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[0002] 전자담배는 타르나 유해성분을 제거하고 니코틴과 각종 향 등을 첨가한 담배액을 가열하여 연기를 발생시킨 후 이를 흡입하는 제품이다.

[0003] 종래의 전자담배는, 액체를 연소시켜 연기를 발생시키는 무화기, 무화기에 설치된 발열부재에 전기를 공급하는 배터리유닛을 포함하며, 솜이나 스폰지에 담배액을 수동으로 몇 방울 떨어뜨리는 방식과 카트리지에 담배액을 저장하고 담배액이 낙하하는 카트리지 방식이 있다.

[0004] 솜이나 스폰지에 사용자가 담배액을 떨어뜨리는 방식은 솜의 양이나 솜의 밀도에 따라 솜에 흡수되는 담배액의 양이 달라지고, 솜이나 스폰지로 인해 발생되는 오염의 문제도 있었다.

[0005] 카트리지 방식의 경우에는 증력에 의해 카트리지에서 담배액이 솜이나 스폰지에 공급되거나 유리섬유에 공급되는 방식이다. 그러나, 사용자의 습관에 따라 또는 카트리지 내부의 담배액이 저장되어 있는 양에 따라, 또는 카트리지에 형성된 담배액 배출구멍의 오염 여부에 따라 발열코일로 담배액이 원활하게 공급되지 못하는 현상이 자주 발생하였으며, 불충분한 양의 담배액이 발열코일에 공급될 경우 발열코일이 타거나 오염되는 현상이 발생하였다. 또한, 카트리지에 형성된 담배액 배출구를 통해 직접 무화기의 유리섬유 및 발열코일로 담배액이 한 방울씩 떨어지는 구조이므로, 장시간 사용하지 않을 경우 또는 사용자의 사용습관에 의해 필요 이상으로 과다한 담배액이 유리섬유 공급될 수 있으며, 이 경우에는 유리섬유를 넘쳐 하부에 있는 공기구멍으로 담배액이 누수되는 현상이 발생하는 경우가 있었다.

고안의 내용

해결하려는 과제

[0006] 본 고안의 목적은 상술한 문제점을 해결하기 위한 것으로서, 카트리지로부터 항상 충분하고 적정한 담배액이 발열부재로 공급되고, 공기구멍을 통한 담배액의 누수 염려가 없는 전자담배를 제공하는 데 있다.

[0007] 또한, 본 발명의 다른 목적은 담배연기를 흡입하는 중에도 수시로 편리하게 흡입되는 공기양을 조절할 수 있는 전자담배를 제공하는 데 있다.

과제의 해결 수단

[0008] 상술한 목적을 달성하기 위한 본 고안의 전자담배는, 사용자가 입에 대고 담배연기를 흡입하는 흡입캡, 상기 흡입캡과 연결되며 담배액을 저장하는 액카트리지, 상기 담배액 카트리지의 하부에 연결되며, 흡수부재 및 상기 흡수부재와 접촉된 발열부재를 구비한 무화기 및, 상기 무화기의 하단에 연결되어 상기 발열부재에 전기를 공급하는 배터리유닛을 포함하며, 상기 무화기는 몸체의 측면에 개구가 형성되고 상기 개구를 통해 흡수부재가 돌출되어 있으며, 상기 카트리지와 상기 무화기를 결합 시 상기 흡수부재의 적어도 일부가 상기 카트리지에 저장된 담배액에 담궈지는 것을 특징으로 한다.

[0009] 상기 배터리유닛의 상부 돌출판에는 상기 무화기의 내부공간과 연통된 공기구멍이 형성되어 있으며, 상기 공기구멍을 개폐정도를 조절하는 공기조절부재를 더 포함하는 것이 바람직하다.

[0010] 상기 공기조절부재는 링형상의 링몸체, 상기 공기구멍을 조절하는 조절판 및 상기 조절판의 일측으로 돌출된 조절노브를 포함할 수 있다.

[0011] 상기 카트리지는 상부가 밀폐되고 하부가 개방된 형상이며, 중앙에 담배연기가 배출되는 중앙파이프가 설치되는 것이 바람직하다.

[0012] 상기 카트리지에 저장된 담배액의 양을 확인할 수 있도록 상기 카트리지는 일측에 투명창이 형성되는 것이 바람직하다.

고안의 효과

[0013] 본 고안의 전자담배는, 카트리지에 저장된 담배액에 흡수부재가 항상 담궈져 있으므로 흡수부재에 담배액을 항

상 충분히 머금고 있으며 충분한 담배연기를 생성할 수 있고, 사용자의 만족감을 높일 수 있다.

[0014] 또한, 본 고안은 종래기술과 같이 카트리지에서 담배액이 낙하되는 구조가 아니라 담배액에 담궈져 있는 흡수부재의 삼투압에 의해 담배액을 흡수하는 구조이므로 흡수부재가 머금을 수 있는 담배액 이상으로 담배액이 흡수되지 않으며, 따라서 장시간 전자담배를 사용하지 않더라도 담배액이 공기구멍으로 누수되는 현상은 발생되지 않는다.

[0015] 또한, 본 고안은 담배액에 담궈져 있는 흡수부재가 담배액을 흡수하기 때문에 이를 감싸고 있는 발열코일에 항상 담배액이 충분히 공급되고, 종래기술의 카트리지 배출구멍으로 담배액이 낙하되는 구조에서 카트리지 배출구멍의 오염될 경우 종종 발생하였던 발열코일이 타거나 오염될 우려가 없다.

[0016] 또한, 본 고안의 전자담배는, 공기가 유입되는 공기입구를 공기조절부재를 이용하여 조절할 수 있으므로, 사용자의 취향에 따라 흡입력을 조절할 수 있으며, 베터리유닛에 공기조절부재가 배치되어 있음으로 인해 전자담배를 피우는 중에도 손쉽게 조절노브를 움직여 자신에 맞는 흡입력을 조절할 수 있는 장점이 있다.

도면의 간단한 설명

[0017] 도 1은, 본 고안의 일 실시 예에 따른 전자담배의 사시도이고,

도 2는, 도 1에 도시된 전자담배의 분해 사시도이고,

도 3 은, 도 1에 도시된 전자담배의 단면도이다.

고안을 실시하기 위한 구체적인 내용

[0018] 이하, 첨부된 도면들을 참조하여 본 고안의 일 실시 예에 따른 전자담배(10)를 자세히 설명한다.

[0019] 도 1 내지 도 3을 참조하면, 본 고안의 일 실시예에 따른 전자담배(10)는, 흡입캡(20), 카트리지(30), 무화기(50), 배터리유닛(90) 및 공기조절부재(70)를 포함한다.

[0020] 흡입캡(20)은 내부에 통로(25)가 형성되어 있으며, 카트리지(30)의 상부에 결합 및 분리 가능하다.

[0021] 카트리지(30)는, 중앙파이프(34)가 중심부에 수직으로 배치되어 있으며, 담배액(33)을 저장한다. 카트리지(30)의 상단은 밀폐되어 있고, 하단은 오픈된 구조이다. 따라서, 무화기(50)를 분리하고자 할 때는 카트리지(30)를 거꾸로 든 상태에서 분리해야 저장된 담배액(33)이 쏟아지지 않는다.

[0022] 무화기(50)는 카트리지(30)의 하단에 분리 가능하게 나사 결합되며, 몸체(57), 흡수부재(51) 및 발열부재(52)를 포함한다. 몸체(57)의 외주면에는 카트리지(30)와 나사결합을 위한 나사산(58)이 형성되어 있으며, 나사산(58)을 기준으로 하부몸체(56)와 상부몸체(55)로 구분할 수 있다. 상부몸체(55)의 상담에는 오프닝(59)이 형성되어 있고 측면에는 대칭으로 개구(53)가 형성되어 있다. 오프닝(59)은 중앙파이프(34)의 하단과 연결된다. 흡수부재(51)는 본 실시예에서 유리섬유로 구성되며 무화기(50) 내부공간에서 양측 개구(53) 밖으로 돌출 설치되어 있고, 흡수부재(51)는 양측 개구(51)가 밀폐되도록 개구(53)를 꽉 채워 설치된다. 따라서, 상기 개구(53)를 통해 담배액이 무화기(50) 내부공간으로 유입될 수는 없고 유리섬유(53)의 삼투압에 의한 흡수력에 의해에만 흡수된다. 발열부재(52)는 발열코일로 구성되어 있으며, 상기 유리섬유(51)를 감싸는 구조이며 유리섬유에 충분한 열을 전달할 수 있는 구조이다.

[0023] 배터리유닛(90)은 무화기(50)의 하단에 연결되며, 내부에 배터리(미도시)와 베터리를 무화기(50)로 공급하거나 차단시키는 스위치(92)를 구비한다. 상부에는 돌출관(94)과 나사산(95)이 구비되어 있다. 돌출관(94)에는 수평방향으로 길게 장홀형상으로 형성된 공기구멍(93)이 있으며, 공기구멍(93)은 무화기(50)의 내부공간과 연통되어 있다.

[0024] 공기조절부재(70)는, 링형상으로 링몸체(73), 조절판(72) 및 조절노브(71)를 포함한다. 링몸체(73)는 배터리유닛(90)의 돌출관(94)에 접촉되어 회전될 수 있으며, 조절판(73)은 상기 공기구멍(93)을 막는 판으로서 링몸체(73)와 연결되어 있다. 조절노브(71)는 사용자가 손으로 잡고 회전시킬 수 있도록 사각형 형태로 돌출되어 있으며 상단에 미세한 미끄럼 방지홈(75)이 형성되어 있다.

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[0025] 이하, 첨부된 도 1 내지 도 3을 참조하여 상술한 본 고안의 일 실시예에 따른 전자담배(10)의 작동관계를 설명한다.

[0026] 도 1 및 도 3과 같이, 카트리지(30)와 무화기(50)가 연결되면, 무화기(50)의 측면으로 돌출된 유리섬유(51)는 카트리지(30)에 저장되어 있는 담배액(33)에 담궈진다. 담배액(33)은 삼투압에 의한 유리섬유(51)의 흡수력에 의해 자연스럽게 유리섬유(51)로 흡수되고 유리섬유는 항상 자신이 흡수할 수 있는 만큼의 충분한 담배액을 함유하고 있는 상태를 유지하고, 담배액의 농도의 평행이 이루어지면 더 이상 담배액이 유리섬유(51)로 흡수되지 않는다. 따라서, 유리섬유(51)는 항상 적정한 양의 담배액을 머금고 있으며 장시간 사용하지 않더라도 담배액(33)이 흘러내리지 않는다.

[0027] 사용자가 스위치(92)를 누르면 순간적으로 무화기(50)의 발열코일(52)로 전기가 공급되고 발열코일(52)에 감싸져 있는 유리섬유(51)는 가열되며, 유리섬유(51)가 함유하고 있는 담배액은 기화되어 무화기 내부공간(61)에는 충분한 담배연기(54)가 생성된다. 생성된 담배연기(54)는 사용가가 흡입할 경우 무화기(50) 내부공간(61)에서 중앙파이프(34) 및 흡입캡(20)의 통로(25) 및 2중필터(27)를 지나 사용자의 입속으로 들어간다. 2중필터(27)는 담배연기와 함께 올라오는 불순물을 제거한다.

[0028] 유리섬유(51)의 일부가 항상 담배액(33)에 담궈져 있는 상태이므로, 카트리지(30)에 저장된 담배액(33)의 많고 적음에 관계없이 유리섬유(51)는 항상 담배액을 흡수할 수 있고 유리섬유에는 항상 충분한 담배액이 함유되어 있다. 따라서, 발열코일(52)도 항상 담배액과 접촉되어 있으며, 담배액의 불충분한 공급으로 인한 발열코일(52)의 오염 및 타는 현상은 발생하지 않는다.

[0029] 또한, 유리섬유(51)에 담배액이 자유낙하하여 떨어지는 구조가 아니라, 유리섬유(51)의 삼투압에 의해 유리섬유가 머금을 수 있는 양만큼만 담배액을 흡수하여 함유하기 때문에 기존의 필요 이상으로 낙하되어 유리섬유를 넘쳐흘러 공기구멍으로 담배액이 누수되는 현상은 발생되지 않는다.

[0030] 사용자가 흡입되는 공기의 양을 조절하고 자할 때에는 공기조절부재(70)의 조절노브(71)를 좌우로 회전시키면 된다. 도 1에서 조절노브(71)를 좌측으로 회전시킬 때에는 공기구멍(93)을 더 막게 되어 흡입되는 공기의 양이 줄어들고, 우측으로 회전시킬 때에는 절단부(77)에 의해 개방되는 공기구멍(93)의 크기가 늘어나므로 흡입공기의 양이 늘어난다. 따라서, 사용자의 자신이 원하는 흡입력에 맞추어 공기의 양을 손쉽게 조절할 수 있다. 특히 공기조절부재(70)가 배터리유닛에 장착되는 구조이므로, 사용자가 전자담배(10)를 피우는 중에도 자신에 맞는 흡입력을 조절해 가면서 필수 있는 장점이 있다.

[0031] 이상, 본 고안의 원리를 예시하기 위한 바람직한 실시 예와 관련하여 도시하고 또한 설명하였으나, 본 고안은 그와 같이 도시되고 설명된 그대로의 구성 및 작용으로 한정되는 것이 아니다. 오히려 첨부된 실용신안등록청구범위의 사상 및 범주를 일탈함이 없이 본 고안에 대한 다수의 변경 및 수정 가능함을 당업자들은 잘 이해할 수 있을 것이다. 따라서, 그러한 모든 적절한 변경 및 수정과 균등물들도 본 고안의 범위에 속하는 것으로 간주 되어야 할 것이다.

부호의 설명

[0032] 10: 전자담배

20: 흡입캡

30;카트리지

34:중앙파이프

50:무화기

51:흡수부재(유리섬유)

52;발열부재(발열코일)

70:공기조절부재

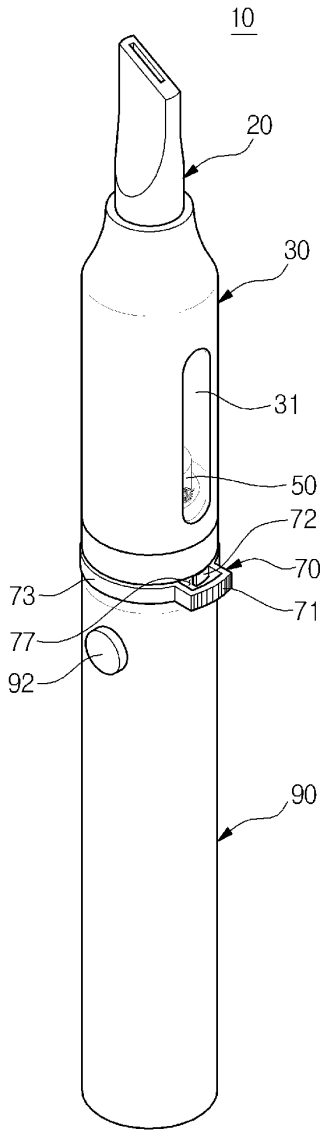
90:배터리유닛

93:공기구멍

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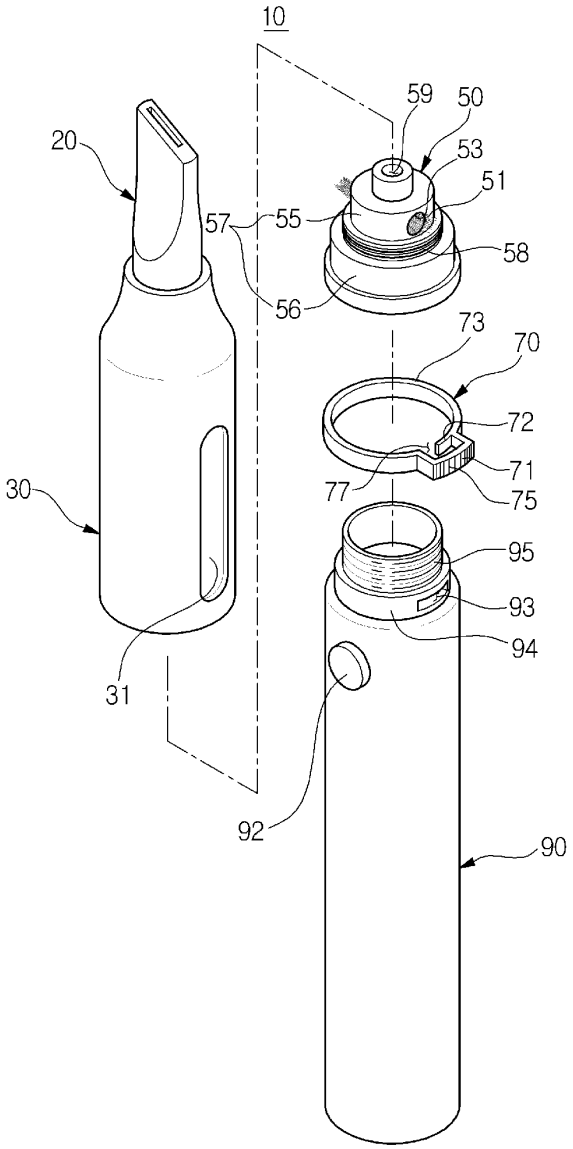
도면

도면1



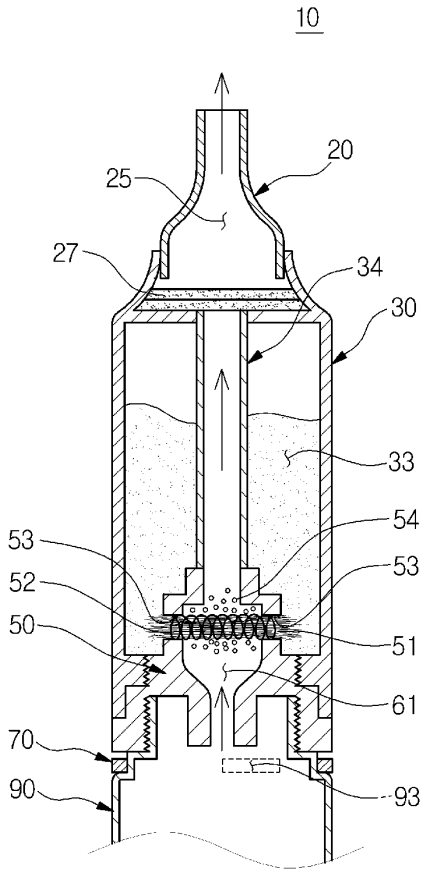
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도면2



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도면3



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ABSTRACT KR20120008751

An electronic cigarette is started. The disclosed electronic cigarette is a suction cap for the user to inhale tobacco smoke, the suction cap is connected to the suction cap and stores the tobacco liquid cartridge, the case surrounding the tobacco liquid cartridge, connected to the lower portion of the tobacco liquid cartridge and absorbed An atomizer having a member and a heat generating member in contact with the absorbing member, and a battery unit connected to a lower end of the atomizer to supply electricity to the heat generating member, wherein a tobacco liquid is supplied to a bottom surface of the tobacco liquid cartridge And a liquid discharge pipe which is installed inside the liquid discharge pipe, wherein the tobacco liquid is discharged to the absorbing member through the liquid discharge pipe and the liquid guide member.

전자담배가 개시된다. 개시된 전자담배는 사용자가 입에 대고 담배연기를 흡입하는 흡입캡, 상기 흡입캡과 연결되며 담배액을 저장하는 담배액카트리지, 상기 담배액카트리지를 감싸는 케이스, 상기 담배액 카트리지의 하부에 연결되며 흡수부재 및 상기 흡수부재와 접촉된 발열부재를 구비한 무화기 및, 상기 무화기의 하단에 연결되어 상기 발열부재에 전기를 공급하는 배터리유닛을 포함하며, 상기 담배액카트리지의 저면에는 담배액이 공급되는 액배출파이프와, 상기 액배출파이프의 내부에 설치된 액유도부재를 포함하며, 상기 담배액이 상기 액배출파이프와 상기 액유도부재 사이를 통해 상기 흡수부재로 배출되는 것을 특징으로 한다.

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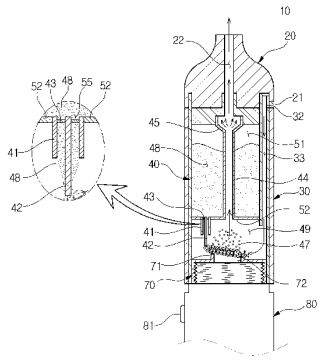
전체 청구항 수 : 총 6 항

(54) 고안의 명칭 전자담배

(57) 요 약

전자담배가 개시된다. 개시된 전자담배는 사용자가 입에 대고 담배연기를 흡입하는 흡입캡, 상기 흡입캡과 연결되며 담배액을 저장하는 담배액카트리지, 상기 담배액카트리지를 감싸는 케이스, 상기 담배액 카트리지의 하부에 연결되며 흡수부재 및 상기 흡수부재와 접촉된 발열부재를 구비한 무화기 및, 상기 무화기의 하단에 연결되어 상기 발열부재에 전기를 공급하는 배터리유닛을 포함하며, 상기 담배액카트리지의 저면에는 담배액이 공급되는 액배출파이프와, 상기 액배출파이프의 내부에 설치된 액유도부재를 포함하며, 상기 담배액이 상기 액배출파이프와 상기 액유도부재 사이를 통해 상기 흡수부재로 배출되는 것을 특징으로 한다.

대 표 도 - 도2



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실용신안 등록청구의 범위

청구항 1

사용자가 입에 대고 담배연기를 흡입하는 흡입팁;

상기 흡입캡과 연결되며 담배액을 저장하는 담배액카트리지;

상기 담배액카트리지를 감싸는 케이스;

상기 담배액 카트리지의 하부에 연결되며, 흡수부재 및 상기 흡수부재와 접촉된 발열부재를 구비한 무화기; 및,

상기 무화기의 하단에 연결되어 상기 발열부재에 전기를 공급하는 배터리유닛;을 포함하며,

상기 담배액카트리지의 저면에는 담배액이 공급되는 액배출파이프와, 상기 액배출파이프의 내부에 설치된 액유도부재를 포함하며, 상기 담배액이 상기 액배출파이프와 상기 액유도부재 사이를 통해 상기 흡수부재로 배출되는 것을 특징으로 하는 전자담배.

청구항 2

제 1 항에 있어서,

상기 담배액카트리지는 내부공간을 담배액저장공간과 연기생성공간으로 구분하는 분리막을 더 포함하며, 상기 흡수부재는 상기 액유도부재와 접촉된 것을 특징으로 하는 전자담배.

청구항 3

제 1 항에 있어서,

상기 담배액카트리지의 내부 일측에는 공기유입유로 및 공기입구를 더 포함하는 것을 특징으로 하는 전자담배.

청구항 4

제 3 항에 있어서,

상기 흡입캡의 일 측에는 오목부가 형성되고, 상기 흡입캡을 돌려 여닫아 조절함으로써 상기 공기입구의 개폐량을 조절하는 것을 특징으로 하는 전자담배.

청구항 5

제 1항 내지 제 4 항 중 어느 한 항에 있어서,

상기 담배액카트리지의 중앙부에는 연기흡입파이프가 설치되고, 상기 연기흡입파이프에는 확관부를 포함하는 것을 특징으로 하는 전자담배.

청구항 6

제 5 항에 있어서,

상기 케이스의 일측에는 투명창이 형성되어 있으며, 상기 담배액카트리지는 투명한 재질로 구성된 것을 특징으로 하는 전자담배.

첨 부 서

기술분야

[0001] 본 고안은 전자담배에 대한 것으로서, 담배액의 공급이 일정하고 구조가 개선된 전자담배에 관한 것이다.

배경기술

[0002] 전자담배는 타르나 유해성분을 제거하고 니코틴과 각종 향 등을 첨가한 담배액을 가열하여 연기를 발생시킨 후 이를 흡입하는 제품이다.

[0003] 종래의 전자담배는, 니코틴이 함유된 담배액을 저장하는 담배액카트리지와, 액체를 연소시켜 연기를 발생시키는 무화기, 무화기의 발열체에 전기를 공급하는 배터리유닛으로 구성되며, 이와 같은 종래의 전자담배는 등록실용신안 제0453424호 및 공개실용신안 공개번호 제2011-0002227호 등에 개시되어 있다.

[0004] 그러나, 상기 개시된 종래의 전자담배들은 담배액을 저장하고 있는 담배액카트리지에 담배액이 많을 경우에는 한 번에 많은 담배액이 무화기로 공급되고 담배액이 적게 남은 경우에는 너무 적은 양의 담배액이 무화기로 공급되는 현상이 있어 담배액의 공급이 불규칙하여 담배연기의 발생이 원활하지 못한 단점이 있었다.

[0005] 또한, 공기구멍으로 담배액이 누수되는 현상이 발생되는 경우가 있고, 가열된 담배연기가 사용자의 입으로 배출되는 과정에서 결로된 불방울이 사용자의 입으로 들어가면서 전자담배 사용자에게 불쾌감을 유발하는 문제점이 있었다.

고안의 내용

해결하려는 과제

[0006] 본 고안의 목적은 상술한 문제점을 해결하기 위한 것으로서, 항상 일정하고 규칙적으로 담배액이 공급되는 전자담배를 제공하는 데 있다.

[0007] 또한, 본 발명의 다른 목적은 공기구멍을 통한 담배액의 누수가 없으며 결로된 물방울이 사용자의 입으로 상승되는 문제점이 해결된 전자담배를 제공하는 데 있다.

과제의 해결 수단

[0008] 상술한 목적을 달성하기 위한 본 고안의 전자담배는, 사용자가 입에 대고 담배연기를 흡입하는 흡입캡, 상기 흡입캡과 연결되며 담배액을 저장하는 담배액카트리지, 상기 담배액카트리지를 감싸는 케이스, 상기 담배액 카트리지의 하부에 연결되며 흡수부재 및 상기 흡수부재와 접촉된 발열부재를 구비한 무화기 및, 상기 무화기의 하단에 연결되어 상기 발열부재에 전기를 공급하는 배터리유닛을 포함하며, 상기 담배액카트리지의 저면에는 담배액이 공급되는 액배출패이프와, 상기 액배출패이프의 내부에 설치된 액유도부재를 포함하며, 상기 담배액이 상기 액배출파이프와 상기 액유도부재 사이를 통해 상기 흡수부재로 배출되는 것을 특징으로 한다.

[0009] 상기 담배액카트리지는 내부공간을 담배액저장공간과 연기생성공간으로 구분하는 분리막을 더 포함하며, 상기 흡수부재는 상기 액유도부재와 접촉되는 것이 바람직하다.

[0010] 상기 담배액카트리지의 내부 일측에는 공기유입유로 및 공기입구를 더 포함할 수 있다.

[0011] 상기 흡입캡의 일 측에는 오목부가 형성되고, 상기 흡입캡을 좌우로 돌려 조절함으로써 상기 공기입구의 개폐량을 조절하도록 구성할 수 있다.

[0012] 상기 담배액카트리지의 중앙부에는 연기흡입파이프가 설치되고, 상기 연기흡입파이프에는 확관부를 포함하는 것이 바람직하다.

[0013] 상기 케이스의 일측에는 투명창이 형성되어 있으며, 상기 담배액카트리지는 투명한 재질로 구성될 수 있다.

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고안의 효과

[0014] 본 고안의 전자담배는, 담배액카트리지 저면에 액배출파이프와 액유도부재를 두어 담배액의 양에 상관없이 항상 일정한 양이 규칙적으로 무화기에 공급되므로 항상 충분하고 일정한 담배연기가 생성되는 효과가 있다.

[0015] 또한, 본고안의 전자담배는, 공기입구가 담배액카트리지의 상부에 있고 공기가 상부에서 하부로 유입되는 구조이므로, 담배액이 공기입구를 통해 누수되는 현상이 발생되지 않는다.

[0016] 또한, 본 고안의 전자담배는, 연기흡입파이프에 확관부를 두어 결로된 물방울이 사용자의 입까지 상승되지 못하도록 하므로, 사용자의 만족감을 높일 수 있다.

[0017] 또한, 본 고안의 전자담배는, 공기가 흡입되는 공기흡입구의 개폐량을 조절하여 공기의 양을 조절할 수 있는 장점이 있다.

도면의 간단한 설명

[0018] 도 1은, 본 고안의 일 실시 예에 따른 전자담배의 분해사시도이고,

도 2는, 도 1에 도시된 전자담배가 조립된 상태에서의 단면도이고,

도 3 은, 도 1에 도시된 전자담배의 액배출파이프를 잘라 하부에서 상부방향으로 바라본 단면도이다.

고안을 실시하기 위한 구체적인 내용

[0019] 이하, 첨부된 도면들을 참조하여 본 고안의 일 실시 예에 따른 전자담배(10)를 자세히 설명한다.

[0020] 도 1 및 도 2를 참조하면, 본 고안의 일 실시예에 따른 전자담배(10)는, 흡입캡(20), 케이스(30), 담배액카트리지(40), 무화기(70) 및 배터리유닛(80)을 포함한다.

[0021] 흡입캡(20)은 수직으로 통기공(22)이 형성되어 있고, 통기공(22)을 통해 담배연기가 사용자의 입으로 유입된다. 흡입캡(20)의 일측 하부에는 오목하게 들어간 오목부(21)형성되어 있다.

[0022] 케이스(30)는, 내부를 들여다 볼 수 있는 투명창(31)이 형성되어 있으며, 투명창(31)을 제외한 나머지 부분은 불투명하게 구성된다.

[0023] 담배액카트리지(40)는, 공기흡입유로(33), 공기입구(32), 분리막(52), 액배출파이프(41), 액유도부재(42), 연기흡입파이프(44), 확관부(45)를 포함한다. 공기흡입유로(33)는 담배액카트리지(40)의 내부 일측에 수직 파이프 형상으로 형성되어 있으며, 공기입구(32)는 공기흡입유로(33) 상부 일측 즉 담배액카트리지 상부에 상하 방향으로 길게 형성된다. 분리막(52)은 담배액저장공간(51)과 연기생성공간(49)으로 담배액카트리지 내부공간을 구획한다. 액배출파이프(41)는 담배액카트리지(40)의 저면 즉 분리막(52)에 형성된 액배출구(55, 도 3참조)와 연결되어 있고 분리막(52)의 하방으로 일정길이 연장되어 있다. 액유도부재(42)는 액배출파이프(41)의 내부에 중심에 설치되어 있으며 지지부재(43)에 의해 액배출파이프(41)와 연결된다. 액유도부재(42)는 액배출파이프(41)의 길이 보다 길며, 하단부가 후술되는 흡수부재(71)와 접촉된다. 연기흡입파이프(44)는 담배액카트리지(30) 중앙에 배치되어 있으며, 하부는 연기생성공간(49)과 연통되고 상부는 통기공(22)과 연통된다. 확관부(45)는 연기흡입파이프(44)의 상단에서 파이프의 내경이 갑자기 확대되는 부분으로서 상승되는 담배연기의 속도 및 온도를 급격하게 낮춘다.

[0024] 무화기(70)는 배터리유닛(80)으로부터 전기를 공급받아 담배액(48)을 가열하여 담배연기를 생성하는 것으로서, 흡수부재(71)와 발열부재(72)를 포함한다. 흡수부재(71)는 도 1 및 도 2를 참조하면, 유리섬유로 구성되고, 발열부재(72)는 유리섬유를 감싸는 발열코일로 구성되어 있다. 유리섬유(71)는 경사지게 배치되고, 발열코일(72)은 배터리(미도시)와 전기적으로 연결된다.

[0025] 배터리유닛(80)에는 내부에 배터리(미도시)가 내장되어 있고, 측면에 무화기(70)로 전기공급을 온/오프하는 스위치(81)가 배치되어 있다. 발열코일(72)과 배터리유닛(80) 간의 전기적인 연결 및 스위치(81)의 배치 및 작동관계는 이미 잘 알려진 종래의 기술이며 본 고안의 요지가 아니므로 자세한 설명을 생략한다.

[0026] 이하에서는 도 1 내지 도 3을 참조하여, 상술한 본 고안의 일 실시 예에 따른 전자담배(10)의 작동관계를 자세

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히 설명한다.

[0027] 담배액카트리지(40)에 저장된 담배액(48)은 중력에 의해 액배출구(55)를 통해 액배출파이프(41)와 액유도부재(42) 사이의 공간으로 유입되면서 담배액(48)의 표면장력에 의해 담배액의 낙하속도는 현저히 저하된다. 표면장력과 중력 간의 힘에 의해 담배액은 액배출파이프(41)와 액유도부재(42) 사이의 공간과 액유도부재(42)의 외주면에 머물러 있으며, 도 2의 확대부분의 도면과 같이 액유도부재(42)의 단부에서 유리섬유(71)에 의해 일정한 액만큼씩 흡수된다. 표면장력에 의해 담배액은 액유도부재의 단부에서 스스로 낙하되지 못하고, 접촉되어 있는 유리섬유(71)의 흡수력(삼투압)과 흡입압(압력)에 의해 유리섬유(71)로 흡수되는 것이므로 흡입을 할 경우에만 유리섬유에 흡수되고 사용을 하지 않을 시에는 거의 흡수되지 않는다.

[0028] 사용자가 스위치를 누르면 발열코일(72)이 가열되고 유리섬유(71)에 흡수된 담배액이 가열되어 담배연기(47)가 생성되고 유리섬유(71)에는 증발된 만큼 담배액이 줄어들게 된다. 생성된 담배연기를 사용자가 빨아들이면, 빨아들이는 흡입력과 유리섬유(71)의 흡수력에 의해 담배액은 액유도부재(42) 단부로부터 유리섬유(71)로 이동하게 되며, 유리섬유(71)에 어느정도 담배액이 흡수되면 더 이상의 흡입력이 제공되지 않는 한 담배액은 더 이상 유리섬유(71)로 흡수되지 않는다. 따라서, 항상 일정한 양의 담배액이 유리섬유(71)에 공급되고 저장된 담배액의 많고 적음에 거의 영향을 받지 않는다.

[0029] 사용자가 담배연기를 빨아들일 때, 공기는 담배액카트리지(40)에 형성된 공기입구(32) 및 공기흡입유로(33)를 통해 연기생성공간(49)으로 유입된후, 담배연기(47)와 함께 연기흡입파이프(44), 확관부(45) 및 통기공(22)을 통해 사용자의 입으로 유입된다. 담배생성공간(49)에서 온도가 높았던 담배연기(47)는 상승하면서 온도가 내려가게 되고 물방울로 응결되는 결로현상이 발생한다. 그러나 결로된 물방울은 공간이 넓어지는 확관부(45)에 와서는 물방울 자중에 의해 더이상 상승하지 못하고 확관부(45)의 내벽에 맺히게 되고 담배연기만 통기공(22)을 통해 사용자의 입으로 들어간다.

[0030] 도 2는 흡입캡(20)을 좌로 돌려 닫음으로써 공기입구에 유입되는 공기량을 줄인 것이나, 흡입캡(20)을 좀 덜 닫을 경우 공기입구(32)로 유입되는 공기량이 늘어난다. 즉, 사용자는 흡입캡(20)이 담배액카트리지(30) 공기입구의 규격을 조절함으로써 유입되는 공기량을 조절할 수 있다.

[0031] 이상, 본 고안의 원리를 예시하기 위한 바람직한 실시 예와 관련하여 도시하고 또한 설명하였으나, 본 고안은 그와 같이 도시되고 설명된 그대로의 구성 및 작용으로 한정되는 것이 아니다. 오히려 첨부된 실용신안등록청구범위의 사상 및 범주를 일탈함이 없이 본 고안에 대한 다수의 변경 및 수정 가능함을 당업자들은 잘 이해할 수 있을 것이다. 따라서, 그러한 모든 적절한 변경 및 수정과 균등물들도 본 고안의 범위에 속하는 것으로 간주 되어야 할 것이다.

부호의 설명

[0032] 10: 전자담배

20: 흡입캡

30;케이스

32:공기입구

33:공기흡입유로

40;담배액카트리지

41:액배출파이프

42:액유도부재

44:연기흡입파이프

45;확관부

52:분리막

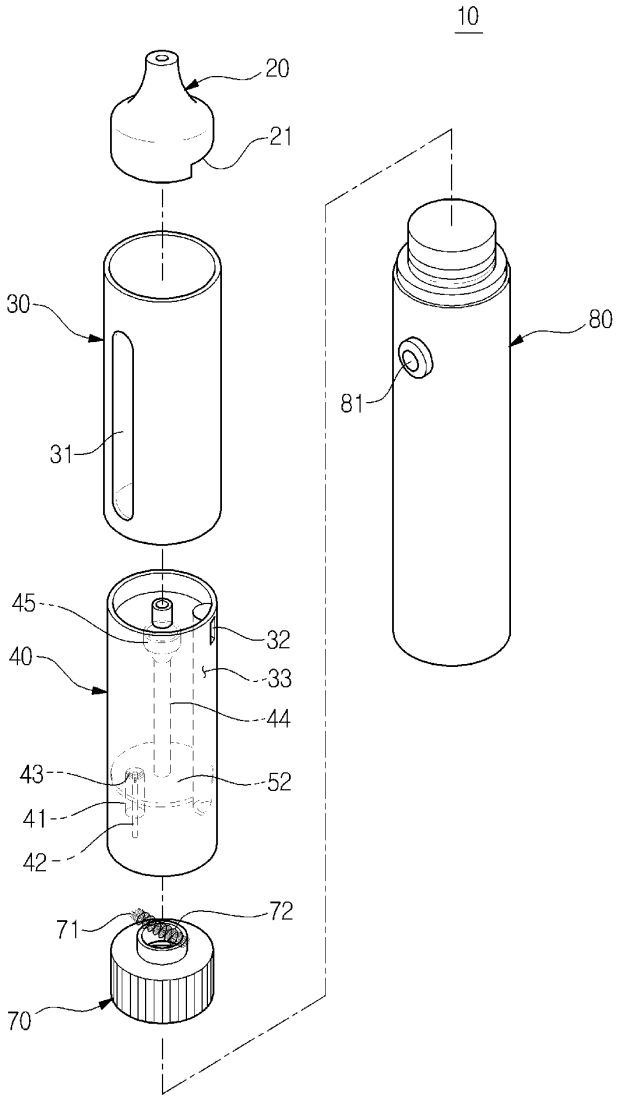
70:무화기

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80:배터리유닛

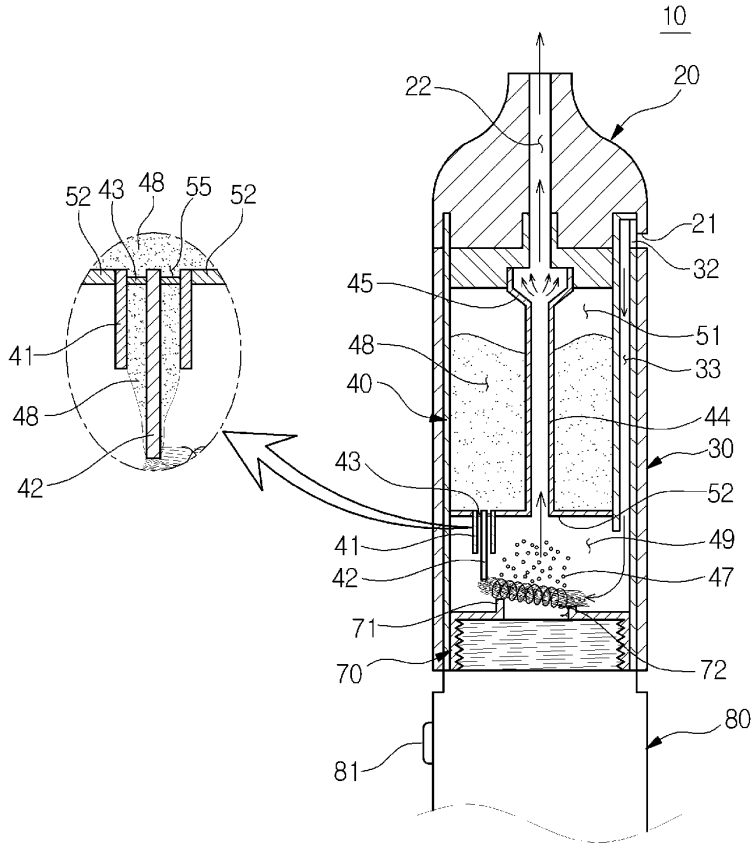
도면

도면1

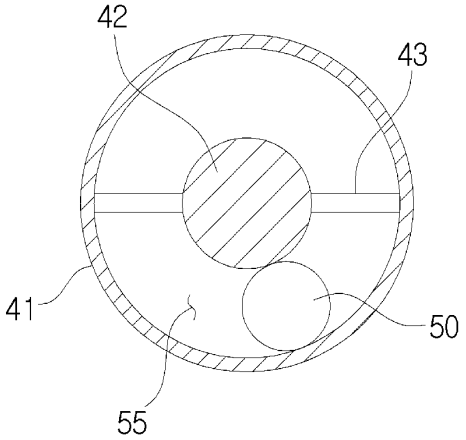


NJOY Exhibit 1002.666

도면2



도면3



NJOY Exhibit 1002.667

Espacenet

Bibliographic data: KR20120113519 (A) — 2012-10-15

CONTAINER OF NICOTINE SOLUTION FOR ELECTRIC CIGARETTE AND ELECTRIC CIGARETTE WITH THE SAME

Inventor(s): LEE YONG YIN [KR] ± (LEE, YONG YIN)

Applicant(s): LEE YONG YIN [KR] ± (LEE, YONG YIN)

Classification: **- international:** ***A24F47/00***
- cooperative: **A24B15/167**; **A24F47/008**; **A61M15/06** more

Application number: KR20110031266 20110405 Global Dossier

Priority number(s): KR20110031266 20110405

Also published as: KR101265170 (B1)

Abstract of KR20120113519 (A)

PURPOSE: A nicotine solution container and electric cigarettes with the same are provided to directly supply external air to a receiving container. CONSTITUTION: An electric cigarette comprises a battery assembly(11), a heater assembly(12), a receiving container(13), and a suction assembly(14). The battery assembly comprises a first housing for power supply, a battery, a printed circuit board, a lighting unit, a cover, and a connector. The heater assembly comprises a coupling unit combined with the connector, a separator, and a heater fixing unit. The receiving container comprises an evaporation room, a storage room, and an evaporation induction tube.

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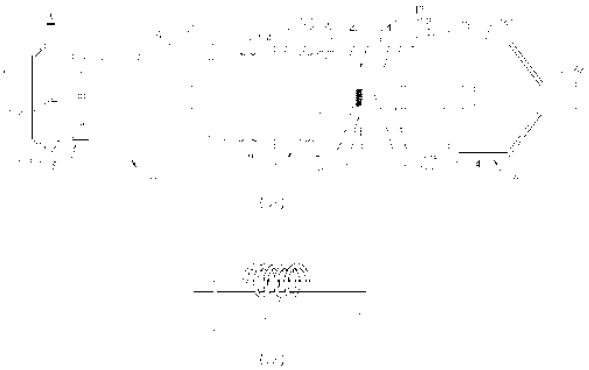
전체 청구항 수 : 총 6 항

(54) 발명의 명칭 **전자담배를 위한 니코틴 용액의 수용 용기 및 이를 가진 전자담배**

(57) 요 약

본 발명은 전자담배를 위한 니코틴 용액의 수용 용기 및 이의 삽입 수용 용기를 가진 전자담배에 관한 것으로, 구체적으로는 용기가 수용 용기로 조립 삽입이 되면서 이의 동시에 기화 가능한 일정량의 니코틴 용액의 이송로 공급될 수 있도록 하는 전자 담배를 위한 니코틴 용액의 수용 용기 및 이를 가진 전자 담배에 관한 것이다. 본 발명에 따르면 조립 삽입될 수 있는 전자담배를 위한 니코틴 용액의 수용 용기는 바디가 수용공간을 가진 몸체(21); 기화 공간과 분리되어 저장 분(132); 기화 분으로부터 저장 분의 이격되고 연장된 기화 슈트부(134); 저장 분(132)의 니코틴 용액을 기화 분(131)으로 공급하기 위한 공급 공로(21); 및 공급 공로(21)와 기화 분(131)을 수동시키는 주입 홀(1n)을 포함하고, 상기 기화 분(131) 외벽의 적어도 일부는 시정 분 외벽과 일체가 되어 공급 몸체(21)와 일체로 된 부분에 형성된다.

대 표 도 - 도1



(a)

(b)

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NJOY Exhibit 1002.670

서버 환경에서 실행

청구항 1

와꾹 챧여 쿠티기 ᄀᆞ성된 ᄀᆞ 있는 켜세안테는 위햔 ᄂᆞ래텐 용어의 ᄀᆞ용 룡ᄀᆌ 있어서,

쿠티기 ᄀᆞ용ᄃᆞᆫᆞ 기화 션(330):

ᄀᆞ쫑 중신ᄒᆞᆫ 뇬ᄐᆡ텐 서정 션(320):

ᄀᆞ쫑 숫ᄋᆞᄂᆡᄒᆞᄂᆡ 서성 션에 의ᄒᆡ 위성된 ᄭᆞᆫᆞ 마ᄂᆞ 션(330):

ᄌᆞ숭 뇬(1020)ᄀᆡ 니ᄉᆡᄉᆡ 숭애ᄒᆞ 기화 뇬(330)ᄋᆞᄂᆞ 솎ᄒᆞᆫᄀᆞ 로ᄒᆞ 솎ᄀᆞ 숭ᄂᆞ(320): 및

솎ᄀᆞ 숭션(320)에 기화 뇬(330)ᄒᆞᆯ ᄉᆞᆼᄉᆞ기는 햔 ᄎᆡ(10)ᄒᆞᆯ 션햔ᄂᆞᆫ 것.

성ᄀᆡ 기화 뇬(330) 챧ᄒᆞᆨ 서ᄒᆞᆫᄂᆞᆫ 위ᄀᆞᄂᆞᆫ 제상 뇬 ᄎᆞ뉘ᄀᆡ 얀서가 ᄂᆞᆫ 솎ᄀᆞ 숭ᄂᆞ(320)ᄂᆞᆫ 얀서ᄂᆞᆫ ᄀᆞ 뇬ᄋᆞ에 형성ᄃᆞᆫᆞ 션옫 ᄉᆞ성ᄋᆞᄂᆞ 요ᄒᆞ ᄌᆞ쿠ᄀᆞᆫᄂᆞᆫ 어ᄒᆞᆫ 니ᄀᆞᄐᆡᆫ 룡에ᄒᆡ ᄀᆞ용 룡기.

청구항 2

청구항 1ᄋᆞ 있어서, 기화 뇬(330)ᄋᆞ 로부ᄐᆞ 숭기ᄒᆞᆫ ᄆᆞ옫서가ᄀᆞ 숭기 ᄀᆡ위 밑ᄇᆞᆫᆞ 기ᄌᆞᄀᆞ 옫옫 ᄉᆞ성ᄋᆞᄂᆞ 요ᄒᆞ 켜서 ᄂᆞ뷰ᄂᆞᆫ 요ᄒᆞᆫ 니ᄉᆞᄉᆡ 숭에ᄒᆡ ᄀᆞ용 룡기.

청구항 3

청구항 1ᄋᆞ 있어서, 숭ᄀᆞ ᄆᆞ옫 숭ᄂᆞᆫᄀᆞ 숭기ᄒᆞᆫ ᄆᆞ옫서가ᄀᆞ 숭기 ᄀᆡ위 밑ᄇᆞᆫᆞ 기ᄌᆞᄀᆞ 옫옫 ᄉᆞ성ᄋᆞᄂᆞ 요ᄒᆞ 켜서 ᄂᆞ뷰ᄂᆞᆫ 요ᄒᆞᆫ 니ᄉᆞᄉᆡ 숭에ᄒᆡ ᄀᆞ용 룡기.

청구항 4

ᄆᆡ디ᄋᆞ 어ᄑᆡ케ᄋᆞᄂᆡ션(300):

쿠티 어ᄑᆡ케ᄋᆞᄂᆡ션(300):

와꾹 챧여 쿠티ᄀᆡ기ᄌᆞ 지ᄒᆡ어ᄀᆞᄂᆞ 마ᄂᆞᆨᄋᆞ ᄌᆞ숭 션(320)ᄋᆞ 형성된 ᄀᆞ용 룡기(330):

ᄌᆞ숭 션(320)ᄋᆞᄐᆡᄑᆡ뉴ᄀᆞ ᄀᆞ용 룡기(330)ᄒᆡ 위ᄒᆞᄂᆞ 위성된 기화 마ᄂᆞ 션(330):

ᄀᆞ쫑 ᄆᆞᄂᆞ 햔(1020)에 위ᄌᆡ된 쭌얹 ᄋᆞ석ᄒᆡ티(100): 및

ᄀᆞ용 룡기(330)ᄋᆞᄂᆡ션ᄐᆡ 서정 션(320)ᄋᆞᄂᆞ 니ᄀᆞᄐᆡ된 룡에ᄋᆞᆫ 중ᄀᆞᄒᆞᆫᄀᆞ 위ᄋᆞᆫ 중ᄀᆞᄀᆞᆫ 밑ᄂᆞᆫ 포ᄋᆞ화ᄒᆞ,

ᄉᆞᄀᆞ 중ᄀᆞᆫ 뇬ᄂᆞᆫᄋᆞ ᄀᆞ용 룡ᄀᆞ(330)화 ᄀᆞᄌᆞ 션(320)ᄋᆞ 빚성ᄒᆞᄋᆞ 중뇬 ᄀᆡ며에 빚성ᄃᆞᆫ 중ᄀᆞᆫ 중ᄇᆞ의 위꾹 챧 ᄂᆞ냄ᄋᆞ 제ᄋᆞ 뇬(330)ᄋᆞ ᄉᆞ 얀ᄂᆞᆫ 룸얹 쭌(300)ᄋᆞ 형성ᄂᆡ 것ᄋᆞ ᄑᆞ성ᄋᆞᄂᆞ 션ᄌᆞ냄ᄀᆞ.

청구항 5

청구항 6

청구항 4ᄋᆞ 있어서, 서정 션(330)에 로ᄂᆞ 중기ᄒᆞᆫ ᄀᆞᄂᆞᄇᆞ 음ᄒᆡ화ᄀᆡ 위ᄋᆞᆫ 중기 음ᄇᆞ기 빚성된 션옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞᆫ 션ᄌᆡ냄ᄒᆡ.

청구항 6

청구항 4에 있어서, 중ᄃᆡ 어ᄑᆡ션ᄃᆡ(320)에 중ᄀᆞ 쇼ᄋᆞᆫ 형ᄋᆞ 빚성된 ᄋᆞᆫ옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞ 켜서ᄒᆞᆫ다.

청구항 7

청구항 6에 있어서, 서정 션(330)ᄋᆞ 로부ᄐᆞ 중기ᄒᆞᆫ ᄀᆞᄂᆞᄇᆞ 음ᄒᆡ화ᄀᆡ 위ᄋᆞᆫ 중기 음ᄇᆞ기 빚성된 션옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞ 켜서ᄒᆞᆫ다.

청구항 8

청구항 4에 있어서, 서정 션(330)ᄋᆞ 로부ᄐᆞ 중기ᄒᆞᆫ ᄀᆞᄂᆞᄇᆞ 음ᄒᆡ화ᄀᆡ 위ᄋᆞᆫ 중기 음ᄇᆞ기 빚성된 션옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞ 켜서ᄒᆞᆫ다.

청구항 9

청구항 4에 있어서, 중ᄃᆡ 어ᄑᆡ션ᄃᆡ(320)에 중ᄀᆞ 쇼ᄋᆞᆫ 형ᄋᆞ 빚성된 ᄋᆞᆫ옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞ 켜서ᄒᆞᆫ다.

청구항 10

청구항 4에 있어서, 중ᄃᆡ 어ᄑᆡ션ᄃᆡ(320)에 중ᄀᆞ 쇼ᄋᆞᆫ 형ᄋᆞ 빚성된 ᄋᆞᆫ옫 ᄉᆞ성ᄋᆞᄇᆞ 하ᄂᆞ 켜서ᄒᆞᆫ다.

방 법 예

[0000] 이 발명은 켜서ᄒᆞ테ᄑᆡ션 장ᄒᆞ 니ᄉᆞᄉᆡ 형ᄋᆞ로 ᄌᆞ숭 중ᄀᆞ 및 어ᄒᆡ 션ᄒᆞᆫ ᄌᆞᄀᆞ 션ᄌᆞ냄ᄃᆞ 포ᄒᆞ 있어 ᄂᆞᆫ. ᄀᆞ쫑ᄋᆞᆫ 중기ᄀᆡ ᄀᆞ용 룡ᄀᆞ서 서ᄒᆞᆫ 중션ᄋᆞ 마ᄋᆞ와 ᄉᆞ서ᄋᆡ 기화 기ᄌᆞ와 인ᄌᆡ셰ᄋᆞ 니ᄀᆞ텐 룡ᄋᆞᄃᆞ 로ᄐᆞ 솎ᄋᆞᄂᆞᆫ 중기ᄒᆞᆫ 션ᄌᆡ 냄ᄃᆞᆫ 로ᄒᆞ 있ᄋᆞ다ᄂᆞᆫ.

배 경 기 술

[0002] 본 명세서는 일반적으로 무선 네트워크에 관한 것이고, 보다 구체적으로는 무선 네트워크에서 액세스 포인트(AP)와 스테이션(STA) 사이의 통신을 위한 방법 및 장치에 관한 것이다. 무선 랜(WLAN) 기술은 무선 주파수 기술을 사용하여 개인 휴대 정보 단말기(PDA), 랩톱 컴퓨터, 휴대용 멀티미디어 플레이어 또는 모바일 폰과 같은 전자 장치가 인터넷에 무선으로 접속할 수 있게 한다. 무선 랜 기술은 IEEE 802.11 표준 세트와 같은 표준 기술 사양에 의해 지원된다. 802.11 표준 세트는 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac, 802.11ad, 802.11af, 802.11ah, 802.11ai, 802.11aj, 802.11aq, 802.11ax, 802.11ay 등을 포함한다. 802.11 표준 세트는 계속 발전하고 있다.

[0003] 802.11ad 표준은 60 GHz 주파수 대역에서 최대 7 Gbps의 데이터 전송률을 지원한다. 802.11ad 표준은 802.11ay 표준에 의해 확장되었다. 802.11ay 표준은 802.11ad 표준과 하위 호환성을 유지하면서 최대 20 Gbps의 데이터 전송률을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 넓은 대역폭을 사용하고, 더 많은 안테나를 사용하며, 더 높은 차수의 변조 방식을 사용한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 공간 스트림을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 채널 본딩을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 MIMO 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔포밍 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 트레이닝 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 추적 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 관리 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 선택 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 조정 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 재조정 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 복구 기술을 지원한다. 802.11ay 표준은 또한 802.11ad 표준보다 더 많은 빔 유지

수용 용기의 다양 생산이 가능하도록 하는데 주된 목적을 가진다.

도면의 간단한 설명

[0013] 도 1은 본 발명에 따른 수용 용기가 적용된 전자레인지의 실시 예를 도시한 것이다.

도 2a는 본 발명에 따른 수용 용기의 실시 예에 대한 분리사시도를 도시한 것이다.

도 2b는 외부 공기 유입이 조절되는 구조에 대한 실시 예 및 히터에 전도성물질이 코팅되는 실시 예를 도시한 것이다.

도 3은 본 발명에 따른 수용 용기가 적용된 전자레인지의 다른 실시 예를 도시한 것이다.

도 4는 본 발명에 따른 수용 용기에 니크롬 용액의 충진되는 구조에 대한 실시 예를 도시한 것이다

도 5는 용기의 진지 탐색의 구조를 개략적으로 도시한 것이다.

발명을 실시하기 위한 구체적인 내용

[0014] 이하에서 본 발명은 첨부된 도면에 도시된 실시 예를 참조하여 상세하게 설명이 되지만 실시 예는 본 발명의 명확한 이해를 위한 것으로 본 발명은 이에 국한되지 않는다.

[0015] 도 1은 본 발명에 따른 수용 용기가 적용된 전자레인지의 실시 예를 도시한 것이다.

[0016] 본 발명에 따른 전자레인지를 위한 니크롬 용액의 수용 용기는 히터가 수용되는 히터 몸(131), 기화 공간을 갖는 시정 부(133), 기화 부(133)으로부터 시정 부(131)의 외부로 연장된 기화 유도 부(134), 시정 부(132)의 니크롬 용액을 기화 몸(131)으로 공급하기 위한 공급 통로(21) 및 공급 통로(21)와 기화 몸(131)을 소통시키는 주입 홀(1a)을 포함한다. 상기 기화 부(131)와의 차이는 입자부 시정 부(132)와의 일체가 되고 공급 통로(21)는 입체로 이루어져 있다.

[0017] 이하에서 구체적으로 설명한다.

[0018] 도 1을 참조하면, 본 발명에 따른 수용 용기가 적용될 수 있는 전자레인지(10)는 전원 공급을 위한 전원 케이블(C), 메뉴(B), 알맞게 설치된 전자기판(133), 버튼(S)에 의하여 전력 공급을 받는 마그네트론(112), 커버(111) 및 외관 부분(114)을 가지는 메인바디(11); 외관 부분(114)에 결합되는 천정 부분(121), 바닥면(123) 및 측면판(122)에 고정되는 히터 고정 부재(124)으로 이루어진 히터 어셈블리(12); 히터 고정 부재(124)에 결합되면서 회전 구동 수단(134)과 함께 설치 결합체(F)를 구성하는 원형 니크롬 용액을 충전하기 위한 주입 홀(1a)을 형성하는 기화 몸(131), 기화 몸(131)에 수용되고 니크롬 용액이 저장되는 저장 부(132) 및 기화 몸(131)으로부터 시정 부(133)의 외부로 연장된 기화 유도 부(134)으로 이루어진 수용 용기(13); 및 기화 부(132)의 다른 쪽 단에 결합되는 제1 공기(141) 및 마우스홀(142)로 이루어진 흡입 어셈블리(14)를 포함한다.

[0019] 메인바디 어셈블리(11)는 필요에 따라 마그네트론(112)의 작동 여부 또는 히터(E)의 작동을 제어하기나 흡입 회수를 계산하기 위한 전자기판(113)을 포함할 수 있다. 조작부(10)는 외부에 설치되는 스위치에 의하여 작동되거나 또는 흡입이 이루 공기 유입이 의하여 작동할 수 있다. 공기 유입에 의하여 작동이 되는 경우 필요에 따라 스위치(S)가 설치될 수 있다.

[0020] 히터의 어셈블리(11)의 기화 어셈블리(12)는 다양한 방법으로 결합할 수 있고 예를 들어 도 1에 도시된 것처럼, 외관 부분(114)과 천정 부분(121)이 형성된 니사 부분(115, 123)에 의하여 서로 결합될 수 있지만 이에 제한되지 않는다.

[0021] 히터 어셈블리(12)의 천정부 부재(123)는 히터 고정 수단(124)을 지지하면서 메인바디 어셈블리(11)의 기화 몸(131)을 밀폐적으로 분리시키는 기능을 가진다. 이와 같은 밀폐적 분리는 기화된 니크롬 용액이 마찰적으로 배출되는 것을 방지하고 또한 검출센서(F)에 작용하는 니크롬 용액의 누설을 방지하고 그리고 메인바디 어셈블리(11)의 내부의 유입된 공기가 제어된 힘으로 기화 부(131)으로 유입될 수 있도록 한다. 본 발명에 제한적인, 외부 공기는 메인바디 어셈블리(11)에 형성된 구멍(도시되지 않음)을 통하여 기화 몸(131)으로 유입되거나 또는 공기 유입 통로(123)를 통하여 기화 부(131)으로 유입될 수 있다.

[0022] 히터 고정 수단(124)은 기화 부(131)의 내부에 히터(H)를 고정하기 위한 것으로 도 1에 도시되지 않았지만 히터 몸이 히터(H)에 전력을 공급하기 위한 전기 연결 단자를 포함할 수 있다. 히터(H)는 니크롬선, 면형 히터 또는 세라믹 히터와 같이 이 분야에서 공지된 히터의 모두 사용될 수 있으며 본 발명은 히터(H)의 종류에 의하여 제한되지

일 수도 있다.

[0023] 기둥 부재(130)는 콘크리트(C)에 의해서 고정된 몸체의 기둥과 연결 홈이 형성되는 콘크리트 몸체 고정부 및 몸체의 상단 에서 돌출되는 고정부 (나)에 의해서 지지되는 형태로 이루어질 수 있으며, 적층 설치(F)의 선택에 따라서는 상기 콘크리트 몸체 고정부 (나)에 지지되는 방식으로 콘크리트 보수 보강 작업이 진행될 수도 있다.

[0024] 기둥 부재(130)에서 기둥의 콘크리트 몸체 고정부 (나)는 철근 콘크리트 구조로 형성 이외에도 다양한 형태로 제작될 수 있다. 기둥 부재(130)의 하부 단부는 기초 콘크리트(200)의 홈부에 삽입 고정되는 형태로 제작되는 것이 바람직하며, 이를 위해 기초 콘크리트(200)의 상부 단부는 기둥 부재(130)의 하부 단부가 삽입 고정될 수 있는 홈부 형태로 제작되는 것이 바람직하다. 기둥 부재(130)의 하부 단부는 기초 콘크리트(200)의 상부 단부에 삽입 고정되는

배출 수직 방향으로 서로 다른 거리를 가지도록 마련될 수 있다. 기화 부(131)의 몸체(131a) 하부 지정 부(132)의 하부면으로부터 이격됨으로 인해 본(31)의 측벽을 형성하는 부분은 수직한 측벽(22a)으로 될 수 있고 지정 부(132)의 하부면 전체 중 수직면(23)의 아래에 넓게 노출될 수 있다. 이와 같은 수직한 측벽(22a)은 기화 부(131)의 측벽 전체로 형성되거나 또는 일부에 형성될 수 있다. 공급 홀(21)는 수직한 측벽(22a)을 따라 기화 부(131)의 측벽에 형성될 수 있다. 더욱으로 도 2a의 (나)의 우측에 부분이 도시되 있지만, 기화 부(131)의 측벽에 기화 부(131)의 길이 방향으로 일정하게 높게 일정 부분(22)이 형성될 수 있다. 공급 홀(21a)는 높게 일정 부분(22)을 따라 형성될 수 있다.

[0033] 공급 홀(21, 21a)는 저장 부(132)의 노즐의 용액을 기화 부(131)으로 전달하기 위해 것으로 원형의 형태을 가지거나 또는 다각형의 형태을 가질 수 있다. 공급 홀(21, 21a)는 동하여 주입되는 노즐의 용액은 유입 홀(21)을 통하여 히터(H)에 공급될 수 있다. 유입 홀(21)에 공급 홀(21, 21a)와 기화 부(131)을 연결하는 튜브 등이 형성될 수 있다. 만약 선유 심유재(F)가 노즐의 용액의 전부 주위의 일부분에 선유 심유재(F)의 일부분 유입 홀(21)을 통하여 공급 홀(21, 21a)로 인입될 수 있다.

[0034] 기화 부(131)에 의해 증기를 배출시키기 위한 증기 배출 홀(133)는 기화 부(131)의 수직 방향에 따라 배출 홀(21a)의 외측 부분에 형성될 수 있지만 한정하지 않는다. 도 2a의 (나)를 참조하면, 실시예에는 메쉬 어셈블리(11), 히터 어셈블리(13), 수용 용기(15) 및 몸체 어셈블리(14)를 포함할 수 있고 경우는 상기 이송 부재(12)와 수용 용기(15)의 상기 부분에 의하여 상기 유입 홀(133)는 상기 부분으로부터 외측 부분(도면에서 아래쪽에 해당)에 위치하게 된다.

[0035] 기화 부(131)의 노즐의 외부 증기를 배출시키는 것은 기화 부(131)의 노즐에서 기화된 노즐의 용액의 외부 증기와 함께 몸체 어셈블리(14)를 경유하여 사람의 입으로 배출될 수 있도록 하기 위함 것이다. 도 2b의 (나)에 도시된 것처럼, 증기 유입 홀(133)는 기화 부(131)의 측벽(C21, C22)에 대하여 경사된 형태로 될 수 있다. 도 2b의 (나)에 도시된 바와는 기화 부(131)의 측벽의 저장 부(132)의 측벽에 대하여 수직한 방향이다. 구체적으로 바깥 측벽(C21)은 저장 하우징(C2)의 노즐에서 저장 부(132)의 측벽에 대응하고 안쪽 측벽(C22)은 기화 부(131)의 측벽이 해당한다. 안쪽 측벽은 위에서 설명한 공급 홀(21, 21a)가 형성된 부분에 해당한다. 상기 유입 홀(133)는 2개의 측벽(C21, C22)을 관통하여 기화 부(131)의 외부와 내부를 연결하는 형태로 될 수 있다. 또한 하나의 측벽(C22)에만 형성된 부분은 상기 유입 홀(133)가 관통이지만은 하나의 측벽(C22)만을 포함하는 형태로 만들어질 수 있다. 필요에 따라 상기 유입 홀(133)에 팬부(FT)가 설치될 수 있다. 팬부(FT)는 외부 증기에서 흡입구의 역할을 하는 방지홀에서 노즐 몸체 방향에서 증기의 유입으로 인하여 소음이 발생하는 것을 방지하기 위하여 설치될 수 있다. 팬부(FT)는 다양 구성의 형태로 만들어질 수 있다.

[0036] 도 2a의 (가)에 도시된 것처럼, 흡입 어셈블리(14)는 저장 부(132)의 한쪽 단에 결합될 수 있는 결합 부분을 가진 외부 케이싱(141a), 기화 부분 부(132)의 반대쪽 끝 부분에 설치될 수 있는 설치 홀(142) 및 기화된 노즐의 용액이 최종적으로 사람의 입으로 흡입되는 것을 방지하도록 하는 이중 공간(143) 및 흡입 노즐(142a)를 포함할 수 있다. 또한 필요에 따라 저장 부(132)에 노즐의 용액이 다시 충전될 수 있는 필터부재(14)는 저장 부(132)의 충전을 위해 여러 기능을 가질 수 있다.

[0037] 도 2b는 본 발명에 따른 기화 부에 유입되는 공기의 양을 조절하는 실시 예, 메쉬 어셈블리로부터 기화 부의 공기를 유입시키기 위한 실시 예 및 심유 집합체(F)가 고정되는 실시 예를 각각 도시한 것이다.

[0038] 도 2b의 (가)를 참조하면, 증기 유입 홀(133a)는 높이 방향 따라 일정 길이만큼 일정한 형태의 길이를 가질 수 있다. 길이의 크기는 조절 길이(C23b)를 가진 조절 수단(23)에 의하여 조절될 수 있다. 조절 수단(24)은 여러 개의 제2 하우징(C2)을 겹치는 형태로 만들어질 수 있고 증기 유입 홀(133a)의 조절 길이(133b)가 일치하는 정도에 따라 증기 유입 홀(133a)에서 증기가 유입되는 양이 조절될 수 있다.

[0039] 도 2b의 (다)를 참조하면, 분리벽(123)에 증기 소통 홀(25)이 형성될 수 있다. 증기 소통 홀(25)은 분리벽(123)을 이격방향에서 위쪽으로 관통하는 형태로 만들어질 수 있고 외측 부분은 몸체부(123)의 표면으로부터 일정 거리만큼 돌출된 형태가 되도록 마련될 수 있다. 이와 같은 돌출된 형태는 히터(H)에 위치하는 심유 집합체(F)에 접촉하는 니코틴 용액의 분리부(123)의 미세한 떨어지지 접촉하게 되어 증기 소통 홀(25)을 통하여 누설되는 것을 방지하기 위한 것이다. 증기 소통 홀(25)의 직경은 예를 들어 0.1 mm 내지 0.5 mm가 될 수 있지만 이에 제한되지 않는다. 증기 소통 홀(25)의 형성 위치 또는 수는 제한이 제한되지 않으며 마찬가지로 메쉬 고정 부재(124)의 내부으로 일정 거리만큼 돌출되어 형성되는 것이 바람직하다. 이는 메쉬부재을 고정할 수 있는 니코틴 용액의 누설을 방지하기 위함 것이다.

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[0040] 도 2b의 (b)에 도시된 실시예, 실시 절합체(F)는 하나 이상의 고정 수단(324)의 일부에 형성된 수용 홈(325)과 지정 슬릿(131)의 고정 돌부(313c)에 형성된 고정 홈(326a)에 의하여 고정될 수 있다. 고정 돌부(131c)는 통상 동조(21, 21a)가 형성된 부분의 아주 미세 돌출 있고 수용 홈(326)과 고정 홈(326a)이 서로 맞물리는 것에 의하여 주체적으로 원활을 형성하고 그리고 전술 검합지(F)의 각 부분의 원활 부분이 고정될 수 있다.

[0041] 제시된 실시 예는 예시적인 것으로 전술검합지(F)는 다양한 방법으로 하부(B)에 고정될 수 있다.

[0042] 도 3은 본 발명에 따른 전자칠판의 다른 실시 예를 도시한 것이다.

[0043] 도 3을 참조하면, 전자칠판은 전체적으로 직사각형의 판면을 가지면서 형성되는 형상을 가질 수 있다. 필요에 따라 일부분 휘어지거나 중간 부분에서 꺾인 형상을 가질 수 있다. 외부 케이싱(31)은 지지력 강화 형상이고 적어도 다르게 용해 표시 부분(32), 비다른 사용 표시 부분(33), 전술 연결 부분(35) 및 연결 마우스피스(33)를 가질 수 있다. 적어도 다르게 용해 표시 부분(32)은 적층 부분의 내부에 적층하는 다르게 용액을 육안으로 식별할 수 있도록 하기 위한 것이고 비다른 사용 표시 부분(35)은 후속 사용 가능한 테두리의 용량을 표시하기 위한 것이다. 연결 마우스피스(33)는 도 3의 중간 부분에 표시된 것과 같은 연장 마우스피스(37)의 연결을 위한 것이며, 일정 마우스피스(37)는 인접 마우스피스(33)에 삽입될 수 있는 인접 소켓(33a), 인접 소켓(33a)으로부터 일정 간격만큼 연장되는 연장 튜브(371), 연장 튜브(371)의 일 부분에 형성된 슈퍼 마우스피스(372)로 이루어질 수 있다. 필요에 따라 슈퍼 마우스피스(372)의 일부에 일정한 고정 돌기(373)가 형성될 수 있다. 이외의 다른 용액은 연결 마우스피스(33)로 슈퍼되어 연장 튜브(371)를 경유하여 슈퍼 마우스피스(372)로 주입될 수 있다. 일정 마우스피스(37)는 이를 통해 적층을 하면서 확인을 하기 위한 것으로 통상적 투명의 경우 연결 마우스피스(33)를 통하여 들여다 볼 수 있다.

[0044] 전자칠판의 휴대성을 높이기 위하여 외부 케이싱(31)의 일면에 손 그립(G)가 부착될 수 있다. 손 그립(G)에 여러 손에 전자칠판을 보다 쉽게 하기 위한 목걸(SP)이 연결될 수 있다.

[0045] 도 3의 (가)에 제시된 실시 이외 전자칠판의 다양성 보다 사용 방법을 향상시키기 위한 여러가지 것으로 본 발명은 제시된 방법에 제한되지 않는다.

[0046] 전자칠판이 전체적으로 지지력 향상을 가지는 도 3의 (나)에 도시된 것처럼, 기화 동(131a)의 일면(311)에 적층 돌부(313)가 형성될 수 있다. 적층 돌부(313)는 위에서 이미 설명한 것처럼 다양한 형태로 형성하거나 또는 적층 부분을 형성하는 방법으로 변화될 수 있다. 또한 통기 슈퍼 홈(133a)가 기화 본(131a)에 형성될 수 있다.

[0047] 위에서 전자칠판은 지지력 향상의 다양한 보강 및 향상의 다양한 가능 수 있고 적층 동부(31, 31a)를 통하여 기화 본 내부에 다르게 용액의 공급이 가능할 수 있다. 이하에서 다르게 용액이 공급 동로(21, 21a)로부터 하부(B)에 공급되는 실시 예에 대하여 보다 상세히 설명한다.

[0048] 도 4는 본 발명에 따른 수용 용기에 다양한 용액의 적층되는 상태에 대한 실시 예를 도시한 것이다.

[0049] 도 4에 제시된 실시 예에서 위험의 편의를 위해 수용 용기에 대하여 원통의 투명한 사각형 모양 제시된 상태로 다른 다양한 형상 수용 용기에 적용한 쉽게 변형을 통하여 적용될 수 있다.

[0050] 도 4의 (가)를 참조하면, 하부 어셈블리는 2개으로 이루어진 본체판(23) 및 본체판(23)에 연결되 하부 고정 수단(324)과 이루어지고 내부 고정 수단은 일정 공간(L)를 가질 수 있다. 상기 및 하부 형상의 위쪽에 하부(B)가 고정되고 일정 공간(L)의 위쪽 면에 본 형상의 수용 홈(In)이 형성될 수 있다. 수용 홈(In)에 하부(B)의 내부와 유동하여 고정되는 전술 검합지(F)의 일 부분이 위치할 수 있다.

[0051] 도 4의 (나)를 참조하면, 기화 본의 측면(C2)에 형성된 공급 동로(21, 21a)의 일 부분에 원형 동로(41)가 형성될 수 있다. 원형 돌부(41)의 아래쪽 부분에 하부 고정 부분(324)과 접촉되어 돌출부(325)에 접촉되는 하부 부분(42)이 형성될 수 있다. 원형 동로(41)는 적층 부분의 하부 면을 가지면서 일 측면을 기화 본의 내부와 연결되는 부분 형상이 될 수 있다. 계속해 하부 쪽 부분의 2개 지점을 거쳐 공급 돌부(21, 31a)와 연결이 되며 기능적 연결 측의 2개 지점은 슈퍼 홈(In)과 연결이 된다. 그리고 기능적 다른 부분은 하부 고정 부분(124)의 바깥쪽 날개 면과 접촉하여 밀폐가 된다. 이와 같은 구조에서 공급 동로(21, 21a)를 통하여 주입된 다르게 용액은 원형 동로(42)에 저장되고 원형 동로(42)는 일정 지점에서 슈퍼 홈(In)에 연결되고, 그리고 원형 동로(42)에 저장된 다르게 용액은 슈퍼 홈(In)에 위치하는 전술 검합지(F)를 통하여 하부(B)로 공급될 수 있다.

[0052] 제시된 구조는 기화 본과 지정 부분 일체로 형성하면서 또는 별도 제작된 하부 이외부분의 주위를 간단하게 할 수 있다는 이점을 가진다. 구체적으로 만약 원형 동로(41)가 형성되어 있지 않다면 공급 동로(21, 21a)의 슈퍼 홈

(1n)이 일직선으로 주름이 펴이야 한다. 그러므로 도 4에 도시된 것처럼, 위험 물체(21)가 협성로이 있더라면 비록 어린이라는 위험의 요인이지 기회 등에 조립될 수 있다.

[0053] 제시된 실시 예는 여러 가지 갖으로 다양한 구조의 혼합 방법 또는 다른 형태의 방법가 형성될 수 있으며 본 발명은 이와 같은 방법의 협성 방법 또는 형성 여부에 의해서 제한되지 않는다.

[0054] 본 발명에 따른 수용 용기는 전자장비의 구조가 간단해지도록 하면서 디스플레 용에의 노출의 방지할 수 있도록 한다는 이점을 가진다. 또한 본 발명에 따른 수용 용기는 다양한 형태의 전자장비에 적용될 수 있으며 하면서 수용 용기의 대량 생산이 가능하도록 하나는 장점을 가진다.

[0055] 이에서 본 발명의 제시된 실시 예를 참조하여 설명이 되었지만 이 분야에서 통상의 지식을 가진 자는 제시된 실시 예를 참조하여 본 발명의 기술적 사상을 넘어나지 않는 범위에서 다양한 변형 및 수정 발명을 변경할 수 있을 것이다. 본 발명은 이와 같은 변형 및 수정 발명에 의하여 제한되지 않으며 다만 아래에 첨부된 청구범위에 의하여 제한된다.

부호의 설명

[0056]

10: 전자장비	11: 디스플레 어셈블리
112: 광원 수납	111: 커버
113: 전자기판	114: 하단 부분
115: 디스 부분	12: 하부 어셈블리
121: 제1 부분	122: 다시 부분
123: 부스바	124: 하부 고정 수납
13: 수용 용기	131, 131a: 기화 부
131c: 고정 돌기부	132: 지지 부
133, 133a: 협기 유입 통로	133b: 주입 입구
134: 기화 유도 부	135: 돌출 부분
14: 흡입 어셈블리	141: 제1 흡기
141a: 연부 커넥팅	142: 디스펜서
142a: 흡입 노즐	144: 삽입 부
145: 이송 공간	
21, 21a: 통기 홀더	22a: 노출된 부재
22: 통기 연결 부분	24: 고정 수납
25: 공기 주입 부	26: 수용 부
26a: 고정 부	
31: 외부 커넥팅	311: 덮개
313: 통기 홀더	33: 디스플레 용에 표시부분
33: 인쇄 마우스피스	33a: 인쇄 소켓
35: 메인보 사용 표시 부분	
36: 주위 인쇄 부분	37: 인쇄 마우스피스
371: 인쇄 부분	372: 유입 마우스피스
373: 고정 메커	

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41: 원형 몸체

5: 전자장치

511: 메모리

521: 중앙처리

523: 버퍼

524: 가화기

525: 변환처

541: 흡입 홀

54: 흡입 어셈블리

C1: 제1 하우징

FT: 필터

In: 유입 홈

P: 히터

C: 수 나노

42: 바닥 커버

51: 메모리 어셈블리

52: 기능 어셈블리

523: 정기 유도 부

526: 정압 용기

525: 인기 유도 부

52: 변환처

542: 토출구

C2: 제2 하우징

B: 배터리

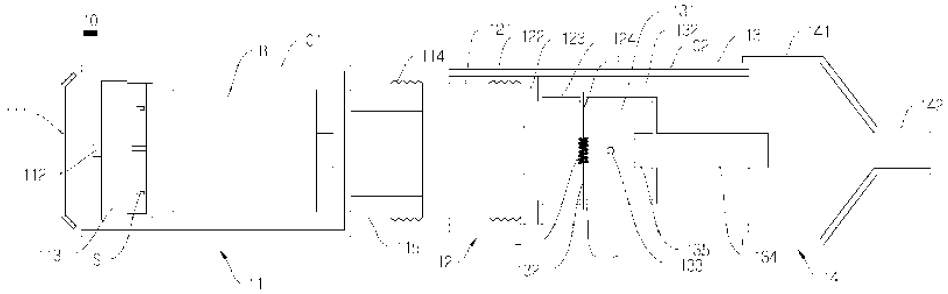
F: 선유 습윤제

C21, C22: 홈

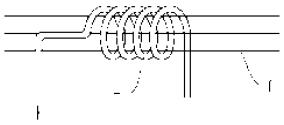
SP: 분수

도면

도면1

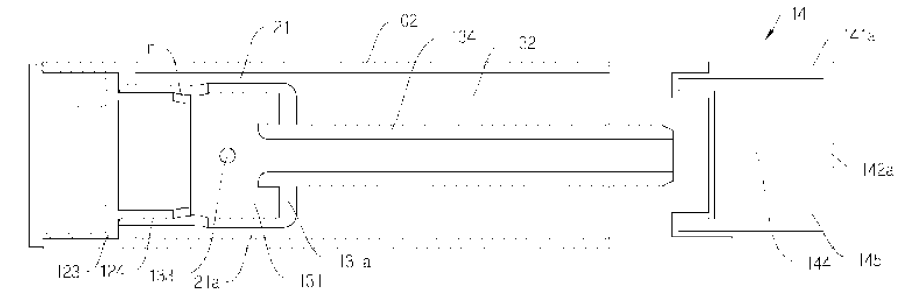


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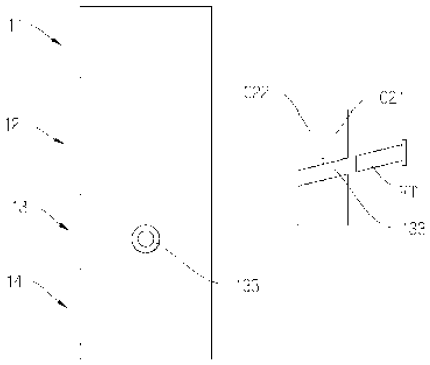


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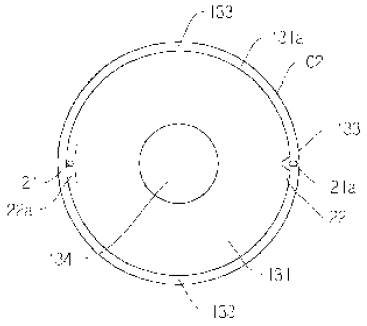
도면2a


21
22
34
32
14
142a
123
124
133
21a
131
13a
144
145

(가)

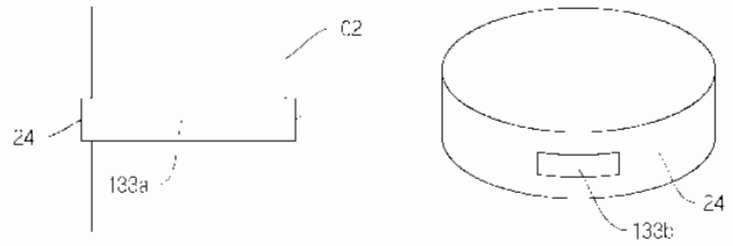

22
22'
33
34
35

(나)

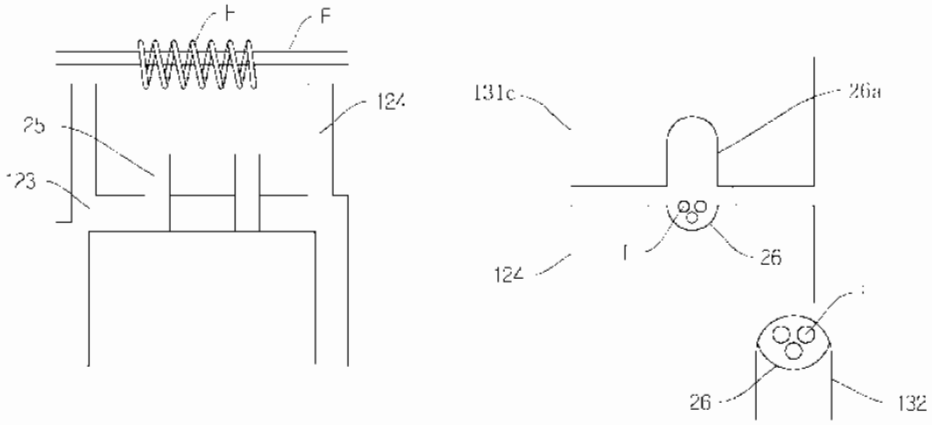

132
121a
22
33
21a
22
21'
22a
34
131
132

(다)

도면2a

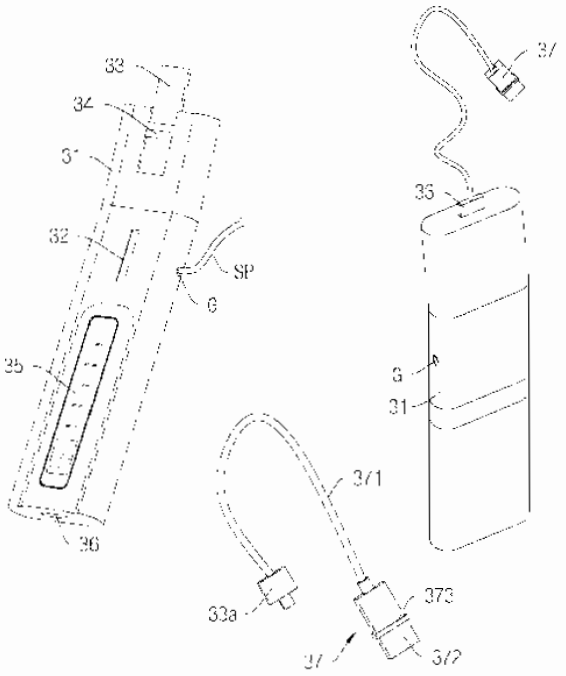


(a)

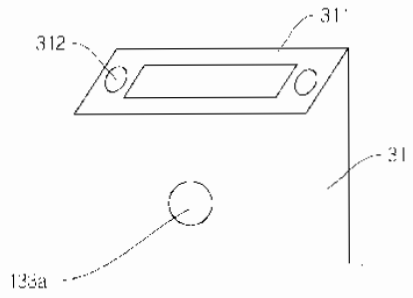


(b)

도면



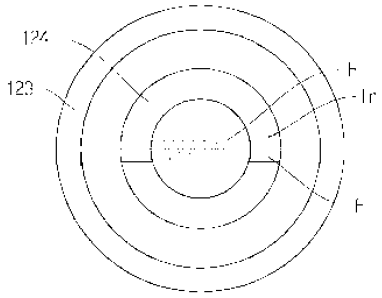
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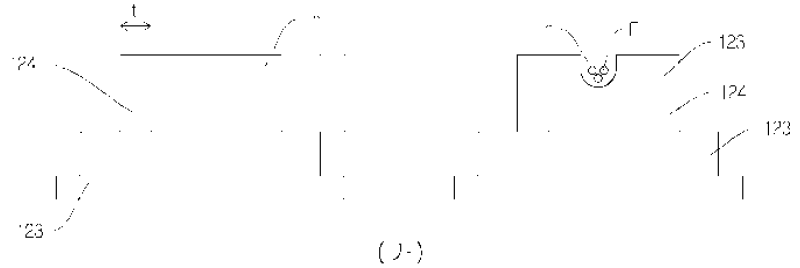


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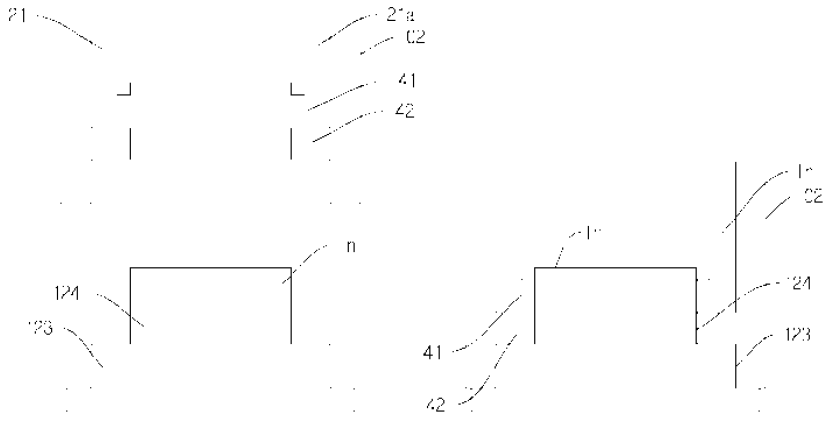
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도면4


124
123
r
t
r

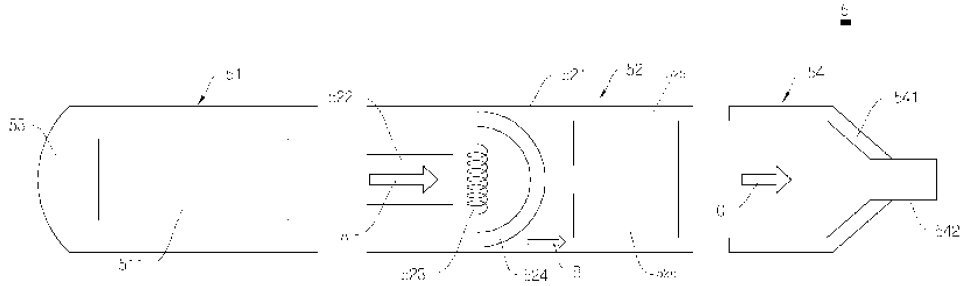

t
124
123
r
125
124
123

(a)


21
21a
C2
41
42
n
124
123
41
42
124
123

(b)

도면5


51
52
53
541
542
C
B

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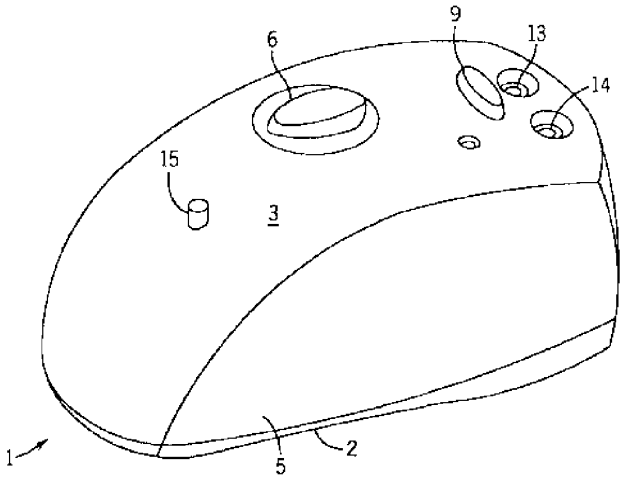
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[Continued on next page]

(54) Title: LOCALIZED SURFACE VOLATILIZATION



(57) Abstract: The present invention relates to an apparatus and method for rapid flash-like volatilization of high and low vapor pressure components from liquid or solid emanators which is in contact with a point or localized heat source. Vaporization is promoted by a geometrically small electrically resistive heating element with variable activation for pulsed or cyclic heating of an emanating surface containing the volatile components. The apparatus is primarily directed towards the treatment of residential air for fragrancing, odor elimination, treatment of insects or pests, air sanitization, air and surface antibacterial or antimicrobial treatment, or other ambient air or surface modification by way of gas or vapor distribution.

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LOCALIZED SURFACE VOLATILIZATION

CROSS-REFERENCE TO RELATED APPLICATION

This application is based on and claims priority from provisional patent Application Number 60/386,998 filed on June 6, 2002.

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus and method for rapid flash-like volatilization of high and low vapor pressure components from liquid or solid emanators which is in contact with a point or localized heat source. Vaporization is promoted by a geometrically small electrically resistive heater material with variable activation for pulsed or cyclic heating of the emanating surface containing the volatile components.

The field of the invention is primarily directed towards the treatment of residential air for fragrancing, odor elimination, treatment for insects or pests, air sanitization, air and surface antibacterial or antimicrobial treatment, or other ambient air or surface modification by way of gas or vapor distribution. Applications include portable, e.g. wearable or carried on an individual's belt, fixed for localized treatment, e.g. covering a relatively small area, or fixed for space treatment, e.g. covering an entire room of a house or building. Other fields of use could include commercial and other public environments requiring air or surface modification by gaseous treatment.

Air modification and treatment has been a part of dwelling, recreational, work, and other indoor and localized outdoor environment aesthetics and functionality throughout history. An inherent problem has been that aesthetic or functional volatiles with sufficiently high vapor pressure to adequately treat the environment by unaided means are limited in number and their treatment benefit. As a result there has been a long history of the use of heat to assist in the vaporization of higher molecular weight and lower vapor pressure compounds.

The use of heat increased the range of aesthetic and functional compounds that can be used for air quality management. Some of the first would have used flame (candle systems, stovetops, etc.). Although effective, and continues to be used today, heat from a flame can be difficult to use because the magnitude of heat

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is difficult to regulate, and a flame typically has wide fluctuations of temperature ranges. Other problems include the affect on larger surfaces, i.e. unintended areas may be raised in temperature, the soot from a flame can blacken components, a flame can give off an unpleasant odor, the solution to be volatized can be rapidly degraded, and there is little adjustment. As a result, many materials are eliminated for use with flame systems.

In addition to flame based systems, there have emerged chemical heat emanation enhancers. Many well-known and simple chemistries are available as described in U.S. Patents 6,248,257 and 6,289,889, and include calcium oxides, aluminum copper sulfate, potassium chlorate, calcium sulfate, iron oxide, acids and bases, and others. Chemical heat sources suffer from inadequate means to closely control temperature, ability to stop the reaction, and many have pre- or post-reaction aggressive components.

Another generation of delivery methods includes devices such as compressed gases or aerosols, which propel minute droplets creating great aggregate surface area for volatilization of a liquid composition into the air. These systems work well for instant and situational applications, but have yet to be as viable for continuous air treatment. A simple set of technologies to address this interest area have been dispensing devices with open or semi-closed supported gelatinous, fibrous, or other material of absorbed or adsorbed actives and enhancers that promotes passive emanation by increased surface area. The needed large surfaces cause these products to be large, heavy, and have unsightly use features as the gels shrink, structures are exposed, surfaces soil, etc.

Other passive metering systems that have emerged and have been used include semipermeable membranes, wicks, capillaries, porous materials or other fluidic transport and emanating surfaces. Other products such as deodorant and sublimation blocks are also used for dispensing air-treating vapors into the atmosphere by evaporation. The performance of these systems vary widely, and although there are hybrid systems of new materials and designs that promote

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vaporization by passive methods, they can suffer from the same drawbacks listed with gel and fibrous systems, and they generally lack optimal performance attributes.

There has been increasing use of electrified systems to promote enhanced volatilization, through the use of heat, air movement, electromechanical aerosolizers, or other methods or combinations. Heat and/or airflow have been combined with many of the passive air modification methods mentioned above. Airflow systems are marginally better than passive systems and continue to require somewhat larger emanating surfaces to achieve enhancement. The added system energy has provided for actives with better effectiveness, and depending upon the complexity of these devices, more optimal delivery performance. Although these systems are generally successful they leave important performance characteristics unaddressed.

SUMMARY OF THE INVENTION

The present invention provides an apparatus and a heating method using a localized heater with pulsed activation that can be incorporated for use in domestic or commercial, indoor or outdoor, fixed or portable applications. The apparatus includes an electro-resistive heating element such as a wire, thin film, or thick film resistive heater touching or affixed to an emanating surface from which a volatile compound can be vaporized by heat generated from pulsed electrical input. Preferably, the heater includes a Nicrome wire that contacts a wick which is heated to vaporize an active on the surface of the wick into the surrounding air. Heating is preferably accomplished using alkaline or rechargeable batteries, and tabletop as well as portable, wearable devices are contemplated. The localized heater and pulsed cycling work jointly to create rapid heating and cooling, limited thermal conductivity away from the local heat zone, meter effluent release by the magnitude, duration, and frequency of electrical cycles, and impart less thermal damage to the effluent. The heater is a component of technology that can be

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integrated with other methods of emanation enhancement, such as moving air, as well as visual or audible stimulus.

The present invention addresses many of the unmet performance attributes of prior devices. One such is the need for portability. Passive devices are portable, but generally ineffective. Powered devices are more effective but restricted to being relatively close to electrical power outlets, and battery powered devices are limited to the use of less energy consuming emanation enhancement technologies such as fans, as resistive heaters rapidly consumes available battery energy. The inability to use heat, again substantially limits the actives that can be effectively used with the unit. All current devices also remain relatively unresponsive to the functional or aesthetic demands and preferences for which the product is intended, such as full space treatment, variable treatment strength, alteration of systems to different chemistries, etc. The present invention overcomes these issues by addressing the important performance issue of using an efficient resistive heater and minimizing the size of the heater to only the very small area needed to achieve desired emanation.

It is a further advantage of this invention to provide volatilization enhancement that improves air treatment performance. Specifically, this involves the use of pulsed heating of a thin film low thermal mass heater that rapidly heats and cools. This permits the heater to be used for metering the amount of active emanated by the magnitude, duration, and frequency of heating. Varying these parameters allows for adjustability to treat environments that change in size, air treatment need, personal preference, and characteristics of different actives and solutions. Such features have not been available with constant heat systems whether the source is a flame, electrical resistive heat, chemical reaction, etc. Air movement systems are also usually fixed in their airflow, and even with those that do modulate, the use of airflow can be limiting for lower vapor pressure component usage.

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This invention also provides the advantage of using localized and pulsed heating to reduce changes in emanation effluent composition. Typical use of heat for emanation enhancement has placed the solution at constant and elevated temperature. The result is that not only is the relatively large heater and immediate area of the emanating surface brought to elevated temperature, but quickly the device, the matrix or container and its contents are also elevated in temperature. This results in not only increased general emanation, but the constant application of heat accelerates concentration change as the high vapor pressure constituents will emanate more rapidly than the lower vapor pressure constituents. This will cause a continuous change in the solution concentration and create a change in the desired composition of the effluent.

The constant application of heat also places constituents at higher temperature and molecular energy that accelerates the kinetics toward molecular degradation. Using carbon based compounds as an example, with the most common and weaker of them being C-C, C-H, C-N, and C-O, all having less than 100 kcal/mole bond strength. With an average bond strength being about 80 kcal/mole, these bonds would be supplied with sufficient energy for degradation at high constant temperatures. Considering Joule's Law a relevant value of the amount of heat produced by a conductor from the flow of current can be obtained. That is, $H=KI^2Rt = KtP$, where: H = heat (cal), K = constant of proportionality and is valued at 0.2390 (cal/j), I = current (A), R = resistance of the conductor (Ω), and t = time (s), and P = power (watt = j/s). Typical values for the localized and pulsed resistive heater can range from 0.25 – 3 seconds pulsed on-time, 0.2 – 25 ohms, and 0.2 – 1 amperes per cycle. At the extremes this represents a heat value $H << 80$ kcal/mole for the short pulse cycles. However, by constant heating it is just a few hours before energies have been input into the system equivalent to those needed for degradation of chemical bonds. This energy is dissipated throughout the solution, its container, the wick, and other structural components. The constant application of heat significantly contributes to accelerating degradation kinetics.

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These undesirable results can be substantially minimized or eliminated by the combined effect of both cyclic and localized heating.

Localized heating implies the use of reduced emanation surfaces. This is possible because the pulsed heating can vary in magnitude, duration, and frequency to get equivalent emanation amounts needed from a smaller area. The benefit of a smaller area is less surface for low temperature release of the higher vapor pressure components of a product, resulting in more uniform product over time. Also because of the nature of pulsed heating, the emanator and effluent in the vicinity of the heater is usually not in a thermal environment and the effluent is not subjected to long and continuous higher energy environments. Also, because of the discontinuous application of heat there is limited heat transfer at proximal or further distances from the heater. These conditions reduce possible effluent degradation and increase effluent stability over time.

When heat is applied with a localized cyclic heater, it can be controlled and directed for optimal vaporization. Vapor pressure of a liquid occurs because at any temperature there is a distribution of kinetic energy held by the molecules in solution. Those with higher energies sufficient to escape the surface of the liquid are vaporized and an equilibrium of vaporization with condensation is reached at the given conditions. By adding heat into the liquid the distribution of molecules with sufficient escape energy increases, rising the rate of vaporization and vapor pressure. By recognizing that vaporization is a surface event, and it is singly the process of vaporizing of the liquid that is desired, then surface heating provides the most efficient method to transfer heat to surface molecules and minimizing the transfer of heat to bulk liquid and degradation processes. Such a mechanism of vaporization can increase energy efficiency of the system. Submerging a heater results in equivalent energy transfer, but the energy within the liquid is subsequently dissipated. At the liquid interface, high energy molecules are allowed to escape or diffuse short distances to the surface and then escape as a vapor. Within the liquid high energy molecules transfer their energy by collision to other

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molecules before escaping, resulting in bulk liquid heating. At temperatures below boiling where vapors do not accumulate into bubbles that can protect the vapor and rise quickly to the surface, many high energy molecules do not reach the surface to escape, thus lowering the efficiency of vaporization for small energy inputs. Consequently, the depth of the surface can extend beyond the distance of a few molecules that are needed for molecular properties at the liquid interface to transition to molecular bulk liquid properties. The nature of the viscosity, intermolecular interaction, and other characteristics of the solution, its various constituents, and their specific ability to reach the surface because of their molecular size, functionality, structure, degree of intermolecular interaction, and other considerations will determine the effective surface thickness that will allow for the rapid vaporization of such constituents without significant loss to bulk heating. A practical consideration for efficiency is that the majority of vaporized molecules escape the surface to include those vaporizing under the heater or opposite the surface, if such condition exists, and which would create longer pathways for escape. A practical definition of this surface thickness is considered 300 μm and more preferably 100 μm with an understanding that thermal lines from a heater are often confined to one diameter or thickness away from the heater and this represents the zone of heating by minimal conductive processes. Surface heating in central to the design of a portable, low energy heat source. Cyclic heating allows for the use of broad temperature ranges with minimal effluent concentration and molecular changes.

Localized and cyclic heating that can vary in its magnitude, duration, and frequency parallels the proportional relationship of increased temperature with increased vaporization. As a result, optimal evaporation can occur regardless of the chemical and physical characteristics of the substance being evaporated. This relationship follows the condensed phase-vapor equilibrium of $\log P = -\Delta H/RT + C$, where P = pressure, ΔH = system interaction enthalpy, R = gas constant, T = temperature (K), and C = constant. A log P is plotted against 1/T and shows

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increasing vapor pressure with increasing temperature between a condensed phase and a vapor phase. The input of low heat for longer cyclic duration or the input of high heat for short duration and frequency of these cycles each achieve similar amounts of vaporized liquid. Localized low mass heaters allow for rapid heating to temperatures, preferably near, but below boiling points. This is not a necessity as multicomponent mixtures for many solutions and even complex mixtures for fragrance solutions will have wide ranges in boiling points of the constituents. It is more important that a rapid heating and then cooling cycle occur that promotes uniform evaporation of all components through a rapid or flash-like vaporization. This mechanism provides for rapid treatment of a space while preserving the concentration and molecular stability of the solution. Lower temperatures and longer on-time cycles can be used to achieve initial treatment or maintenance of the vapor in the space, but then the application becomes more reminiscent of current systems that suffer from extended heating. It is preferred that maintenance be achieved by rapid heating and then cooling, but with less frequency. Thus continuing to preserve solution concentration and molecular stability. As a result, the magnitude and duration of the heating cycle can meter the rate over time, or quantity per cycle vaporized using localized cyclic heating.

Typically, the addition of heat in the localized cyclic heater preferentially creates rapid heat for flash-like evaporation. Doing so limits the flow or flux of heat distantly from the heat source, as governed by Fourier's Law, $q = -kA(MT/Mx)$, where q = heat transfer, k = thermal conductivity of the material, A = unit area of transfer, (MT/Mx) = the temperature gradient. Thermal conductivities of 3.3×10^{-4} cal/(sec)(cm^2)(°C/cm) for light hydrocarbon oils representative of organic liquids, aqueous solutions of 4.3×10^{-5} cal (gm)/(sec)(cm^2)(°C), and 60.3×10^{-6} cal/(sec)(cm^2)(°C/cm) for air. These values indicate that the thermal conductivity for air creates an insulative barrier that does not permit effective thermal transfer from noncontact heat sources which are common in many applications. This invention takes advantage of reduced heat transfer by rapid

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contact heating, limited cyclic timing, and use of inherent low thermal conductivity of common light hydrocarbon or aqueous solutions of $10^{-4} - 10^{-5}$ thermal conductivity to provide an optimal volitalizer of effluents for air modification with limited energy use and improved product stability.

In addition, localized and pulsed heating creates the opportunity for greater portability of a product employing these technologies. Localized heating implies that heat is confined to a specific area. This can be accomplished by limiting the magnitude, duration, and frequency of heating and taking advantage of material properties for limiting undesired thermal transfer. It also suggests that the geometric size and shape of the heater locally confines the influence of heat. Another less obvious aspect of localized heating is the specific composition, performance, spatial positioning, dimension, and design of the heater to provide focused heating. A proper selection of these elements provides for localized heating. The smaller dimension provides for greater design flexibility into products where size becomes a consideration. Simplicity of the heater allows for broader use and even multiple use within the same application. Incorporating the above considerations as well as efficient power usage criteria, a heater can be specified that allows for conventional or battery power with desirable battery life and heater performance characteristics. Pulsing the heater is integral to permitting extended use of battery power or efficient use of wall power, and safety considerations as the heater circuit is usually not closed and drawing power.

A further advantage of this technology is the simplicity that enables previously impractical applications of multiple and independent heaters because of heater size. For example, control of the heater may be analog or digital or the heater may even be remotely actuatable. This has not been previously available because of the lack of thermal responsiveness in cooling and heating that would cause effluents to emanate simultaneously, unless desired, etc. The simplicity of electrical heating coupled with the benefits of localized and pulsed heating allow for the incorporation of multiple emanators. Such an embodiment creates products

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that deliver multiple fragrances to overcome human adaptation, which is manifest by the inability to detect the presence of the fragrance over time. Changing fragrances by pulsing different emanators from time to time, any adaptation is mitigated as the physiological changes associated with the environmental change are then detected. An extension of multiple emanators could include also include a combination of fragrances, odor eliminators, insect repellents, insecticides, fungicides, antibacterials, etc.

Central to the volatilization and energy use efficiency of the localized and pulsed heater is its spatial location to the emanator. Preferably the heater is in close proximity and even touching or mounted to the surface of the emanator. Because of the need for only a geometrically small heater, the emanator also need not be large and preferably would be small. This close association is not preferred in the fact that the emanator matrix will absorb heat that is then unavailable for vaporization, but such a close position to the release matrix also places the heater in close proximity to the effluent. Because of the insulative properties of many media such as air, ceramic, etc. it is advantageous to have the heater in contact with the effluent to facilitate the most efficient thermal transfer and volatilization. In connection with this, the heater becomes more supported or affixed to the matrix, becomes more robust, and maintains more consistent spatial proximity to the effluent.

Yet an additional advantage of this invention is the use of an affixed heater to the effluent refill. The refill assembly may thus include not only a reservoir containing a composition having a volatile active, and a wick having an emanating surface for the active, but also the heater element itself. The incorporation of these elements provides for the consistency and robustness suggested above with the heater. A heater affixed to a refill provides the spatial relationship most effective for volatilization of surface liquid. It also provides for a renewed heater with each refill purchase, such that there is reduced risk of matrix fouling near the heater or fouling and reduced efficiency in thermal transfer from the heater to the effluent. It

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also provides a proprietary interface between refill and the support system to ensure that the safety, performance, specifically designed effluents, and other factors are preserved by using appropriate refills.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a localized cyclic heater in accordance with the present invention using NiCr resistive wire with multiple emanators;

Fig. 2 is a perspective view of the heater in Fig. 1 with its cover off exposing selected components in the circuitry and user interface;

Fig. 3 is a schematic illustration of electronic circuitry for the heater of Figs. 1 and 2 to provide for cyclic localized heating of the multiple emanators;

Figs. 4a-4e schematically illustrate various resistive wire heater designs to change the thermal characteristic of the heater;

Figs. 5a-5e schematically illustrate various thin film resistive heater designs to change the thermal characteristic of the heater;

Fig. 6 is a graph illustrating the metering capability of the heater with a fragrance;

Fig. 7 is a graph illustrating the metering capability of the heater with an insecticide;

Fig. 8 is a graph illustrating the efficacy of the heater for knockdown (kill) of Aedes aegypti female mosquitoes compared to controls and a currently marketed product using a NiCr resistive wire and wall power device;

Fig. 9 is a graph illustrating the particle size generated by the heater that facilitates rapid revaporization and continued loft without fallout;

Fig. 10 is a graph illustrating a thin film resistive heater temperature responsiveness after 0.5 to 2 seconds of current;

Fig. 11 schematically illustrates an end view of a wire heating element held in contact with the tip of a wick by a coil spring;

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Fig. 12 is a top view of the embodiment of Fig. 11 with the spring not shown for clarity;

Fig. 13 is a plan view of the wire mounting used in the embodiment of Fig. 11;

Fig. 14 schematically illustrates a pair of spring fingers used to apply a spring force on the wire heating element;

Fig. 15 schematically illustrates spring force being applied by a pair of coiled sections of the wire heating element itself;

Fig. 16 schematically illustrates spring force being applied by corrugations integrally formed in the wire heating element itself;

Fig. 17 schematically illustrates spring force being applied by stretching a wire heating element;

Fig. 18 schematically illustrates a side mounting embodiment of the present invention;

Figs. 19a and 19b illustrate the use of notches formed in a wick for receiving a wire heating element;

Fig. 20 illustrates yet another embodiment which utilizes a pair of wire heating elements;

Figs. 21a and 21b illustrate a multi-part wick for delivering active to a wire heating element;

Fig. 22 illustrates an all-in-one refill unit for the present invention;

Fig. 23 illustrates the use of a fan and a baffle in the present invention;

Fig. 24 illustrates the use of a fan and a separate chamber for containing the wire heating element;

Fig. 25 illustrates the use of a fan and varying the cross sectional area of a housing for the wire heating element to control air movement past the wire heating element;

Fig. 26 illustrates the use of a cap covering the tip of a wire heating element; and

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Fig. 27 illustrates a vented housing as yet another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The localized and pulsed heater 1 operates as an integrated system of electrical, mechanical, and fluid systems as shown in Figs. 1 and 2. The embodiments described herein were specifically designed for portable and semi-portable fragrancing and insecticide delivery devices. While a primary object of the invention is to provide for a portable fragrancing or insect repellent vapor-dispensing device, it should be understood that other vaporizable fluids are contemplated within the scope of the present invention, such as air fresheners, perfumes, deodorants, medicaments, and the like.

Referring now to Figs. 1 and 2, there is illustrated one embodiment of a portable cyclic localized heater 1 constructed in accordance with the principles of the present invention. More specifically, heater 1 includes a housing which comprises a base 2 for supporting the internal components of heater 1, and a cover 3 for enclosing those components. Base 2 is in the shape of a shallow tray and includes a lip 4 at its peripheral edge which engages a corresponding lip 5 formed on cover 3 so that cover 3 may be joined with base 2 in a snap-fit arrangement. Cover 3 is thus removable so as to permit access to the interior of heater 1, if desired.

Base 2 and cover 3 can be made of any suitable, lightweight material such as a wide variety of commercially available plastics that are produced by conventional processes and known to those skilled in the art. Any plastic housing material that is selected, however, must be compatible with the particular active volative fluid that is to be vaporized. Typically, base 2 and cover 3 may be made of a commercially available polycarbonate material manufactured by known injection molding methods. Base 2 and cover 3 can thus be of any suitable dimension such that it may be readily portable whenever desired.

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As shown best in Fig. 1, heater 1 includes an off duration selector knob 6 on cover 3 which is connected to an off duration potentiometer 25 mounted on circuit board 8 which in turn is supported on base 2. Knob 6 can be rotated to vary the interval between vaporization cycles. Also shown in Fig. 1 is an emanator selector knob 9 which is connected to a selector switch 10 on circuit board 8. Selector knob 9 may be slid in one direction to select a corresponding emanator 11, or in the opposite direction to select emanator 12. For example, emanator 11 may vaporize an insect repellent while emanator 12 might vaporize a fragrance so that a user can choose the particular active to be vaporized, as desired. Fig. 1 also illustrates a pair of spaced openings 13, 14 formed through cover 3 at a location which is aligned with emanators 11 and 12, respectively. Openings 13, 14 thus enable the active being vaporized to exit from heater 1 into the atmosphere. Finally, an instant action button 15 extends through cover 3, and when pushed, overrides the time delay set by the off duration knob 6 and permits a user to obtain an instant or immediate burst of active from one or both emanators 11, 12 depending upon the position of selector knob 9.

Referring now to Fig. 2, circuitboard 8 is mounted on supports 16 so as to be raised above base 2 and provide sufficient room for forming a receptacle 17 for receiving a plurality of batteries 7 (schematically shown in Fig. 3) for powering heater 1. Alternately, heater 1 may be powered by an electrical cord 18 and plug for insertion into a wall mounted electrical power outlet.

Fig. 2 also illustrates the emanators 11, 12. Each emanator 11, 12 comprises a wick 19, 20, respectively and a wire heating element 21, 22, respectively. Each wick 19, 20 has a lower end received within a reservoir 23, 24, respectively for containing a solution of an active such as an insecticide, pesticide or fragrance, and an upper end having a relatively flat tip across which wire heating elements 21, 22 respectively extend. Thus, as active is drawn upwardly by capillary action through wicks 19, 20, the solution is volatized when current is passed through wires 21, 22 resulting in heating of the solution and vaporization of the active.

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Each reservoir 23, 24 is arranged to contain a volatile solution or fluid, preferably biologically active, such as an evaporable liquid insecticide or an evaporable liquid insect repellent, fragrance or the like. The reservoirs 23, 24 may be unitary with base 2 and as such may be an integral part thereof. Alternately, each reservoir 23, 24 may be separately formed and then attached to base 2 so that reservoirs 23, 24 can be removable and thereby allowing for the replacement of each reservoir after desired vaporization of the fluid contained therein. This would allow for the interchanging of a variety of like dimensioned reservoirs containing a wide variety of vaporizable liquid substances. Accordingly, the reservoirs 23, 24 can be so constructed as to be disposable and replaceable by new reservoirs containing a fresh supply of active. Also, if desired, reservoirs 23, 24 may be transparent in order to provide a user with the visual ability to determine the amount of vaporizable active or liquid remaining in the heater 1. Further, although the preferred composition is one which contains the active ingredient in a liquid solution, the composition may also be a solid, semi-solid or gel formulation under ambient conditions. In each case, the composition includes the active ingredient and a carrier for the active ingredient. The carrier may include one or more blowing agents, solvents, stabilizers, synergists, dyes and perfumes. Blowing agents include azodicarbonamide, dinitrosopentamethylenetetramine, azobisisobutyronitrile, and combinations thereof. Suitable blowing agents are disclosed in U.S. Pat. No. 4,228,124, which is hereby incorporated by reference for the purpose of disclosing blowing agents.

Solvents include alcohols such as cetyl alcohol, stearyl alcohol, and mixtures thereof.

Stabilizers (e.g., for providing stability to heat, light, and oxidation) include antioxidants such as 2,6-di-tert-butyl-4-methylphenol ("BHT"), 3-tert-butyl-4-hydroxyanisole ("BHA"), 2,2'-methylene-bis(4-ethyl-6-tert-butylphenol), 2,2'-methylene-bis-(4-methyl-6-tert-butylphenol), 4,4'-butylidene-bis(5-methyl-6-tert-butylphenol), 4,4'-methylene-bis(2-methyl-6-tert-butylphenol), 4,4'-thio-bis(3-

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methyl-6-tert-butylphenol), 4,4'-methylene-bis(2,6-di-tert-butylphenol), stearyl-beta(3,5-di-tert-butyl-4-hydroxyphenol)-propionate, 1,3,5-trimethyl-2,4-6-tris(3,5-di-tert-butyl-4-hydroxybenzylbenzene), 1,1,3-tris(2-methyl-4-hydroxy-5-tert-butyl)-butane, tetrakis[methylene(3,5-di-tert-butyl-4-hydroxycinnimate)]methane, dilauryl thiodipropionate, distearyl thiodipropionate, UV absorbers derived from benzophenone, triazole, and salicylate compounds, and combinations thereof. Suitable stabilizers are disclosed in U.S. Pat. No. 4,874,787 and in U.S. Pat. No. 4,515,768.

Synergists include alpha-[2-(2-butoxyethoxy)ethoxy]-4,5-methylene- dioxy-2-propyltoluene, octachlorodipropyl ether, and N-(2-ethylhexyl)-bicyclo-[2,3,2]-hept-5-en-2,3-dicarboxyimide. Suitable synergists are disclosed in U.S. Pat. No. 4,874,787 and U.S. Pat. No. 4,515,768.

Dyes in the composition can be used to show when the insect repellent is spent. For example, suitable dyes include 3-ethostearate of 9-ortho-carboxyphenyl-6-diethylamin-3-ethylamino-3-isoxanthene and electron-donating dyes. Dyes are disclosed in Japanese Patent Publication No's. 09-175906A and JP 07-324003A, International Patent Publication WO 96/33605 A1, and U.S. Pat. No. 5,891,811.

Perfumes can also be used in the composition. Perfumes can be used, e.g., to show when the insect repellent is spent or for aesthetic purposes. Perfumes must have similar volatility to the insect repellent and must not be attractive to insects. Examples of suitable perfumes include citronella, which can be used herein as a perfume, not an insect repellent.

The pulsed electrical cycling of heater 1 is achieved by solid state electronic circuitry, as shown best in Fig. 3, but is not limited to the specific circuitry illustrated. The primary function for the electronics is to switch the heater 1 on and off at predetermined intervals. The ON/OFF duty cycle reduces the energy and increases battery life as compared with a device that runs continuously. The heater Control Timing can be set to operate for a predetermined specific time duration, e.g. 2 hours, 4 hours, 8 hours, etc. or can be set to turn the heater 1 on and off for

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predetermined time periods, e.g. on for 5 seconds and then off for five seconds as long as the Low Voltage Detector indicates a good battery(s). The duty cycle will be adjustable by changing a resistor 28 on the printed circuit board.

A secondary function for the electronics is to protect the battery(s) 7 from damage by monitoring the battery voltage and disconnecting the circuit when the voltage decreases to a set value. When the battery voltage is below a preset voltage, the electronics will enter into a Battery Low Mode. In this mode, the controls to the heater will be such that the heater is turned off. Low Battery detection is only performed during the heater off state to avoid false detection due to the current drain during the on state. The circuit will sample the battery voltage three times just before the heater on cycle and decide if the next state will be low voltage or normal (heater ON). In addition, there will be a hysteresis built into the low voltage detector circuit to remove oscillations of judgement around the low voltage level.

Figure 3 represents a potential electronic circuit for heater 1. It is a simple, low-cost circuit and will allow the heater to be switched ON and OFF for a predetermined time (duty cycle). The ASIC, microcontroller or discrete logic component 29 incorporates a conventional Low Battery Detection circuit as is well known in this art.

The circuit of Figure 3 will either turn the Heater ON or OFF. Depending on the heater configuration ultimately chosen, the two states of ON and OFF may not be sufficient. Take for example the situation where ON would allow too high a voltage across the heater, resulting in too high of a temperature. In that case, the ASIC, microcontroller or discrete logic component 29 will modulate the output, reducing the voltage to the heater. A pulse width modulated (PWM) method of control would be an efficient scheme for maintaining the proper voltage across the heater element 21 or 22 that is less than full ON.

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The following equation is used for PWM waveforms:

$$V_{RMS} = V_{pk} \sqrt{t_{ON}/T}$$

Where: $V_{pk} = V_{batt}$

t_{ON} = ON time for the heater (seconds)

T = period of time for PWM output (seconds)

As can be seen from the equation, if one monitors battery voltage (V_{pk}) and then adjusts t_{ON}, one can keep V_{RMS} constant.

A beneficial consequence of the use of electronics is the incorporation of a clock within the circuit to create blockout periods of the day when the device is not required and battery energy conservation can take place. As a result, once powered, heater 1 does not need to include an on/off switch such as that shown as 30 in Fig. 3 to depower the board. Specific controls of heater pulsing is provided by three subcircuits. Potentiometer 25 is adjustable to control the duration of heater off cycles from 5 seconds to 30 seconds. Potentiometer 26 allows for battery energy management with variable pulse width modulation that regulates battery use during the on cycle with an on and off subcycle to manage power needs. Other power conserving methods could be used, if desired. Potentiometer 27 is included to regulate the duration of the on cycle from 0.25 seconds to 2 seconds. Other subcircuitry can be included for motion, light, or other sensor switching such that the unit could be dormant until needed.

Power is provided by batteries 7 and could be AA, C, D, or other 3 volt battery wall power transformers. Batteries 7 may also be rechargeable. Power may also be signally or simultaneously connected to a permanent power source in a tethered or untethered manner.

The wicks 19, 20 may be constructed from natural materials, fibers, nonwovens, sintered polymers, ceramics, metal foams, open capillary tubes of ceramic, glass, or other material. A critical consideration for the selection of any of these materials is the temperature required for surface heating for the effluent being

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volatilized. The preferred wicking material is ceramic, in part because of its high temperature tolerance. It shares other features with some other wicks with the ability to tailor pore size to address wicking rates and fouling, it has insulative properties to further minimize heat transfer, and is readily available as a material. If the wick substrate is conductive then a dielectric material layer of a few thousandths of an inch in thickness must be placed between the electrically resistive heater and the substrate. Materials not requiring the need for dielectrics are preferred for their reduced cost, retained capillary pores for wicking, thermal stability, etc. Ceramic wicks are also preferable in that they can withstand heater deposition processing temperatures, if required. Other wick materials include wicks made from saw-dust and silica/sand mixtures that are able to withstand needed temperatures to volatize the actives.

Core to the success of this invention is the selection or creation of an appropriate electro-resistive heating element. A thermally stable material which functions as a heater when current flows from a battery is passed through it can be achieved with a wide variety of heating materials. Important to the small geometrical scale as well as the energy economy needed, heating elements from traditional materials and sources have been limited to wires, thick films, and thin films. Wire heating elements are commonly associated with alloys with trade names of Nichrome, Ohmax, Radiohm, Nirex, Nilvar, and more (Omega Engineering, Inc., Handbook and Encyclopedia, Electric Heaters, 200, pg. z-38). Pure metals that may be used, but show less resistivity and include platinum, iron, zinc, molybdenum, tungsten, and more (Omega Engineering, Inc., Handbook and Encyclopedia, Electric Heaters, 200, pg. z-38). Thin films can be derived from metallic films, oxide films, materials from nitrides, borides, carbides, stanides, and the like. Stannic oxides (SnO_2) or tin oxides can be deposited as a very thin film of 2 μm or less. The other metal oxides are formed as a thicker or intermediate film, but still considered as a thin films. Thick films are also possible sources of resistive heating elements. They can include electrically conductive adhesive

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thermosetting or thermoplastic polymeric resin pastes with silver or copper powder as the conductor. Nonresin matrices of glass and ceramics with pure metals or metal oxides such as Al_2O_3, BeO, Pd/Ag, SiO2, PbO, CaO, B2 O3, Na2 O, K2 O, MgO, and other dopants have been used as thick films. Most heating elements can be obtained in different shapes and sizes while maintaining physical properties such as electrical resistivity, density, thermal conductivity, and specific heat. These properties are determined by the constituent elements, processing methods, and post-processing techniques.

The most preferred of the above resistive heating elements is either a 49 gauge Nichrome wire or a tin oxide thin film. Important to the selection of these resistive heating elements is their effectiveness at volatilizing solutions and their energy efficiency. The gauge of the wire was selected because of its higher resistance and less energy draw to generate needed wire temperatures. Like other resistive materials, there is an issue of thinning wire diameter and the propensity for failure. The Nichrome large gauge wires are relatively fragile and are subject to mechanical failure during manufacturing, transportation, consumer handling, and use. More significantly, thermal cycling induces stresses and fatigue in the heating elements, which may result in heater failure. Undesirable oxidation of the heater material can also occur causing weakening and possible failure. Figs. 4a through 4f illustrate various resistive wire heater designs showing a wire heating element 123a-123f touching an emanating surface 124a-124f located at the tip of a ceramic wick 125a-125f, respectively. More specifically, Fig. 4a illustrates a single straight wire heating element 123a touching a flat emanating surface 124a at the outer tip end of wick 125a. Fig. 4b illustrates a simple or single serpentine wire heating element 123b touching the flat emanating surface 124b at the tip end of ceramic wick 125b. Fig. 4c illustrates a multi-serpentine design for wire heating element 123c touching the flat emanating surface 124c at the tip end of wick 125c. Fig. 4d illustrates a wire heating element 123d that is wrapped around the circumference of the tip end of wick 125d such that the emanating surface 124d comprises the outer

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circumferential surface of wick 125d. Fig. 4e illustrates a pair of spaced wire heating elements 123e touching the flat emanating surface 124e at the tip end of wick 125e. It should be noted that although two wires 123e are illustrated, multiple wires could also be used, i.e. 2, 3 or more, if desired. Fig. 4f illustrates a side mounting embodiment wherein wire heating element 123f touches one side of the tip end of wick 125f such that an arcuate portion of the circumferential surface of wick 125f comprises the emanating surface 124f.

Another type of preferred resistive heating element is a vapor deposited thin film of tin oxide (SnO_2) or other resistive deposited films. An important consideration is the direct deposition of the oxide on the ceramic substrate that creates a mechanically robust heater that may not be as susceptible to mechanical failure. It also does not suffer, as a wire resistive heater does, from inconsistent position with respect to the wick at manufacturing and changes that occur with use. An important consideration with the use of SnO_2 is that its thermal expansion and that of the ceramic do not substantially differ. As a result, there is no debonding or other failures from thermal stresses that occur with pulsed or cyclic heating. Additionally the SnO_2 does not suffer from detrimental additional oxidation with use.

In consideration of minimizing energy use, the heating element material must have a resistivity sufficiently low to allow for rapid heating and cooling. It is therefore desirable that the heater resistance correspond to the energy density of the power source in order to minimize power consumption. Suitable heater materials of low mass, such as SnO_2 can be created with very low density. Not only is the composition of the resistive material important in achieving this, but also the thickness and other geometric consideration with a relationship such as $R=\rho(L/(WT))$. Where R is resistance of the heater, ρ is resistivity of the heater material, L is length, W is width, and T is thickness. The deposition of the thin film by atmospheric, vacuum, electro-spray, thermal, or other vapor deposition allows

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the resistive oxide to be applied to contoured surfaces, which also includes some internal pore surfaces.

Another advantage of a thin film heating element is that there can be an increase in surface area. This allows for increased liquid contact with the heating element to create more efficient thermal transfer and volatilization of the solution. Because of the vapor deposition method, this surface coverage can also extend into the pores of the wick, capillaries, or other structures. Yet because of the thinness of the oxide film it does not close the porous structure and does not inhibit loading performance and volatilization sites. The thin 2 μm thick films allows for the potential to layer thin films as needed to achieve desired resistivity of the heater material, in conjunction with composition, and heater design variables. Possible disadvantages of thin film resistors include: (1) some designs may actually require more energy to achieve the same temperature as a Nichrome wire; (2) some designs may become fragile especially if the substrate on which it is deposited is also thin to help minimize heat transfer; and (3) random temperature variations can occur throughout the film depending on the thickness of the film. Figs. 5a through 5e illustrate various resistive thin film heater designs showing a thin film heating element 126a-126e located at the tip of a ceramic wick 127a-127e, respectively. More specifically, Fig. 5a illustrates a thin film heating element 126a deposited on the flat tip end of wick 127a. Fig. 5b illustrates a thin film heating element 126b deposited on flat tip end of wick 127b as well as the outer circumferential surface of wick 127b which is adjacent the flat tip end and comprising the outer edge margin of wick 127b. Fig. 5c illustrates a thin film heating element 126c deposited only around the outer circumferential surface along the edge margin and adjacent to the flat tip end of wick 127c. Fig. 5d illustrates a grid-shaped thin film heating element 126d deposited on the flat tip end of wick 127d. It should be noted that various other designs could be deposited on the flat tip end or on the circumference of wick 127d, e.g. a mesh, a spiral, a polygonal-shaped grid or some other network

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of spaced lines. Fig. 5e illustrates a thin film heating element 126e in the form of a thin ribbon deposited on the flat tip end of wick 127e.

As set forth above, one of the primary uses of heater 1 is for providing an insect repellant and insecticidal function. Those insecticidal or insect repellant evaporable fluids which are useful in heater 1 are limited only to the extent that such fluids are vaporizable, are of a composition which is capable of vaporization, and are registered for use with humans. The composition comprises one or more active insect repellent and one or more optional carrier ingredients. Optional carrier ingredients include blowing agents, solvents, stabilizers, synergists, dyes, and fragrances well known to those skilled in this art. Suitable insect repellents are exemplified by DEET, pyrethrins, chrysanthemic acid derivatives, and pyrethroids. Examples of some suitable pyrethroids are Allethrin, d-Allethrin, Bioallethrin, S-Bioallethrin, Empenthrin, Prallethrin, and Transfluthrin. A preferred volatile insecticidal fluid substance is 3-allyl-2-methylcyclopenta-2-ene-4-one sold under the brand name Pynamin-Forte by Sumitomo Chemical Co., Ltd. of Japan. A preferred volatile insect-repellent fluid substance is N,N-diethyl meta-toluamide (commonly known as DEET).

In additional to insect repellants, insecticides, and pesticides, the portable device of the present invention can also be utilized to evaporate other evaporable fluid substances such as evaporable fluid antiseptics, evaporable fluid agricultural fungicides, evaporable fluid plant-growth regulants, e.g. fertilizers and the like, evaporable fluid herbicides, air fresheners, perfumes, deodorants, medicaments, and the like.

A Nichrome wire will expand and contract approximately 0.001 inches during the process of heating to 160°C and cooling. A spring mechanism is to be used to keep each Nichrome wire in constant tension against its corresponding wick. However, too much force on the wire will result in permanent deformation (stretching) of the wire or even breakage. The yield strength is the amount of stress required on the wire to permanently stretch the wire. The tensile strength is the

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amount of stress that would break the wire. The heater assembly must be constructed such that the stresses on the wire do not exceed one-half the yield strength. The yield and tensile strength for a 35 AWG Nichrome wire is typically 550 MPa (megapascal) and 880 MPa respectively. Therefore, $\leq$ 300 MPa of stress would be a likely target for the spring mechanism.

Figs. 11-13 schematically illustrate one embodiment of an electro resistive wire heating element or filament 32 being held in contact with the flat tip end 33 of a wick 34. The opposite end of wick 34 is in communication with a composition containing an active ingredient within reservoir or vial 35. A cup 36 having a central opening (not shown) is used to support wick 34 in an upright position, and a seal between this opening and wick 34 prevents excessive evaporation and spillage of the composition within vial 35.

As shown best in Fig. 13, wire heating element 32 is mounted on a bowtie shaped plate 37 which includes a central annular member 38 and oppositely extending triangular shaped wing members 39 and 40. Central member 38 has an opening therein that has a diameter substantially the same as the diameter of wick 34. Wire 32 is disposed across opening 41 and has opposite ends affixed to plate 37 by rivets 41 and 42 which in turn are electrically connected to a battery 7 by wires 43 and 44 respectively.

Plate 37 and wire heating element 32 are captured within a cylindrical spring housing 45 in such a manner that plate 37 freely slides vertically therein, i.e., is free-floating in housing 45. Housing 45 includes an inwardly projecting annular lip 46 at its upper end that provides an annular lower surface 47. One end of a coil spring 48 bears against surface 47 and the other end of spring 48 bears against plate 37 so as to provide a downward force to maintain wire heating element 32 against the emanating surface, i.e., the flat tip end 33, of wick 34, as indicated by arrow 4.

Although a coil spring 48 is illustrated in Fig. 11, other types of springs are also contemplated for use in the present assembly. Fig. 14 schematically illustrates a floating wire heating element 50 mounted across a pair of spring fingers 51, 52

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for movement in the direction of arrow 53. Fig. 15 schematically illustrates spring force being applied by a pair of coiled sections 54 and 55 integrally formed as part of a wire heating element 56. Fig. 16 schematically illustrates spring force being applied by corrugations 57 integrally formed as a part of a wire heating element 58. Fig. 17 schematically illustrates spring force being applied by stretching a wire heating element 59. In this embodiment, wick 60 is shouldered against the underside of plate 61 so that the flat tip end thereof projects through the central opening therein to stretch wire element 59 upwardly which provides a downward force against wick 60.

Fig. 18 schematically illustrates a side mounting embodiment for the present invention wherein a wire heating element 62 is mounted against the side of a wick 63 at a location beneath the flat tip end 64 thereof and above cap 65 of vial or reservoir 66. Wire 62 is affixed to a U-shaped plate 67 and extends across the opening formed by the U to engage or bear against the side of wick 63. A pair of spaced apart conductors 68 and 69 provide an electrical connection to the electronic circuitry schematically illustrated by 70 and battery 71. Conductors 68 and 69 are preferably composed of spring steel so as to inherently function as a spring to provide a force to maintain the wire heating element 62 in contact with the emanating surface, i.e., the side of wick 63.

Fig. 18 also illustrates a holder for removably mounting reservoir 66, cap 65 and wick 63 (comprising one embodiment of a refill assembly) to the apparatus. The holder comprises a base member 72 for supporting the underside of reservoir 66 and a pair of opposing spring finger members 73 and 74 that grab opposite sides of reservoir 66. Finger members 73 and 74 thus provide a snap-fit assembly for removably mounting reservoir 66, cap 65 and wick 63.

Fig. 19a illustrates that a wick 75 can have a notch 76 formed in its flat tip end 77 to receive a wire heating element 78. Notch 76 holds the wire heating element 78 in proper position and also increases the wetting effect at the wire

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heating element 78. Fig. 19b illustrates a notch 79 formed in the side of a wick 80 to receive a wire heating element 81 for the same reasons noted for Fig. 19a.

Fig. 20 illustrates yet another embodiment wherein two spaced apart wire heating elements 82 and 83 contact the flat tip end 84 of a wick 85. Multiple wire heating elements might be used if desired to volatize more effectively, to volatize at a higher rate, or as a redundant system.

Fig. 21a illustrates a multi-part delivery system wherein the device includes a two-piece (or more) wick comprised of a permanent wick portion 86 and a refill wick portion 87. The permanent wick portion 86 and a wire heating element 88 would be affixed or attached to the device so as to be non-removable while the refill wick portion 87 would be part of a refill assembly which is removable and replaceable by a user. In the case of refills, a user interacts with the device and thus it may be beneficial to isolate the heater element 88 from user interaction, thereby preventing damage to the heater, maintaining the relationship of heater-to-wick, preventing contact with a hot surface, and allowing use of a less expensive low-temperature refill wick (permanent wick portion 86 would be high-temp).

Fig. 21b illustrates that when using a two-piece, or multiple-piece wick a coupling medium 89 may need to be disposed along the interface and between portions 86 and 87 to enhance fluid transfer between the refill wick portion 87 and the permanent wick portion 86. Examples of coupling medium 89 include felt type materials, cotton, absorbent paper (e.g. filter paper) and woven fabrics. Coupling medium 89 could be affixed to either refill wick portion 87 or permanent wick portion 86.

Fig. 22 illustrates an "all-in-one" refill assembly or unit comprised of a wire heating element 90, a wick 91 and a reservoir 92 of active solution. Reservoir 92 can be formed integrally as part of a laminated plastic film package 93. The outer edges of the lamination 93 may contain holes 94, or any other desired and convenient means, for aligning the all-in-one refill unit in the device.

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Contacts 95 and 96 provide an electrical connection for wire heating element 90 to a battery or other source of power via electronic circuitry (not shown). There are advantages to an all-in-one refill unit where a simple replacement assembly provides a new heater, a new delivery system (wick), and the refill active solution all at once. This method reduces the life expectancy required of the components, and eliminates the need for expensive robust hardware.

To conserve energy, it is desirable to minimize the air velocity in contact with the heater element. This is because the moving air cools the heater element and takes the heat away, and as a result more power must be supplied to the heater element to maintain a desired temp. However, one also would benefit from evacuating the air inside the housing rapidly, to reduce the active concentration surrounding the pinpoint heater because a lower concentration allows easier volatilizing. Therefore, it is desirable to move air inside the housing, but utilize an air regulation means to reduce its velocity across the heater element. Figs. 23-26 illustrate several different methods of accomplishing this goal when used in combination with a fan while Fig. 27 illustrates another arrangement without a fan.

Fig. 23 illustrates the use of a baffle 97 as the air regulation means. Baffle 97 is disposed between a fan 98 and a wire heater element 99 in the path of the air currents 100 created by fan 98 to prevent direct contact of the air currents 100 with the wire heater element 99.

Fig. 24 illustrates the provision of a chamber 101 to receive a wire heater element 102 below (or above) a passageway 103 as the air regulation means. In Fig. 24, passageway 103 includes an air inlet 104 and an air outlet 105 formed adjacent to chamber 101 and through which air currents 106 from a fan 107 move. Passageway 103 communicates via an opening 108 with chamber 101 so that as air currents 106 flow past opening 108 active vaporized by heater element 102 is drawn into passageway 103 to flow downstream and exit the device via air outlet 105.

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Fig. 25 illustrates varying the cross sectional area of a housing containing a wire heater element 109 as the air regulation means. Fig. 25 illustrates a passageway 110 formed downstream of a fan 111 through which air currents 112 move. Passageway 110 has a defined cross sectional area and opens into a larger chamber 113 having a greater cross sectional area than passageway 110 which contains wire heater element 109 therein. As a result, the velocity of the air currents 112 passing through chamber 113 and thus over wire heater element 109 is reduced as compared to the velocity of the air currents in passageway 110.

Fig. 26 illustrates an embodiment wherein the air regulation means comprises a cap 114 covering a wire heater element 115 located in contact with a flat tip end 116 of a wick 117. The cap 114 acts in a manner similar to baffle 97 in Fig. 23 to prevent direct contact of air from a fan (not shown) on wire heater element 115. In this embodiment, cap 114 also includes a plurality of slots 118 formed therein to allow active volatized by wire heater element 115 to escape the interior thereof. Cap 114 may be held on wick 117 by one or more spring clips 119 which provides a snap-fit retainer for cap 114.

Fig. 27 illustrates yet another embodiment wherein a vented housing 120 is used as the air regulation means. In Fig. 27, housing 120 includes a plurality of spaced openings 121 formed therein so that movement of ambient air therethrough will expel volatized active from the interior of housing 120. Alternatively, housing 120 may be attached via a wrist-band 122 to a user so that as a user swings or moves his or her arm, air moves through openings 121 to expel volatized active.

It should be noted that all of the embodiments illustrated and described herein may be attached to and be wearable by a user so that the device is portable and wearable. In addition to wrist band 122 noted above, other attachment means could include various clips, pins, adhesives, hook and loop fasteners, magnets, ties, necklaces, straps, bands and buckles, as is well known in the art.

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It should also be noted that various types of fans can be incorporated into the device to enhance efficacy by distributing the volatized active and moving it away from the wick. For example, in addition to a conventional fan that utilizes a motor driven rotating blade, one could also use a piezo flapper device. The piezo flapper comprises a piezo device that vibrates, causing an attached material to vibrate and move air (low CFM). Alternatively, a conventional fan can be used to provide higher air velocity, as measured using cubic feet per minute (CFM). A piezo flapper uses a piezo ceramic disc or film material attached to a rectangular "flapper". The piezo vibrates at a low frequency (typically 100hz) when excited with the proper voltage. The vibration is mechanically transferred to the flapper creating a fan that moves air. Key benefits of piezo flappers are the low energy required to activate the device, small size and high reliability. Such fans are available under the trade names Piezoelectric Bender, Piezoelectric Flapper, or Piezoelectric Chopper from companies such as Piezo Systems, Physik Instrumente GmbH & Co., and East Electronics. Fig. 3 illustrates an electronic circuit that incorporates a subcircuit including a potentiometer 128 for controlling a piezo fan 129.

EXAMPLES

Fig. 6 is a graph that illustrates the ability of localized and cyclic heating used in heater 1 to meter the release of fragrance. This method of dispensing provides for increased control and flexibility. Current heated systems create an equilibrium release between temperature, surface area, and effluent physical properties. By controlling the amount of heat or more directly the magnitude of temperature reached, the on-time duration, and the frequency of the cycle this heating method can provide a wide range of effluent release, as shown. This experiment was conducted as shown in Table 1 with a 15G NiCr wire resistive heating element.

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TABLE 1

Temp +/- 5 (F)	Weight per Dispensings (μg)	Weight Change (g)	Weight Initial (g)	Weight Final (g)	Dispensings (or minutes)	Dispensing Cycle (min)
110	18.18	0.00020	14.0901	14.0899	11	1
130	20.00	0.00020	14.0894	14.0892	10	1
150	20.00	0.00020	14.0887	14.0885	10	1
170	40.00	0.00040	14.0882	14.0878	10	1
190	81.82	0.00090	14.0173	14.0164	11	1
210	120.00	0.00120	14.0853	14.0841	10	1
230	200.00	0.00200	14.0830	14.0810	10	1
250	510.00	0.00510	14.0751	14.0700	10	1
270	680.00	0.00680	14.0303	14.0235	10	1
290	815.38	0.01060	14.0098	13.9992	13	1
310	800.00	0.00880	13.9033	13.8945	11	1

Current from wall power was passed through the wire for one minute and then turned off. The amperes were controlled such that the maximum temperature achieved was that shown. Increasing the current increased the temperature and subsequently increased the weight loss per cycle. Ten to thirteen cycles were performed to obtain the average weight loss. The inflection in the profile indicates that there are temperatures that volatilize fragrance at a rate faster than fragrance can feed the heat zone during the on-cycle for volatilization. As a result, the weight loss per dispensing begins to fall with greater temperatures until a plateau occurs. During the off-cycle there is time for the emanator to recharge for another heat cycle.

Fig. 7 is an example of the control of an insecticide by a similar experimental protocol as that described for Fig. 6. This experiment was conducted as shown in Table 2 also with a 15G NiCr wire resistive heating element.

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TABLE 2

Temp +/- 5 (F)	Weight per Dispensings (μg)	Weight			Dispensings (or minutes)	Dispensing Cycle (min)
		Change (g)	Initial (g)	Final (g)		
100	3.18	0.0005	8.8945	8.8940	157	1
150	7.58	0.0005	9.0076	9.0071	66	1
200	18.48	0.0017	8.8962	8.8945	92	1
250	46.34	0.0038	9.0010	8.9972	82	1
300	109.84	0.0067	8.9972	8.9905	61	1
350	154.41	0.0105	8.9905	8.9800	68	1
400	195.96	0.0158	8.9800	8.9642	81	1
450	231.37	0.0118	8.9642	8.9524	51	1
500	352.85	0.0434	8.8940	8.8506	123	1
550	90.54	0.0067	8.9379	8.9312	74	1

The insecticides showed a similar rate limiting behavior as that with fragrances with increasing temperature.

Fig. 8 represents a bioefficacy example where the same localized heating and cyclic control device used as in Fig. 7. Figure 8 represents the adjustable performance of localized and cyclic heating against experimental controls and marketed products. Data was gathered by preparing 6.12 m^2 enclosed chamber with ventilation control. The chamber was cleaned with soap and water for any residual insecticide from previous tests and ventilation stopped. 100 female Aedes Aegypti mosquitoes were released in the chamber and observed for the number of mosquitoes that fell unresponsive over the course of time. Figure 8 indicates that no mosquitoes were lost during the control experiment. The performance standard for mosquito kill or knockdown is that of the pre-burned coil. This occurs by burning a standard coil treated with an insecticide solution. Upon burning the insecticide is released and fills the chamber. A sample of 100 mosquitoes is released in this treated chamber and observed for knockdown over time. It is observed that 90% of the insects are killed with about three minutes of exposure and the remainder within the next few minutes. The "45-Night" designation represents a currently marketed product in a common form, which provides

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nighttime protection for 45 nights. In this and all remaining experiments in this example the chambers were prepared to control standards, the mosquitoes released and then the insecticide product released by the various devices or methods. These experiments required the device to treat the room and begin causing insect knockdown. The 45 night product showed a twelve minute lag to first efficacy. The coil from a cold start showed a seven minute lag with steeper effect against the mosquitoes. PPH represents the localized and cyclic heater and shows that it can be operated with adjustable temperature magnitude, on-time duration, and frequency to have very fast two minute onset and steep bioefficacy slope for such reasons as initial space treatment and then can be adjusted for slower onset at seven minutes and shallower slope which may represent a maintenance treatment, adjustment for smaller space, or for personal preference.

Table 3 shows an important additional conclusion from this example is the observation that the insecticide active was not destroyed by the intensive localized heating. It has been shown that the amount of active released is that which is theoretically needed for knockdown. Such theoretical values have been shown experimentally and correspond to the performance of this technology. This indicating that there is limited destruction of the chemical entity through localized cyclic heating.

TABLE 3

Active Delivered:

Wt. Of Formula Used (g)

	Test 1	Test 2
Before	10.3947	10.3938
After	10.3938	10.3917
Total used	0.0009	0.0021
ug Al used	27	63

Theoretical Air Concentration

	Test 1	Test 2
Volume (L)	420	6120
ug Al	27	63
ug/L	0.0643	0.0103

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Test 1:

Test: 0.42 M3 chamber.
Insect: A. aegypti.
Formula: Raid Electric 45 night
3% EBT, 1% BHT, 96% Isopar V
Heater cycle time: 1:03 min.

Dispensing No.	Temp. (C)	Time (Min)	KD (#)	Total No.	KD (%)
1	116	1	0	9	0
2	119	2	0	9	0
3	121	3	0	9	0
4	118	4	1	9	11
5	120	5	1	9	11
6	115	6	1	9	11
7	116	7	3	9	33
8	116	8	7	9	78
9	118	9	8	9	89
10	119	10	8	9	89
11	119	11	8	9	89
12	120	12	9	9	100

Similarly, by the use of fragrance and human panelist trained in fragrance hedonics, it has been qualitatively shown that the quality of a fragrance is also not degraded with localized cyclic heating. The burst of high temperature heating preferentially facilitates volatilization rather than degradation.

Fig. 9 and Table 4 illustrate the favorable particle sizes created by the operation of the localized and cyclic heating of heater 1.

TABLE 4

	10	20	30	40	50
0.3 um Profile	69269.38	26828	17878.5	15459.63	14119
0.5 um Profile	57631.25	18322.38	10794.13	8980.25	7921
0.7 um Profile	47058.5	10181.75	5176.75	4096.875	3425.875
1 um Profile	39238	6952.125	3285.375	2535.125	2073.75
5 um Profile	730.625	21.5	12.375	10.625	9.75
10 um Profile	5	0.25	0.25	0.25	0.25

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The mechanism of molecular volatilization and detection of particles results form the condensation of the vapor within the vicinity of the emanator. The size and energy (retained heat) of these particles is important in their post condensation behavior. Particles that are too large suffer from lack of time aloft and lack of surface area. Large particles of 2 - 3 μm and particularly above 10 μm in diameter or more are affected by gravity and will fall out of suspension in the air near the emanator. Because of the lack of loft the particles are not able to drift to lower concentrated areas where they can revaporize. Contributing to the difficulty to revolatilize is the reduced surface area per volume of the larger particles, which limits the amount of surface available for volatilizations. Just the opposite is available from the localize cyclic heating method of the present invention. These particles have reduced diameter below 1 μm, which are too small to settle out from gravitational forces, are too small to deposit in human respiratory system, and have large surface to volume ratios such that revolatilization is quickly promoted. The particles from the localized cyclic heat source of heater 1 efficiently disperse and remain dispersed in air.

Fig. 10 and Table 5 demonstrate the variable temperatures that are achievable with a single thin film oxide heater with variable current input.

TABLE 5

Amp	0.5 Temp (F)	1 Temp (F)	1.5 Temp (F)	2 Temp (F)
0.3	119.72	103.30	85.66	63.14
0.35	130.19	111.89	92.43	69.01
0.4	126.72	106.92	89.96	67.46
0.45	0.45	0.45	0.45	0.45
0.5	0.50	0.50	0.50	0.50
0.55	120.75	106.80	88.93	65.50
0.6	128.90	111.11	91.01	67.34

This example illustrates one composition with surface temperatures can vary over broad ranges. It also represents that final temperatures are largely achieved

NJOY Exhibit 1002.717

within the first half second of current application. There is little temperature change between one-half second and two seconds. This example confirms the rapid heating characteristics of the thin film heating element within appropriate ranges for use within the fields described by this application.

NJOY Exhibit 1002.718

CLAIMS

I claim:

1. A portable apparatus for dispersing a volatile active into air, comprising:

a base;

a reservoir containing a composition having a volatile active;

a holder for mounting said reservoir to said base;

a wick having an emanating surface and communicating with said composition for delivering said composition to said emanating surface;

a heating element in contact with said emanating surface; and

a source of power communicating with said heating element to heat said heating element and vaporize said volatile active.

2. The apparatus of claim 1 wherein said volatile active is selected from the group consisting of an insect repellant, an insecticide, a pesticide, an antiseptic, a fungicide, a plant growth regulator, a herbicide, an air freshener, a perfume, a deodorant, a medicament, and mixtures thereof.

3. The apparatus of claim 1 wherein said volatile active is an insect repellant.

4. The apparatus of claim 3 wherein said insect repellant is selected from the group consisting of pyrethrins, chrysanthemic acid derivatives, pyrethroids, and mixtures thereof.

5. The apparatus of claim 4 wherein said insect repellant is a pyrethroid and is selected from the group consisting of allethrin, d-allethrin, bioallethrin, S-bioallethrin, empenthrin, prallethrin, and transfluthrin, and combinations thereof.

6. The apparatus of claim 3 wherein said insect repellant is 3-allyl-2-methylcyclopenta-2-ene-4-one.

7. The apparatus of claim 3 wherein said insect repellant is N,N-diethyl meta-toluamide.

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8. The apparatus of claim 1 wherein said holder provides a removable mounting for said reservoir.

9. The apparatus of claim 8 wherein said reservoir and wick are integral with each other to provide removable and replaceable refill assembly.

10. The apparatus of claim 9 wherein said refill assembly further includes said heating element.

11. The apparatus of claim 8 wherein said holder provides a snap-fit mounting for said refill assembly.

12. The apparatus of claim 1 wherein said wick is composed of a material selected from the group consisting of natural materials, fibers, nonwovens, sintered polymers, ceramics, metal foams and glass.

13. The apparatus of claim 1 wherein said heating element is an electro-resistive heating element.

14. The apparatus of claim 13 wherein said electro-resistive heating element is selected from the group consisting of a wire, a thin film and a thick film.

15. The apparatus of claim 13 wherein said electro-resistive heating element is a wire composed of nichrome.

16. The apparatus of claim 13 wherein said electro-resistive heating element is a thin film composed of tin oxide.

17. The apparatus of claim 1 wherein said composition is in the form of a liquid, solid, semi-solid or gel at ambient conditions.

18. The apparatus of claim 1 further including a spring providing a force to maintain said heating element in contact with said emanating surface.

19. The apparatus of claim 18 wherein said wick includes a relatively flat tip end defining said emanating surface and said heating element contacts said flat tip end.

20. The apparatus of claim 18 wherein said wick includes opposite ends and at least one side surface between said opposite ends defining said emanating surface and said heating element contacts said side surface.

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21. A portable apparatus for dispersing a volatile active into air, comprising:

a base;

a reservoir containing a composition having a volatile active;

a holder for mounting said reservoir to said base;

a wick having an emanating surface and communicating with said composition for delivering said composition to said emanating surface;

a wire heating element in contact with said emanating surface;

a spring providing a force to maintain said wire heating element in contact with said emanating surface; and

a source of power communicating with said heating element to heat said heating element and vaporize said volatile active.

22. The apparatus of claim 21 wherein said volatile active is selected from the group consisting of an insect repellant, an insecticide, a pesticide, an antiseptic, a fungicide, a plant growth regulator, a herbicide, an air freshener, a perfume, a deodorant, a medicament, and mixtures thereof.

23. The apparatus of claim 21 wherein said volatile active is an insect repellant.

24. The apparatus of claim 23 wherein said insect repellant is selected from the group consisting of pyrethrins, chrysanthemic acid derivatives, pyrethroids, and mixtures thereof.

25. The apparatus of claim 24 wherein said insect repellant is a pyrethroid and is selected from the group consisting of allethrin, d-allethrin, bioallethrin, S-bioallethrin, empenthrin, prallethrin, and transfluthrin, and combinations thereof.

26. The apparatus of claim 23 wherein said insect repellant is 3-allyl-2-methylcyclopenta-2-ene-4-one.

27. The apparatus of claim 23 wherein said insect repellant is N,N-diethyl meta-toluamide.

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28. The apparatus of claim 21 wherein said holder provides a removable mounting for said reservoir.

29. The apparatus of claim 28 wherein said reservoir and wick are integral with each other to provide removable and replaceable refill assembly.

30. The apparatus of claim 29 wherein said refill assembly further includes said heating element.

31. The apparatus of claim 28 wherein said holder provides a snap-fit mounting for said refill assembly.

32. The apparatus of claim 21 wherein said wick is composed of a material selected from the group consisting of natural materials, fibers, nonwovens, sintered polymers, ceramics, metal foams and glass.

33. The apparatus of claim 21 wherein said wire heating element is composed of nichrome.

34. The apparatus of claim 21 wherein said composition is in the form of a liquid, solid, semi-solid or gel at ambient conditions.

35. The apparatus of claim 21 wherein said wick includes a relatively flat tip end defining said emanating surface and said heating element contacts said flat tip end.

36. The apparatus of claim 21 wherein said wick includes opposite ends and at least one side surface between said opposite ends defining said emanating surface and said heating element contacts said side surface.

37. A portable apparatus for dispersing a volatile active into air, comprising:

a base;

a refill assembly comprising a reservoir containing a composition having a volatile active, a wick having an emanating surface and communicating with said composition for delivering said composition to said emanating surface, and a heating element in contact with said emanating surface;

a holder for removably mounting said refill assembly to said base;

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a source of power communicating with said heating element to heat said heating element and vaporize said volatile active;

a spring providing a force to maintain said heating element in contact with said emanating surface;

a cover attachable to said base to enclose said refill assembly, holder and spring, and including at least one air inlet and one air outlet; and

a fan mounted to move a current of air from said inlet past said emanating surface to cause egress of said volatile active from said air outlet.

38. The apparatus of claim 37 wherein said volatile active is selected from the group consisting of an insect repellant, an insecticide, a pesticide, an antiseptic, a fungicide, a plant growth regulator, a herbicide, an air freshener, a perfume, a deodorant, a medicament, and mixtures thereof.

39. The apparatus of claim 37 wherein said volatile active is an insect repellant.

40. The apparatus of claim 39 wherein said insect repellant is selected from the group consisting of pyrethrins, chrysanthemic acid derivatives, pyrethroids, and mixtures thereof.

41. The apparatus of claim 40 wherein said insect repellant is a pyrethroid and is selected from the group consisting of allethrin, d-allethrin, bioallethrin, S-bioallethrin, empenthrin, prallethrin, and transfluthrin, and combinations thereof.

42. The apparatus of claim 39 wherein said insect repellant is 3-allyl-2-methylcyclopenta-2-ene-4-one.

43. The apparatus of claim 39 wherein said insect repellant is N,N-diethyl meta-toluamide.

44. The apparatus of claim 37 wherein said holder provides a removable mounting for said reservoir.

45. The apparatus of claim 44 wherein said holder provides a snap-fit mounting for said refill assembly.

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46. The apparatus of claim 37 wherein said wick is composed of a material selected from the group consisting of natural materials, fibers, nonwovens, sintered polymers, ceramics, metal foams and glass.

47. The apparatus of claim 37 wherein said heating element is an electro-resistive heating element.

48. The apparatus of claim 47 wherein said electro-resistive heating element is selected from the group consisting of a wire, a thin film and a thick film.

49. The apparatus of claim 47 wherein said electro-resistive heating element is a wire composed of nichrome.

50. The apparatus of claim 47 wherein said electro-resistive heating element is a thin film composed of tin oxide.

51. The apparatus of claim 37 further including a battery housing mounted on said base, and wherein said source of power comprises at least one battery receivable in said battery housing for powering said heating element and fan.

52. The apparatus of claim 37 further including air regulation means for minimizing the velocity of said air current across said heater element.

53. The apparatus of claim 52 wherein said air regulation means includes a baffle disposed between said fan and said heater element to prevent direct contact of said air current with said heater element.

54. The apparatus of claim 52 wherein said air regulation means comprises a passageway formed adjacent to said heater element and communicating with said air inlet and said air outlet and through which said air current moves, said passageway communicating with said heater element to draw active vaporized by said heater element into said passageway as said air moves downstream therein.

55. The apparatus of claim 52 wherein said air regulation means comprises a passageway formed downstream of said fan through which said air current moves and having a first cross sectional area, and a chamber downstream of

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said passageway through which said air current moves and having a second cross sectional area, said second cross sectional area being greater than said first cross sectional area to thereby reduce the velocity of said air current through said chamber, and said heater element is disposed in said chamber.

56. The apparatus of claim 37 further including a non-removable permanent wick portion engageable with said wick of said refill assembly.

57. The apparatus of claim 56 further including a fluid coupling medium disposed between said permanent wick portion and said wick of said refill assembly.

58. The apparatus of claim 37 wherein said source of power includes electronic circuitry providing pulsed heating of said heating element.

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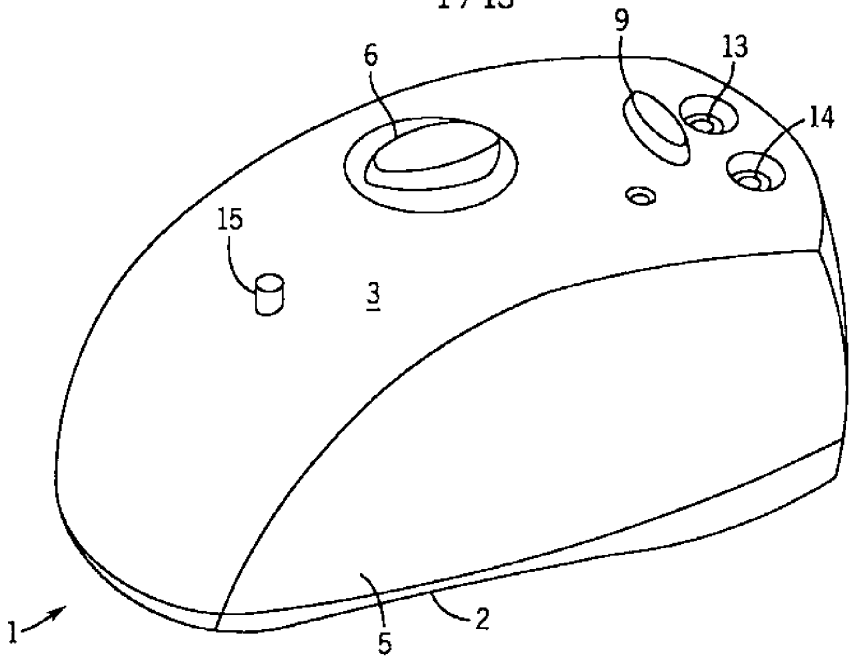


FIG. 1

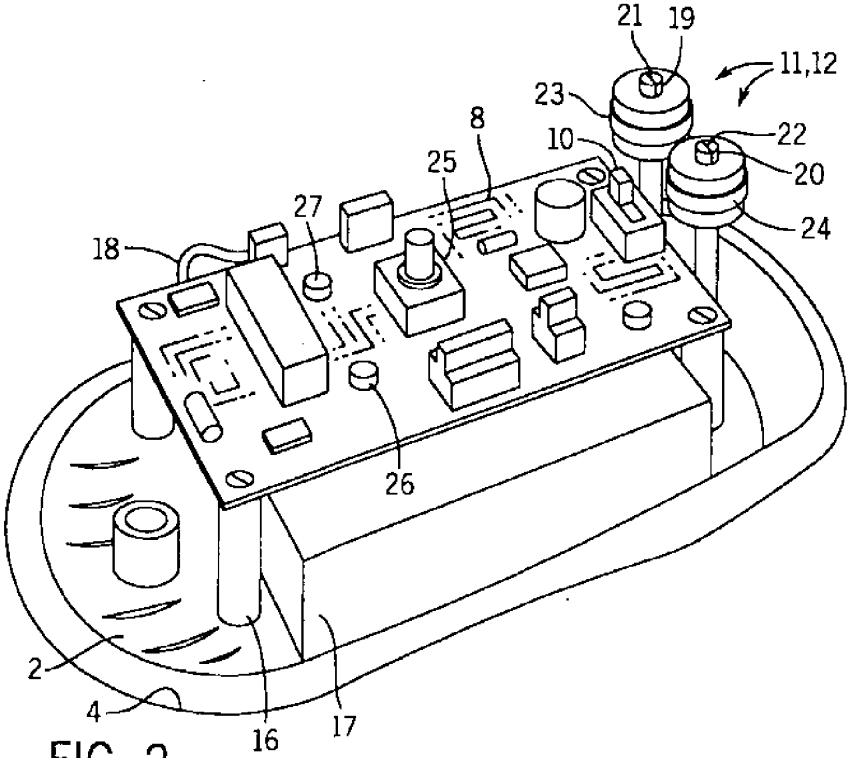


FIG. 2

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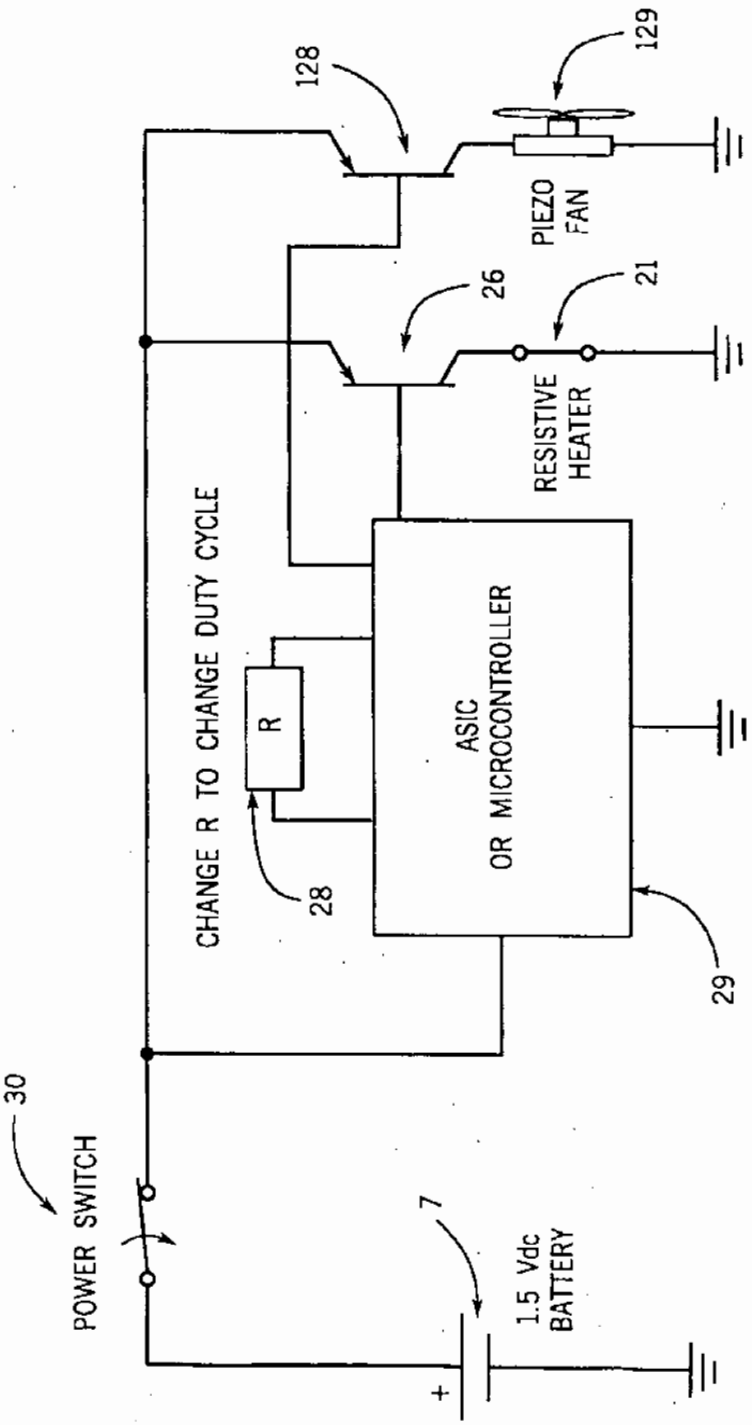


FIG. 3

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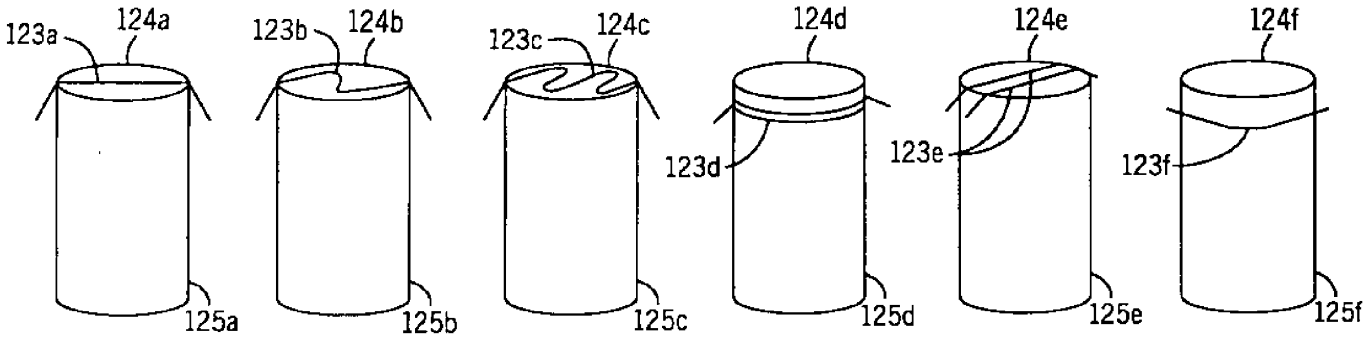


FIG. 4a FIG. 4b FIG. 4c FIG. 4d FIG. 4e FIG. 4f

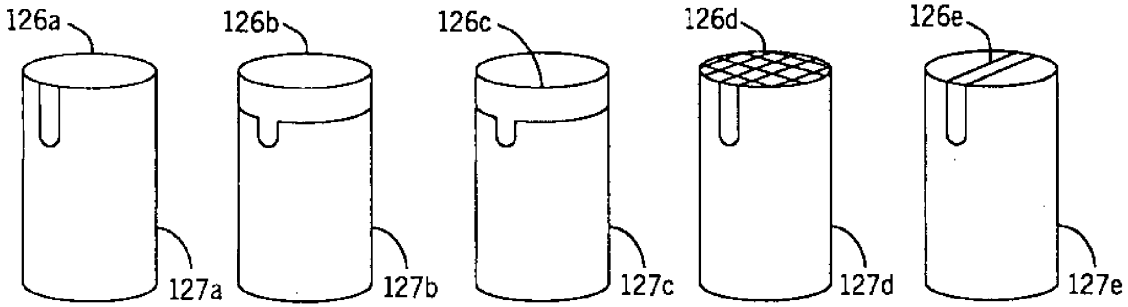


FIG. 5a FIG. 5b FIG. 5c FIG. 5d FIG. 5e

SUBSTITUTE SHEET (RULE 26)

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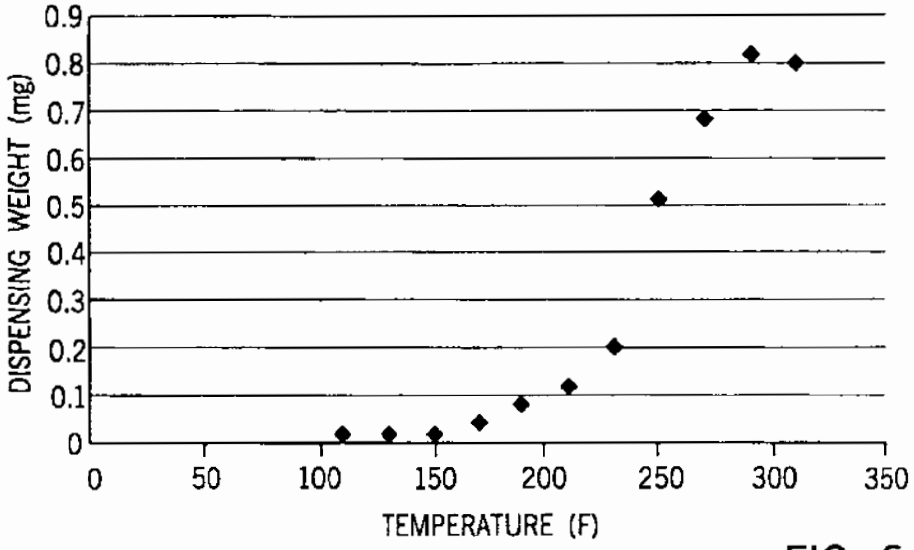


FIG. 6

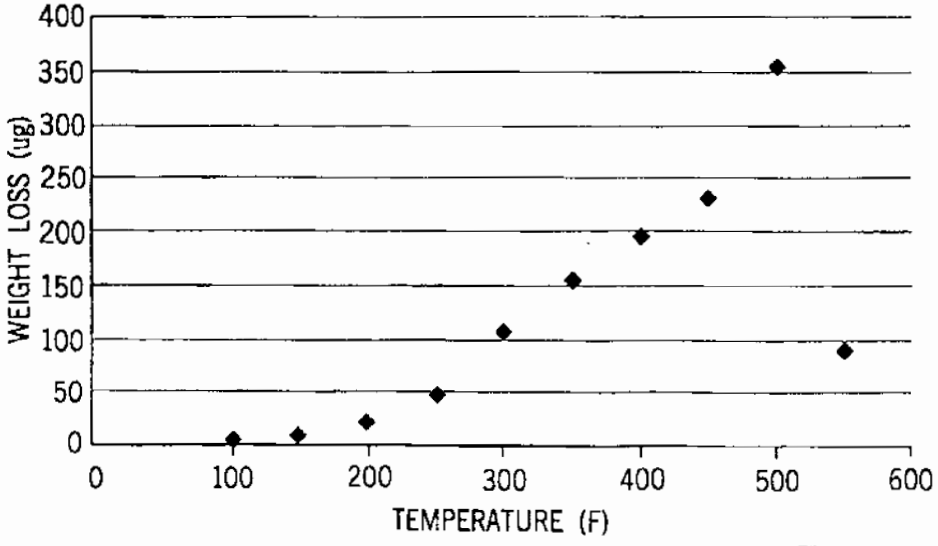


FIG. 7

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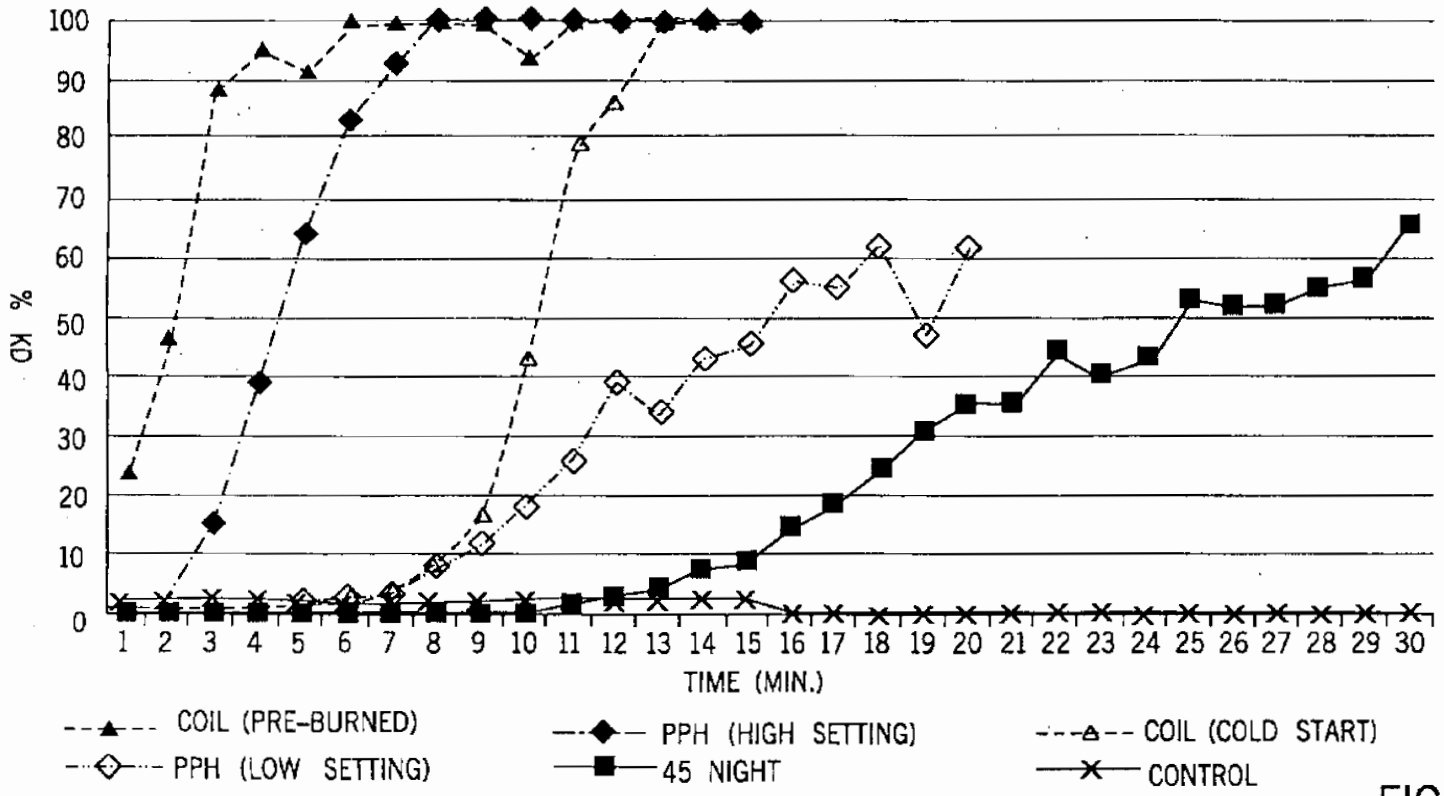


FIG. 8

SUBSTITUTE SHEET (RULE 26)

NJOY Exhibit 1002.730

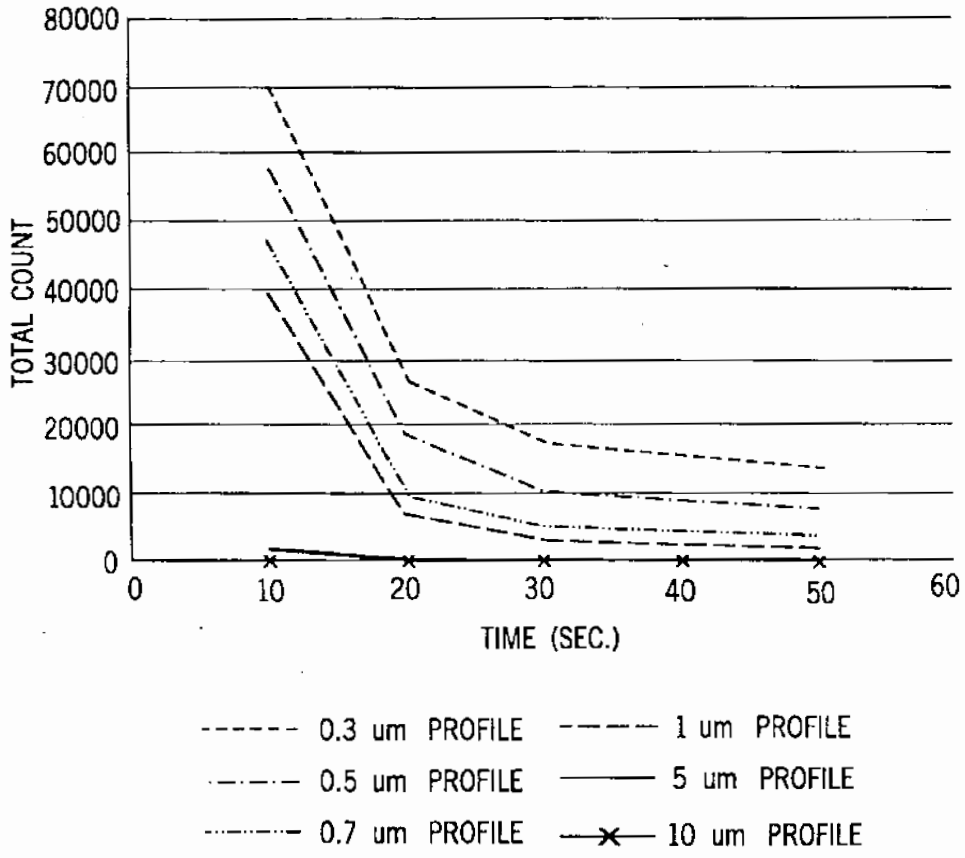


FIG. 9

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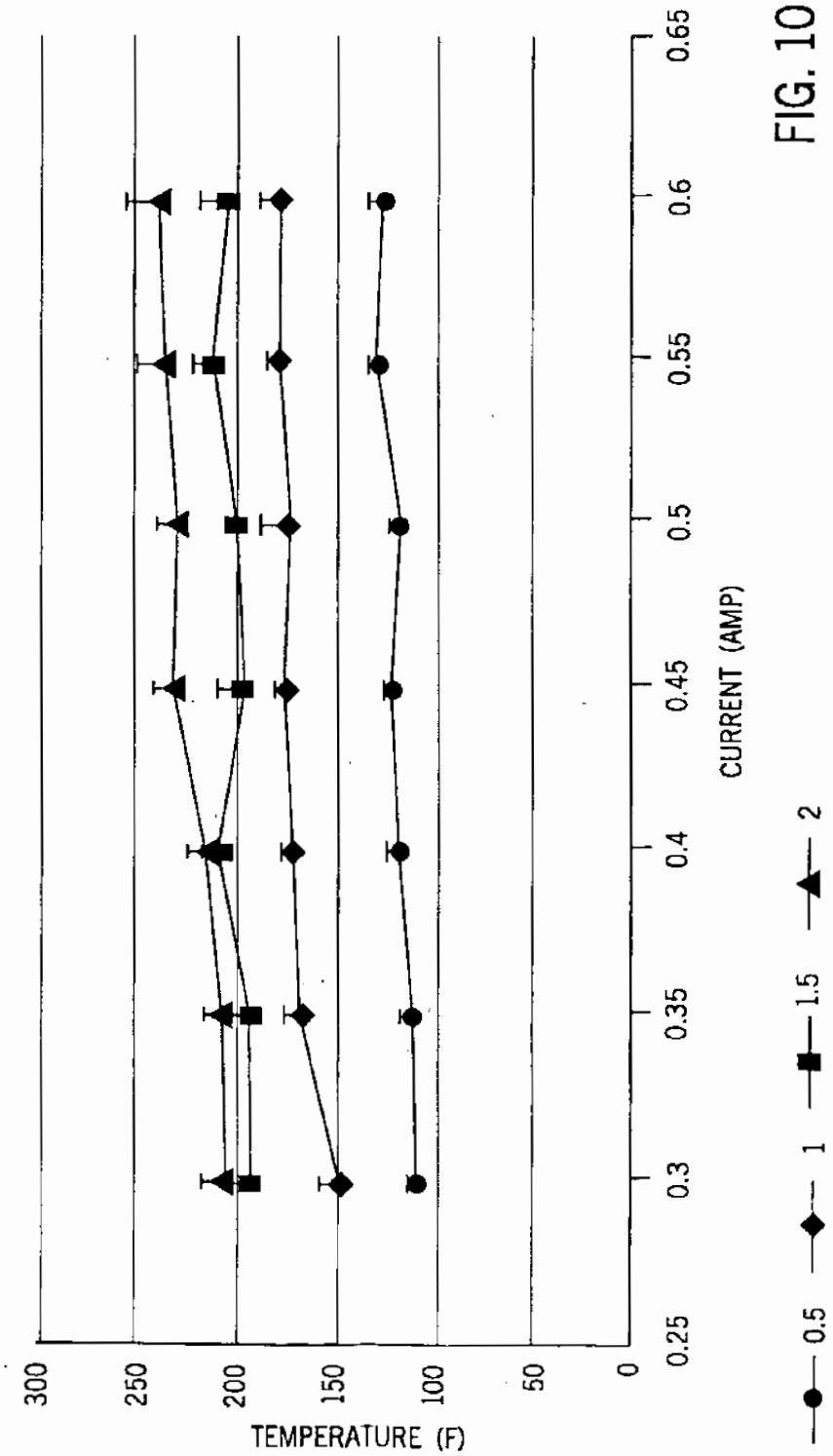


FIG. 10

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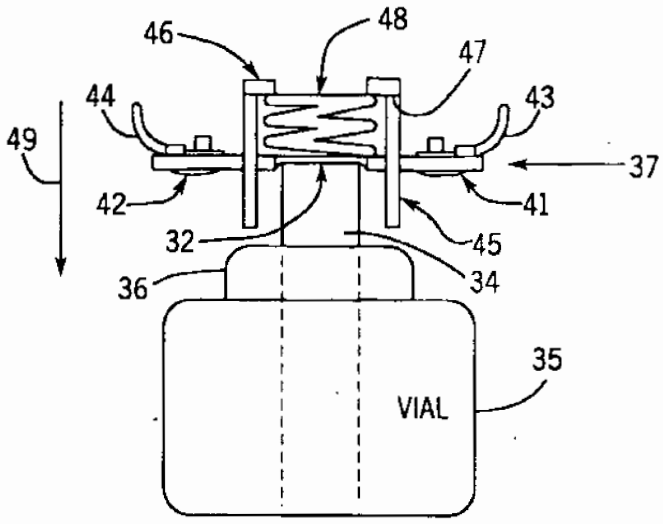


FIG. 11

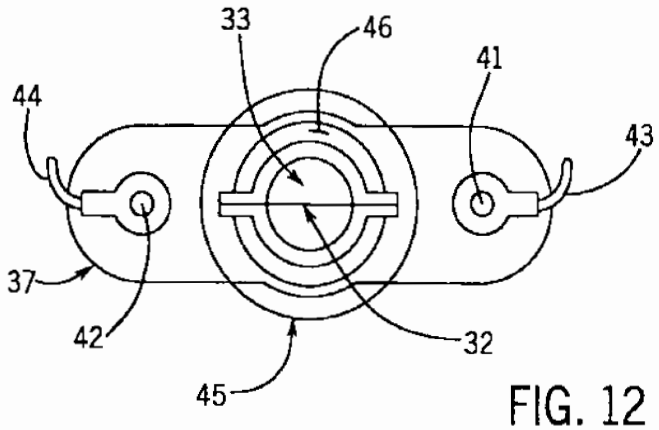


FIG. 12

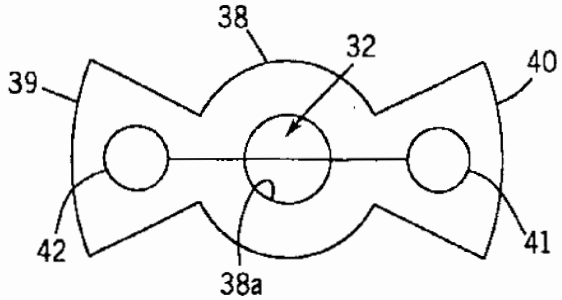


FIG. 13

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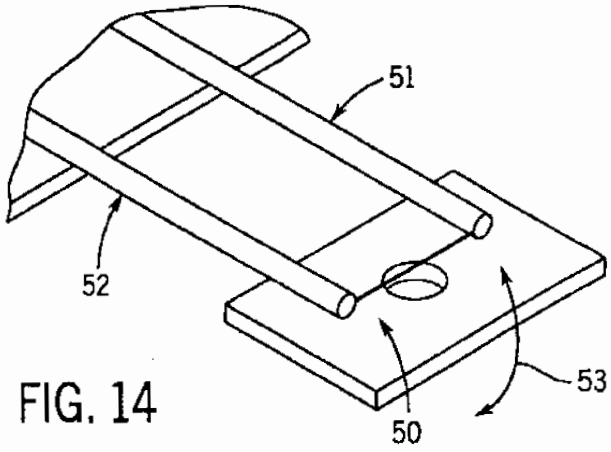


FIG. 14

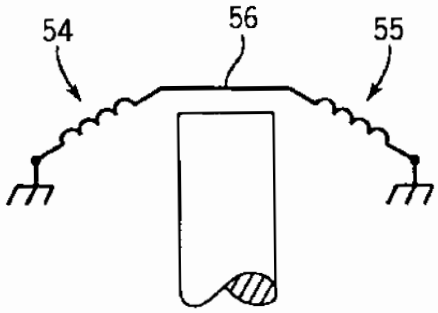


FIG. 15

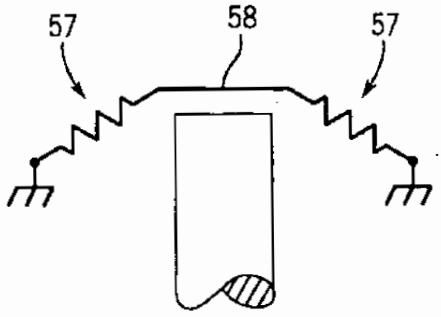


FIG. 16

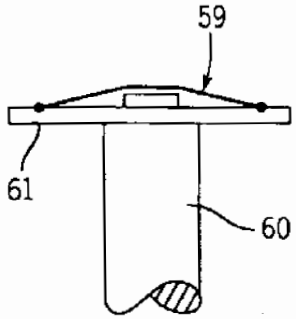


FIG. 17

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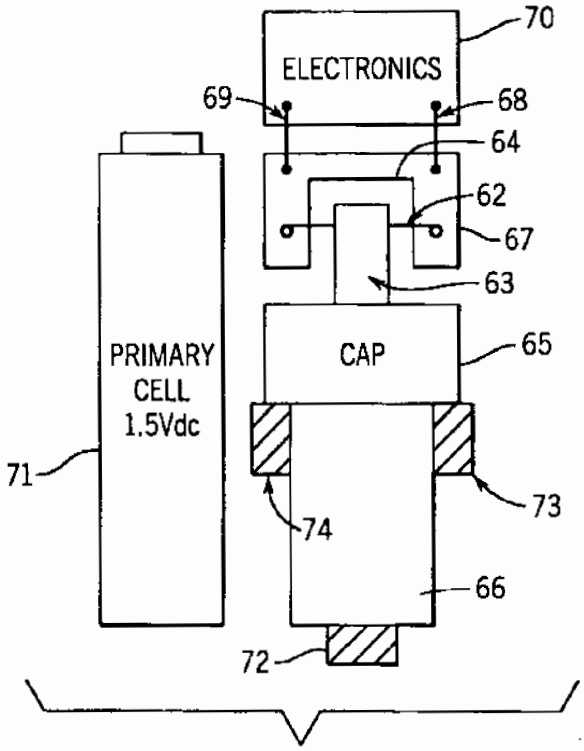


FIG. 18

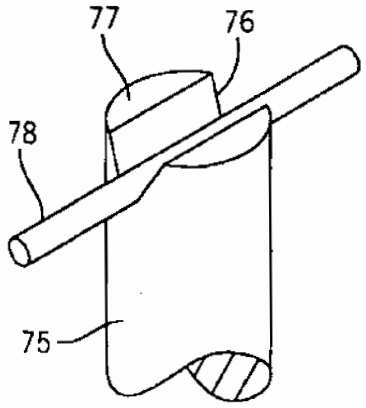


FIG. 19a

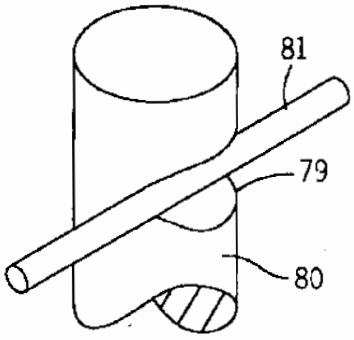


FIG. 19b

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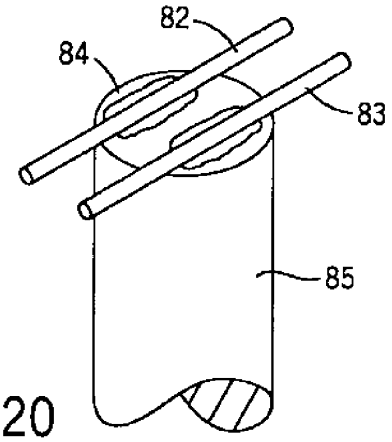


FIG. 20

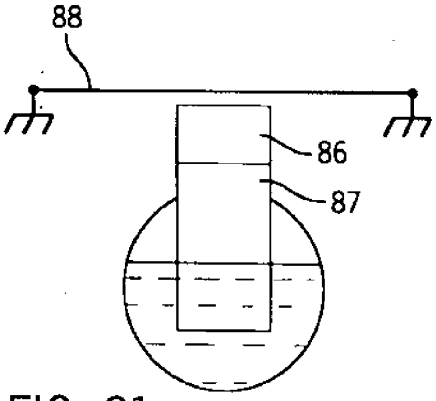


FIG. 21a

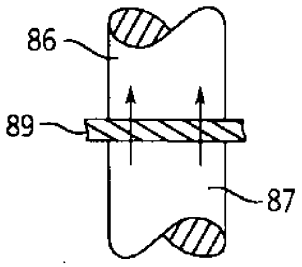


FIG. 21b

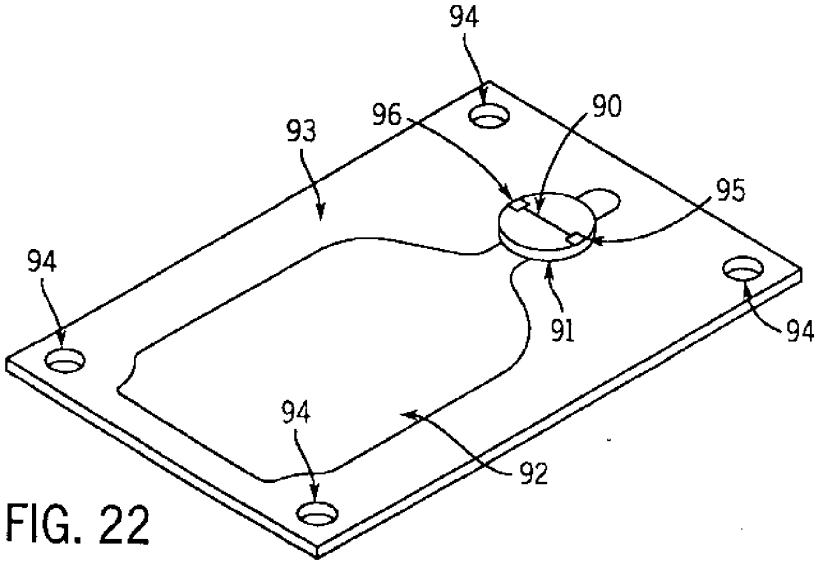


FIG. 22

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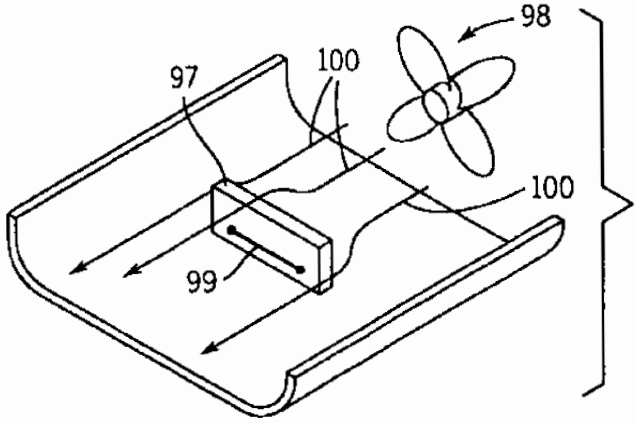


FIG. 23

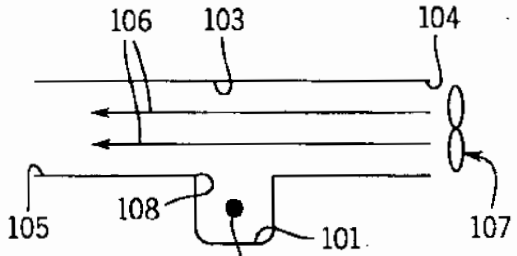


FIG. 24

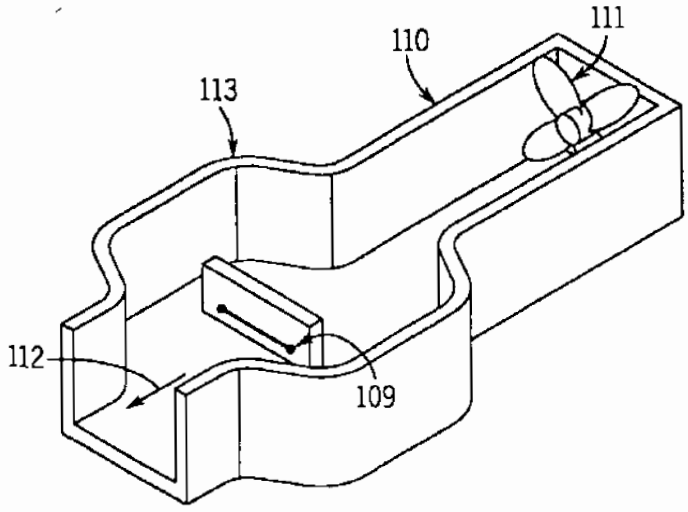


FIG. 25

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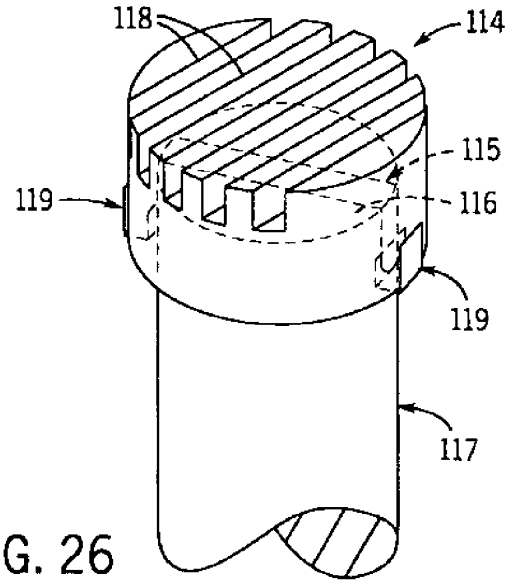


FIG. 26

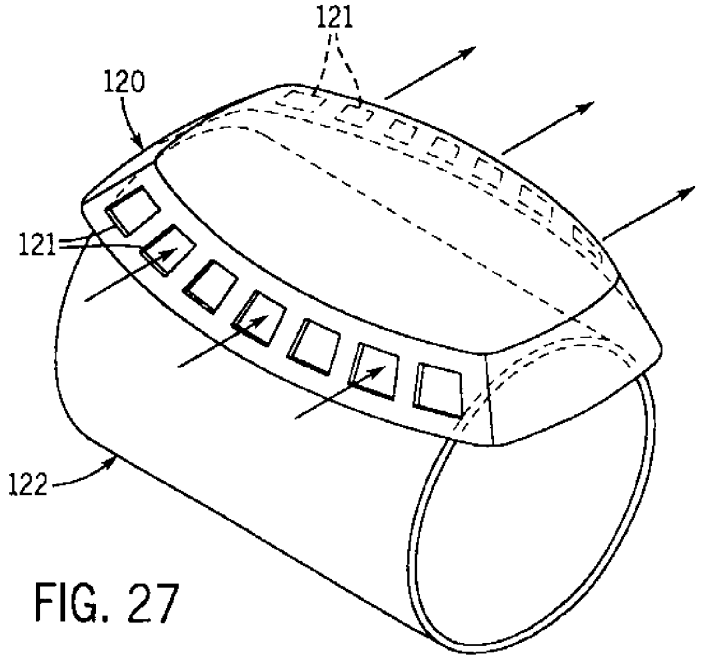


FIG. 27

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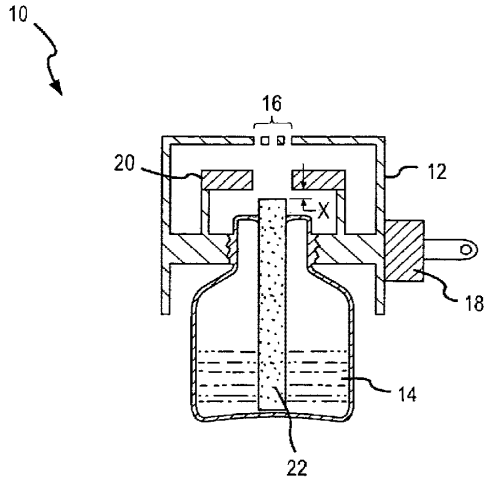
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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR POSITIONING A WICK MATERIAL IN A VAPOR-DISPENSING DEVICE



(57) Abstract: In accordance with one embodiment of the present invention, through effective alignment and positioning of a wick relative to a heating element in a vapor-dispensing device, effective vaporization of the vaporizable liquid can be obtained without subjecting the wick material to possible damage due to contact with the heating unit of the vaporizer during insertion, removal and/or use. For example, the wick is suitably selected and positioned such that sufficient surface area of the wick material is suitably exposed to the heating unit to enable effective evaporation of a vaporizable liquid, but the wick height relative to the heating element prevents contact between the heating element and the wick.

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Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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METHOD AND APPARATUS FOR POSITIONING A WICK MATERIAL IN A VAPOR-DISPENSING DEVICE

FIELD OF THE INVENTION

This invention generally relates to vapor-dispensing devices, and more particularly, to a method and apparatus for positioning a wick material in a vapor-dispensing device.

BACKGROUND OF THE INVENTION

There have been various methods devised to attempt to regulate the diffusion of volatile materials especially with regard to the vapor delivery of fragrances and/or deodorizers. Exemplary prior art devices which relate to this are U.S. Patent Nos.: 525,646; 1,123,036; 1,129,897; 1,323,659; 1,377,909; 2,383,960; 2,507,889; 2,616,759; 2,657,090; 2,787,496; 2,797,844; 2,878,060; 2,961,167; 2,975,464; 3,104,816; 3,239,145; 3,550,853; 3,633,881; 3,679,133; 3,804,331; 4,014,501; 4,094,639; 4,413,779; 4,663,315; 4,739,928; 5,038,394; 5,647,053; 5,903,710; 5,945,094; 5,976,503; and 6,104,867. The primary function of these types of devices has generally been the counteracting of malodors through the delivery of aesthetically pleasing fragrance vapors, or facilitating the delivery of other vapors, such as insecticides or other compositions.

In general, vapor-dispensing products typically include a fragrance-reservoir and a transport system from which fragrance is evaporated into the surrounding air. For example, in such systems the liquid to be evaporated is transported from a reservoir via a wick material partially immersed in the liquid. In such a system, in general, the liquid is transported through the wick by capillary action. Many of these systems, such as the system described in U.S. Patent No. 6,104,867 ("the '867 patent"), include a housing unit into which the liquid reservoir is placed. The housing of such devices advantageously includes a heating unit.

In such devices, the heating element delivers kinetic energy to molecules of the liquid as contained in the wick, thereby increasing the rate of evaporation to obtain higher fragrance intensity and uniform delivery density over time. Typically, in such

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units, a plug unit is plugged onto a conventional electrical outlet, thereby causing the heating unit to heat the liquid and vaporized liquid that have been drawn up into the wick. The wick and/or bottle unit containing the wick are suitably configured to such that the wick material is placed, when completely assembled, in proximity to the heating element. For example preferably, in most such devices, care is taken to ensure that the wick material, and particularly the uppermost portion thereof extends at least into, or more preferably into and through the typically circumferentially arranged heating unit.

While devices so configured typically ensure effective vaporization of the liquid to be dispensed, various difficulties can be encountered through use of the devices. For example, as explained in some detail in the '867 patent, one of these difficulties (addressed by the guidance and/or stabilization systems described in the '867 patent) is that the wick may become damaged either during insertion, use and/or removal of the wick containing reservoir (e.g., bottle). For example, during insertion and/or removal of the reservoir (e.g., bottle) the wick may be caused to contact the heating element. Furthermore, movement of the reservoir (e.g., bottle) relative to the housing during use or otherwise may give rise to deleterious or disadvantageous interactions between the wick and, for example, the hearing unit.

Products currently on the market have utilized wicks constructed of compressed graphite, porous ceramic, or fibrous bundles. See, for example, U.S. Patent No. 4,663,315 issued May 5, 1987 to Hasegawa et al, and U.S. Patent No. 5,647,053 issued July 8, 1997 to Shroeder et al. In these cases, the transport mechanism is capillary action of liquid passing through the structure of a wick, which in use, is contained within the heating element. Notably, and as discussed in more detail below, with momentary reference to Figures 1A and 1B and 2A and 2B, each of these exemplary prior art devices clearly require the wick material to be placed, when in use, within the heating element. (Figures 1A and 1B are Figures from the '315 Hasegawa et al patent, while Figures 2A and 2B are Figures from the '053 Schroeder et al. patent).

Various methods for connecting the fragrance liquid reservoir to a housing unit of a vapor-dispensing device have been developed and are known. Typically, such methods comprise simple snap-type mechanisms, as shown in the aforementioned '867 patent, or screw-thread designs, such as are shown on the '315 patent to

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Hasegawa. With such systems, particularly when used in a wick containing vaporizer, the wick may be damaged by being crushed or bent by careless interconnection, or be overheated by contact with the heating element during operation, due to instability and improper positioning of the wick material relative to the heating element. This same instability and improper positioning may cause uneven heating of the wick, result in diminished evaporative performance, and consumer frustration.

Thus, there exists a need for a method for positioning a wick material in a vapor-dispensing device that addresses the disadvantages of the prior art.

SUMMARY OF THE INVENTION

While the way in which the present invention addresses the disadvantages of the prior art will be discussed in greater detail below, in general, the present invention achieves and advancement in the art by providing a method and apparatus for selective positioning of a wick material in a vapor-dispensing device that facilitates effective fragrance vapor delivery while offering significant advantages in manufacture, assembly, product performance, and product safety.

For example, in accordance with one embodiment of the present invention through effective alignment and positioning of the wick relative to a heating element in a vapor-dispensing device, effective vaporization of the vaporizable liquid can be obtained without subjecting the wick material to possible damage due to contact with the heating unit of the vaporizer during insertion, removal and/or use. In accordance with one aspect of this embodiment, the wick is suitably selected and positioned such that sufficient surface area of the wick material is suitably exposed to the heating unit to enable effective evaporation of a vaporizable liquid, but the wick height relative to the heating element prevents contact between the heating element and the wick.

Further benefits and advantages of the various aspects and embodiments of the present invention are described in detail hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the present invention is particularly pointed out and distinctly claimed in the concluding portion of the specification. A more complete understanding of the present invention, however, may best be obtained by referring to the detailed description and claims in connection with the drawing figures, wherein:

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Figures 1A and 1B are cross-sectional views of the thermal vaporizer disclosed in U.S. Patent No. 5,038,394 issued August 6, 1991 to Hasegawa et al. wherein Figure 1A corresponds to Figure 5 of the '394 Patent and Figure 1B corresponds to Figure 10 of the '394 Patent;

Figures 2A and 2B illustrate the vapor dispensing device described in U.S. Patent No. 5,647,053 issued July 8, 1997 to Schroeder et al., wherein Figure 2A corresponds to Figure 1 of the '053 Patent and Figure 2B corresponds to Figure 4 of the '053 Patent;

and Figure 3 is a cross-sectional view of an exemplary liquid vaporizer system in accordance with various aspects of the present invention.

DETAILED DESCRIPTION OF AN EXEMPLARY EMBODIMENT

The following description is of exemplary embodiment of the invention only, and is not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description is intended to provide a convenient illustration for implementing various embodiments of the invention. As will become apparent, various changes may be made in the function and arrangement of the elements described in these embodiments without departing from the scope of the invention as set forth in the appended claims.

In the context of the present invention the method and apparatus hereof find particular use in connection with liquid vaporizer systems. With reference to Figure 3, an exemplary liquid vaporizer system 10 in accordance with various aspects of one embodiment of the present invention suitably comprises a housing unit 12 and a reservoir (e.g., bottle) unit 14. Reservoir unit 14 is suitably configured for disposition in conjunction with housing 12 and for retention therewithin.

Various methods for connecting the liquid reservoir 14 to a housing unit 12 of a vapor-dispensing system 10 have been developed and are known. Typically, such methods comprise simple snap-type mechanisms or screw-thread designs. Momentarily, generally speaking, various liquid vaporizers are known and any number of such dispensers are suitable for use in accordance with the present invention. That is, any liquid dispensing device which facilitates the transfer of a liquid through a fluid transfer mechanism (e.g., a wick) which is configured to be heated through use of a heating unit can feasibly incorporate various aspects of the present invention.

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For example, a typical non-limiting example used herein is an electric liquid vaporizer comprising a housing unit configured to receive a liquid container or bottle portion. In such systems, typically the bottle portion includes some type of a wick or wick system which permits the liquid, which is ultimately to be vaporized, to be absorbed therein through capillary action. The housing unit of such a system generally contains a heating mechanism, typically electrically activated. The bottle portion which generally contains the liquid for vaporization, is usually configured for attachment to the housing such that the wick is suitably positioned proximate the heating mechanism so that the liquid will be vaporized. In general, however, it should be appreciated that any liquid vaporizer system may be utilized in connection with and benefit from the various aspects of the present invention. The exemplary description provided herein is not intended to be limiting in any way, but rather is provided simply to illustrate various aspects of one embodiment of the present invention.

With continued reference to Figure 3, exemplary devices suitable for incorporating the present invention include vaporizing devices such as liquid electric air fresheners like those described in U.S. Patent No. 6,104,867 issued August 15, 2000 to Stathakis et al; U.S. Patent No. 5,647,053 issued July 8, 1997 to Schroeder et al; and U.S. Patent No. 5,038,394 issued August 6, 1991 to Hasegawa et al. although, generally speaking, various aspects of the present invention can be incorporated in any number of devices, now known or as yet unknown in the art, designed for transporting fluid through a wick or other similar mechanism, and air freshening devices are merely non-limiting examples.

Housing unit 12 generally includes some type of a vent system 16 and an electrical plug unit 18. Housing unit 12 also suitably includes a heating element 20. Typically, such heating units comprise a heating element which can be readily and reliably charged through use in a conventional outlet. In this manner, heating element 20 is electrically connected to plug unit 18 (not shown).

Liquid reservoir 14 suitably comprises some form of a bottle or other liquid containment material. Reservoir 14 is suitably configured for receipt of a vaporizable liquid device. Such liquid material is suitably presented for vaporization through a wick 22. In accordance with various aspects of the present invention, the vaporizable material can be any number of conventional materials dispensed from vapor dispensers including fragrances, disinfectants, sanitizing agents, insect repellents,

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insecticides and the like. Preferably, in accordance with a preferred aspect of the present invention, the material to be volatized comprises a fragrance material and system 10 is suitably configured for use as an air-freshening device. In this manner, reservoir 14 is suitably filled with a fragrance containing material inserted into housing unit 12 such that the fragrance material can be vaporized through operation of heater unit 20.

Inasmuch as the operation of liquid vaporizers of this type is generally known to those of skill in the art, the operation will not be described in detail herein. Suffice it to say, however, that in accordance with various aspects of a preferred embodiment of the present invention, the vapor dispensing system 10 suitably includes some form of housing 12, reservoir 14, and heating element 20 such that when electrical plug unit 18 is plugged into a conventional electrical outlet heater unit is activated.

As discussed in greater detail hereinabove, prior art systems require that the wick pass through a wick opening formed in the heating element itself. For example, as described in U.S. Patent No. 5,038,394, issued August 6, 1991, to Hasegawa, et al., the wick material of the refill bottle is inserted into the ring heater concentrically therewith. As described in the Hasegawa '394 patent, in such a state, the heater is energized and the upper portion of the wick is heated to thereby cause vaporization of the liquid material to be vaporized. See, for example, Figures 1A and 1B.

Similarly, as described in U.S. Patent No. 5,647,053, issued July 8, 1997 to Schroeder, et al., typically the top of the wick will extend into and to about the top of the heating unit so as to enable the heat generated by the heating element to be near the top of the wick. See, for example, Figures 2A and 2B.

In contradistinction to the arrangements shown in the prior art, the present inventors have found that effective fluid delivery can be obtained while avoiding the disadvantages of the prior art by suitably selecting appropriate wick materials and locating the wick structure, for example wick 22, within an effective heating zone, which zone, while proximate the heating element, for example heating unit 20, does not require wick 22 to pass into or through heating unit 20.

In accordance with various aspects of the present invention, the wick material is suitably selected to serve as an effective fluid transport mechanism. Exemplary wick materials include any material which may be suitably configured to exhibit acceptable porosity, and thus, acceptable transport kinetics. Stated another way, in accordance

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with various aspects of the present invention, suitable wick materials include those with effective wicking properties.

For example, the porous wicks described and set forth in Applicants' International Application entitled "Porous Wick for Liquid Vaporizers, "PCT/US01/31462 filed October 9, 2001 and published April 18, 2002, describes various wick constructions having improved vapor dispensing capabilities. The subject matter of that application is hereby incorporated herein by reference. Moreover, other wick materials which permit relatively rapid transport kinetics also may suitably be utilized. For example, various graphite, ceramic, polymeric, or fibrous wicks may be utilized.

Nonetheless, notwithstanding this preference, in each case, it is desirable that the wick material effectively transport the liquid to be vaporized in a substantially uniform manner. It is also preferable that the wick materials be used in an unsheathed fashion. However, in certain applications sheaths may be used; for example, in cases where effective delivery of the volatile material to be vaporized is transported by the wick material to the uppermost portion of the wick. For example, in certain instances where wicks of significant diameters are used, sufficient liquid to be vaporized (e.g., fragrance) may be delivered to the uppermost portion of the wick and in such case sheaths may be adequately employed.

Surprisingly, the present inventors have found that contrary to the teachings of the prior art, there is an effective range within which the wick may be placed and effective vaporization occurs. In this regard, "vaporization," as used herein is used not only in a conventional sense, but also to include the formation of small aerosol-sized particles. That is, vaporization refers not only to the actual vapors but also to these small particles which can remain suspended for extended periods of time. Such vapors are generally caused to be evacuated from the device, such as through vent 16.

In accordance with various aspects of the present invention, suitable wick materials are selected and placed within an effective region (heating zone) surrounding heating element, such as heating element 20. This effective region may be defined in many ways and in part depends upon the particular temperature of the heating element. While certain limitations on the temperatures exist, particularly for air freshening devices, in general, those devices which operate at higher temperatures

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include larger regions within which vaporization continues to be effective. In accordance with various aspects of the present invention, the effective region refers to that varying region which, in part, is temperature dependent.

However, in accordance with various other aspects of the present invention, preferably a suitably selected wick material is placed such that the uppermost portion thereof is located at an effective distance X, as shown in Figure 3, from the lowermost portion of the heating element, for example, heating element 20. In accordance with various aspects of the present invention, the effective distance X preferably is on the order of one centimeter or less, more preferably on the order of less than 0.75 centimeters and optimally in the range of about 0.5 centimeters. In each instance, the height of wick 22 is suitably selected such that when used in connection with housing 12, the uppermost portion of wick 22 is placed in close proximity but not within heating element 20. As such, the effective distance X may approach zero, however, in such instances care should be taken such that the configuration and dimensions of wick ensure that contact with heating element 20 during use are minimized.

The following Example illustrates the utility of the present invention in maintaining a minimal wick height above the wick fitment while enhancing fragrance liquid evaporation through the wick material from a fragrance liquid reservoir.

EXAMPLE

Electric liquid vaporizers having conventional heating elements were obtained. In each instance, the effective distance between the exposed wick and the lowermost portion of the heating element was on the order of 2.7 centimeters. As such, the heights were varied from on the order of about one centimeter away to within the heating element. Specifically, the wick heights were varied from 1.9 cm to 2.9 cm. The vapor-dispensing units were operated for 8 hours per day for 19 days, for a total of 152 hours.

As shown below in Table 1, while the evaporation of fragrance materials from the product increased as the exposed wick surface area was increased, effective evaporation rates are obtained even at that furthest location.

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TABLE 1

Exposed Wick Height	Evaporation	% Relative to D-31
1.9 cm	6.44 g	61%
2.2 cm	7.79 g	74%
2.6 cm	9.70 g	92%
2.9 cm	9.56 g	91%
2.7 cm	10.51 g	100%

In accordance with a further embodiment of the present invention, the wick materials selected may be suitably configured to enhance exposed wick surface area thereby tending to enhance evaporation and, accordingly, vaporization while maintaining minimal wick height. For example, the wick may exhibit any number of sizes, dimensions, and/or combinations thereof which enhance exposed surface area. For example, conically-shaped wicks may be utilized, in addition, suitable wick fitment devices may be selected so as to further enhance exposed wick surface area.

Various principles of the invention have been described in illustrative embodiments. However, many combinations and modifications of the above-described structures, arrangements, proportions, elements, materials and components, used in the practice of the invention, in addition to those not specifically described, may be varied and particularly adapted to specific environments and operating requirements without departing from those principles.

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CLAIMS

We claim:

1. A liquid vaporizer comprising:

a fluid reservoir containing a liquid to be vaporized;

a heating element; and

a wick material wherein the said wick is selectively positioned in an effective operation zone proximate to, but not within the heating element.

2. The vaporizer of claim 1, wherein said effective operation zone is determined by a distance between a lower most portion of the heating element and an uppermost portion of said wick, and wherein said distance is greater than about 0.0 cm.

3. The vaporizer of claim 2, wherein said distance is greater than about 0.25 cm.

4. The vaporizer of claim 3, wherein said distance is greater than about 0.5 cm.

5. The vaporizer of claim 4, wherein said distance is greater than about 1.0 cm.

6. The vaporizer of claim 2, wherein the temperature in said effective operation zone is higher than the temperature outside of said effective operation zone.

7. The improved vaporizer of claim 1, wherein the wick material does not have a sheath.

8. The improved vaporizer of claim 1, wherein the wick material is a porous plastic material.

9. The improved vaporizer of claim 1, wherein the wick material is a graphite material.

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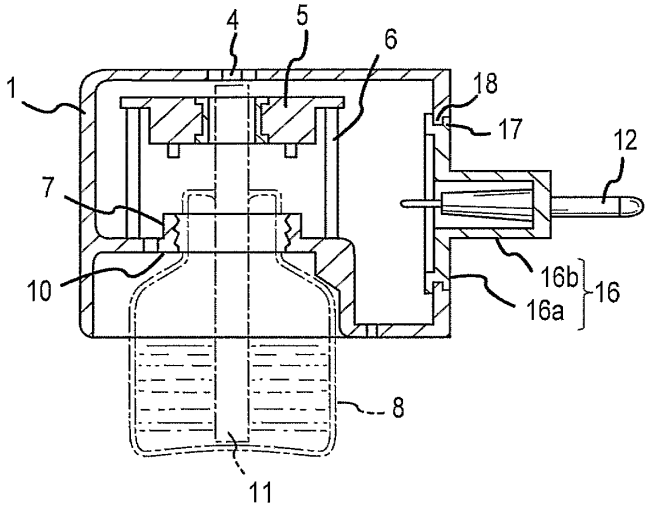


FIG.1A
PRIOR ART

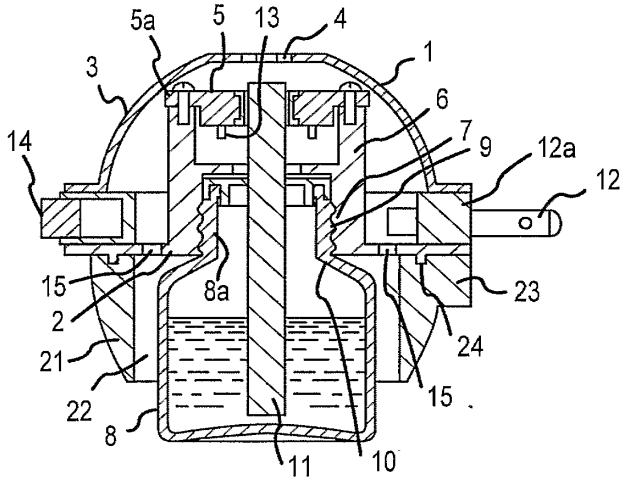


FIG.1B
PRIOR ART

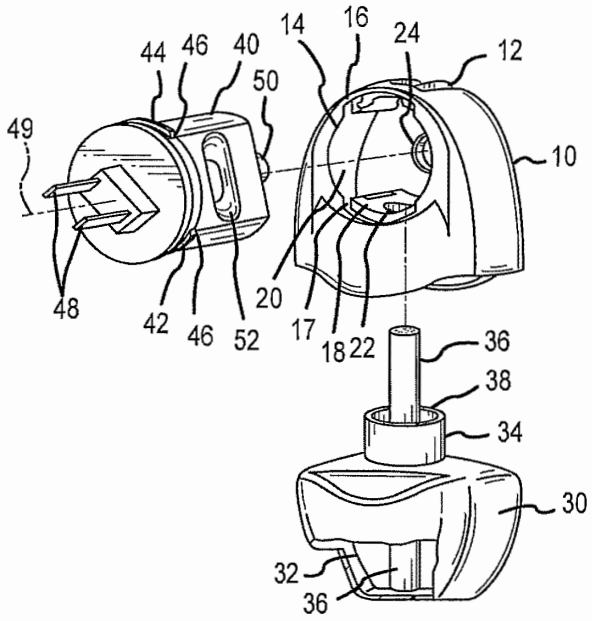


FIG.2A
PRIOR ART

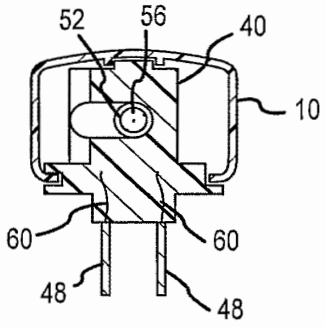


FIG.2B
PRIOR ART

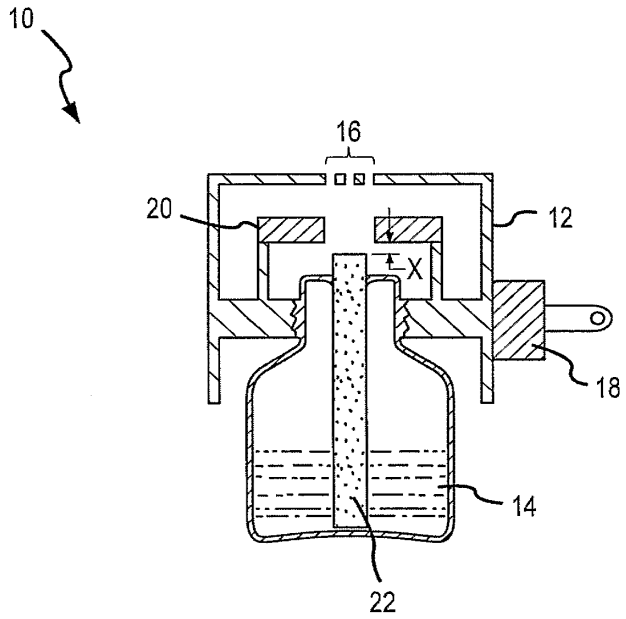


FIG.3

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INTERNATIONAL SEARCH REPORT

Inte ›nal Application No
PCT/US 03/02158

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L9/03 A61L9/02 A01M1/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61L A01M F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/020450 A1 (VIEIRA PEDRO QUEIROZ) 13 September 2001 (2001-09-13)	1,2,6,7
Y	paragraph '0037! - paragraph '0038!; claim 9; figures 6,8	3,4,8,9
X	US 5 094 025 A (DANIELS JERRY C) 10 March 1992 (1992-03-10)	1,2,6,7
Y	column 2, line 43 - line 51	3,4,8,9
X	EP 0 914 768 A (OKUNO YOSHITOSHI) 12 May 1999 (1999-05-12)	1,6,7
Y	paragraph '0015! - paragraph '0016!; figures 1,5	8,9
X	US 5 945 094 A (MARTIN JOHN ET AL) 31 August 1999 (1999-08-31)	1,6,7
Y	column 3, line 30 - line 61 column 5, line 4 - line 15	8,9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 May 2003	20/05/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Katsoulas, K

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Form PCT/ISA/210 (second sheet) (July 1992)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Int[redacted]nal Application No
PCT/US 03/02158

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		WO 9846285 A1	22-10-1998

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(12) 按照专利合作条约所公布的国际申请

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(81) 指定国(除另有指明，要求每一种可提供的国家保护)：AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

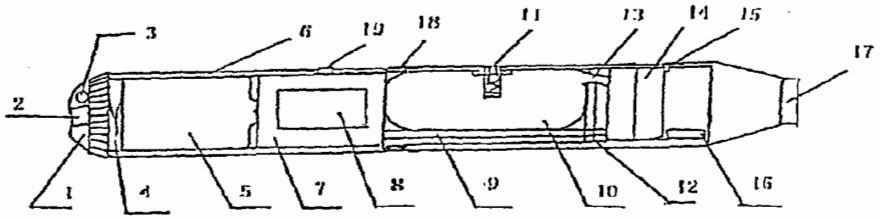
(84) 指定国(除另有指明，要求每一种可提供的地区保护)：ARIPO(BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW)，欧亚专利(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM)，欧洲专利(AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR)，OAPI(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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(54) Title: A NON-SMOKABLE ELECTRONIC AEROSOL CIGARETTE

(54) 发明名称：一种非可燃性电子雾化香烟



(57) Abstract: The invention relates to a non-smokable electronic aerosol cigarette which only comprises nicotine without harmful tar.The features of the invention are: the air flow sensor which is located in the smoking-mouth of the cigarette end is connected to the circuit -plate to start the atomiser high frequency vibrator which connects with the nicotine solution storaging via the spray pipes, the high frequency vibrator is connected to the count routes and the display screen, there is an end shield in the front of the cigarette with cells and light diodes.This device may imitate the traditional smoking pattern and effect, the smokers would feel smoking, and it has no side effect, it realizes "smoking without harm".

[见续页]

WO 2004/080216 A1

NJOY Exhibit 1002.756

(57) 摘要

本发明涉及一种不含有害焦油，只含烟碱(尼古丁)的非可燃性电子雾化香烟。本发明的特点是，构成香烟尾端烟嘴处设置的气流传感器连至电路板上用于启动经供液管与贮存烟碱溶液相接的雾化器高频振荡器，高频振荡器接计数线路和显示屏，香烟前端为装有电池并带有发光二极管的端罩。该装置可逼真的模拟传统的吸烟方式和效果，使吸烟者有吸烟的感觉，而且无副作用，可实现“吸烟无害健康”。

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一种非可燃性电子雾化香烟

技术领域

本发明涉及一种不含有害焦油，只含烟碱(尼古丁)的非可燃性电子雾化香烟。

背景技术

在当今“吸烟有害健康”已成为常识的情况下，全世界目前仍有10亿人吸烟，而且每年这个数字还在扩大，2003年3月1日世界卫生组织（WHO）通过的第一个国际禁烟协定《烟草控制框架公约》，据WHO提供的数字表明，吸烟每年造成490万人死亡，尽管吸烟可导致严重的呼吸系统疾病和癌症，要吸烟者完全戒烟是一桩极端困难的事。

香烟的有效成分是烟碱(尼古丁)，吸烟时烟碱随着香烟燃烧时产生的大量焦油雾滴进入肺泡后迅速吸收，烟碱吸收入血后作用于中枢神经系统的受体上，引起类似兴奋剂的“陶醉感”，如吸烟者所经历的头晕目眩或飘飘然的感觉。

烟碱是小分子生物碱，在小剂量下对人体基本无害，而且在血液中的半衰期极短。烟草的有害物质主要是焦油，烟草焦油是由数百种成分组成。 其中有数种成分内是致癌物。目前证实二次吸烟对不吸烟者的危害更大。

为了寻找只含烟碱而不含有害焦油的香烟代用品，有许多发明

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是用较纯的烟碱制成诸如“戒烟贴”、“烟碱含漱水”、“包装有抛射剂的高压气罐喷雾剂”、“烟碱口香糖”等产品，这些产品虽然没有焦油的危害，但因烟碱吸收缓慢，在血液中不能建立有效的高峰浓度，不能解决需要烟碱“过瘾”的感觉，同时也剥夺了吸烟者已经养成的“抽”、“吸”的习惯，因而类似的产品不能真正的作为戒烟用品或香烟代用品。

发明内容

本发明的目的是克服避免了上述缺点，提供一种可模拟吸烟并有吸烟效果,更接近真实的人性化电子雾化香烟。

本发明的特点是，构成香烟的尾端烟嘴初设置的气流传感器连至电路板上用于启动经供液管与贮存烟碱溶液相接的雾化器高频振荡器，高频振荡器接计数电路和显示屏，香烟前端为装有电池并带有发光二极管的端罩。它的基本工作原理是当把烟嘴放在嘴上吸气时，气流传感器输出电信号启动电路，装置在电路板上的高频振荡电路启动向雾化器提供驱动电压，另一组直流渐变信号供给红色发光二极管发出渐变的红光。雾化器上的双压电片发射超声波用于雾化，贮存于塑胶容器中的烟碱溶液经供液管输入雾化器中，经微喷雾化成直径为 1-15μm 的液滴，其中 75%的液滴直径在 6μm 以下，与进气孔的空气流混合后，能到达细支气管和肺泡中，每次的供液量在 3-50μl 之间，这样就能在 10 分钟之内使烟碱在血液中的浓度达到 30ng/ml 左右，通过液晶显示屏可分别显示出烟碱溶液的消耗量，每

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天吸烟的次数，对使用者提供警示信息。使用者可通过单向阀补充烟碱溶液。

该装置可逼真的模拟传统的吸烟方式和效果，使吸烟者有吸烟的感觉，而且还无副作用，可实现“吸烟无害健康”。

附图说明

图 1 为本发明的结构示意图。

图 2 为本发明的结构框图。

图 3 为本发明的雾化器结构示意图。

具体实施方式

本发明将烟碱的水、醇溶液微喷雾化，经口吸入肺中吸收，该装置包括壳体、高频发生器、烟碱贮液及容器、微喷雾化器、气流传感器及附件组成的整体。壳体外形是直管状，也可以略有曲线形,还可以是通常的烟嘴形，笔形或其他艺术品形象。壳体一端装有红色塑料帽状装饰物，内置红色二极发光管，电池是可充电锂电池，也可是镍氢电池。高频振荡器是集成电路与功放管组成的三点式电容振荡器、三点式电感振荡器或变压器式振荡电路，频率在 35KHZ 至 2.2MHZ，电路中带有频率自动微调电路与压电片谐振，液晶显示器显示该装置启动次数和贮液量。塑胶容器由硅橡胶制成，不被烟碱浸入的高分子化合物也可使用。注液单向阀是由球状物或锥状物在弹簧压力下密封的。气流传感器是由薄膜状热敏电阻阵列或硅芯片制成的。该装置包

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含一片粘合了一个环形径向极化压电片的中间有微喷孔阵列的雾化膜片，微喷孔阵列的外周有一圆形波纹环。与该雾化膜片对应的振动膜片上粘合一个圆形单层或多层纵向极化压电片，此振动膜片上开有凹槽或加入垫圈以同雾化膜片组成液体腔。该液体腔边缘开一小孔以连接具有阻尼作用的供液管。该装置是由交流电信号分别驱动两个压电片形成纵向压力波和径向振动波将液体从微喷孔处挤出并雾化。两个压电片各有两个压电信号输入端，压电信号的频率可以不同或一致。两个压电片是同 PZT、PMN、PNN、PSN、PMN-PT、PNN-PT、PSN-PT、PZN-PT 之一，并具有单层结构或者是不同成分的叠层结构。振动膜片和雾化膜片是由单晶硅片加工成的，也可用耐腐蚀金属或合金制成，如镍片、镍钴合金片、镍钯合金片、镍镉钴铑合金片等。振动膜片和雾化膜片粘合后组成液体腔，液体腔中有由天然纤维或合成纤维制作的供液纤维团。烟碱（尼古丁）溶液是由烟碱、水、乙醇、丙三醇、薄荷醇、烟草香精、抗氧剂、氨水组成。烟碱来自烟草总提取物中的 4 种烟碱的混合物，也可称为烟草总生物碱，尼古丁是最多的一种，所以用纯尼古丁也可代替烟碱。烟碱（尼古丁）浓度在 0.1%-30%之间。该装置可用于经口腔和鼻腔对肺内输送药物或药物前体，提供一种便携式雾化给药装置。

图 1 是这种电子香烟的结构图。图中的 1 是红色有机玻璃，2 是充电插孔，3 是红色发光二极管，4 是弹簧，5 是锂电池，6 是带有旋口 18 的壳体，7 是电路板，8 是液晶显示屏，9 是信号传输导线，10 是塑胶容器，11 是连接到塑胶容器口的注液单向阀，12 是密封

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隔板，13 是供液管，14 是雾化器，15 是进气孔，16 是气流传感器，17 是烟嘴，19 是电源开关。

参照图 1 所示组装各部件成为总体，其中电路板 7 中的电路设计方框图在图 2 中标出，其高频振荡器中带有频率自动微调的目的是使压电片始终处于谐振点,雾化器 14 是由双压电片构成的微喷和雾化两种作用，其结构在图 3 中示出，其工作原理是利用两个压电片分别驱动组成供液腔的振动膜片和雾化膜片，圆形压电片与振动膜片粘合后组成压电换能器，在液体喷出方向提供高速纵向压力波以使液体经微喷孔处高速喷出。环行压电片与带有微喷孔的雾化膜片粘合组成另一压电换能器。向即将离开微喷孔的液滴提供径向振动波，使液滴进一步破碎。在振动膜片与雾化膜片组成的供液腔中加入一疏松纤维团可改善微喷孔阵列中各微喷孔的能量及液体分配，使之趋于平均，振动膜片和雾化膜片可用单晶硅片或耐腐蚀金属合金制成。改变环行压电片和圆形压电片的驱动电压和频率可获得不同直径的雾滴分布曲线。在微喷孔直径在 4-10μm 时，雾滴直径在 1-15μm 的范围内，经调试后充入烟碱溶液即可使用。

图 3 中的 141 为环型压电片，142 为雾化膜片，143 为波纹槽，144 为纤维团，145 为振动膜片，146 为圆形压电片，147 为供液腔，148 为微喷口，149 为压电片引线，1410 为供液管，1411 为垫圈，1412 为凹槽。

烟碱溶液的配制:

用在烟草中提取的 95%以上的液态烟碱依次加入水、乙醇、丙三醇、薄荷醇、烟草香精、抗氧剂后加氨水调整 PH 值在 7.5-11 之间，烟

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碱浓度可在 1%-30%之间变动，浓度太高使误差增大，水的加入量可在 20%-80%之间变动，乙醇的加入量可在 20%-80%之间变动，丙三醇的最高浓度应在 45%以下，抗氧剂为丁基化的羟基茴香醚。

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权利要求书

1．一种非可燃性电子雾化香烟，其特征是构成香烟的尾端烟嘴处设置的气流传感器连至电路板上用于启动经供液管与贮存烟碱溶液相接的雾化器高频振荡器，高频振荡器接计数电路和显示屏，香烟前端为装有电池并带有发光二极管的端罩。

2．按照权利要求 1 所述的电子雾化香烟，其特征是壳体外形是直管状，也可以略有曲线形，还可以是通常的烟嘴形,笔形或其他艺术品形象。

3．按照权利要求 1 所述的电子雾化香烟，其特征是高频振荡器的振荡频率在 35KHZ 至 2.2MHZ，电路中带有频率自动微调电路与压电片谐振。

4．按照权利要求 1 所述的电子雾化香烟，其特征是塑胶容器由硅橡胶制成，注液单向阀是由球状物或锥状物在弹簧压力下密封的，气流传感器是由薄膜状热敏电阻阵列或硅芯片制成的。

5．按照权利要求 1 所述的电子雾化香烟，其特征是与该雾化膜片对应的振动膜片上粘合一个圆形单层或多层纵向极化压电片，此振动膜片上开有凹槽或加入垫圈以同雾化膜片组成液体腔，该液体腔边缘开一个小孔以连接具有阻尼作用的供液管。

6．按照权利要求 1 所述的电子雾化香烟，其特征是两个压电片各有两个压电信号输入端，压电信号的频率可以不同或一致。

7．按照权利要求 1 所述的电子雾化香烟，其特征是振动膜片和

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雾化膜片是由单晶硅片加工成的，也可以用耐腐蚀金属或合金制成，如镍片、镍钴合金片、镍钯合金片、镍铬钴镍铑合金片。

8．按照权利要求 1 所述的电子雾化香烟，其特征是振动膜片和雾化膜片粘合后组成液体腔，液体腔中有由天然纤维或合成纤维制作的供液纤维团。

9．按照权利要求 1 所述的电子雾化香烟，其特征是烟碱(尼古丁)溶液是由烟碱、水、乙醇、丙三醇、薄荷醇、烟草香精、抗氧剂、氨水组成。

10．按照权利要求 1 所述的电子雾化香烟，其特征是烟碱(尼古丁)浓度在 0.1%-30%之间。

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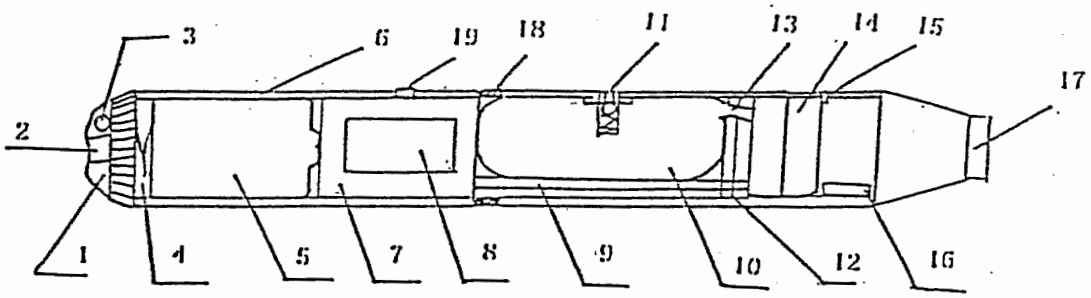


图 1

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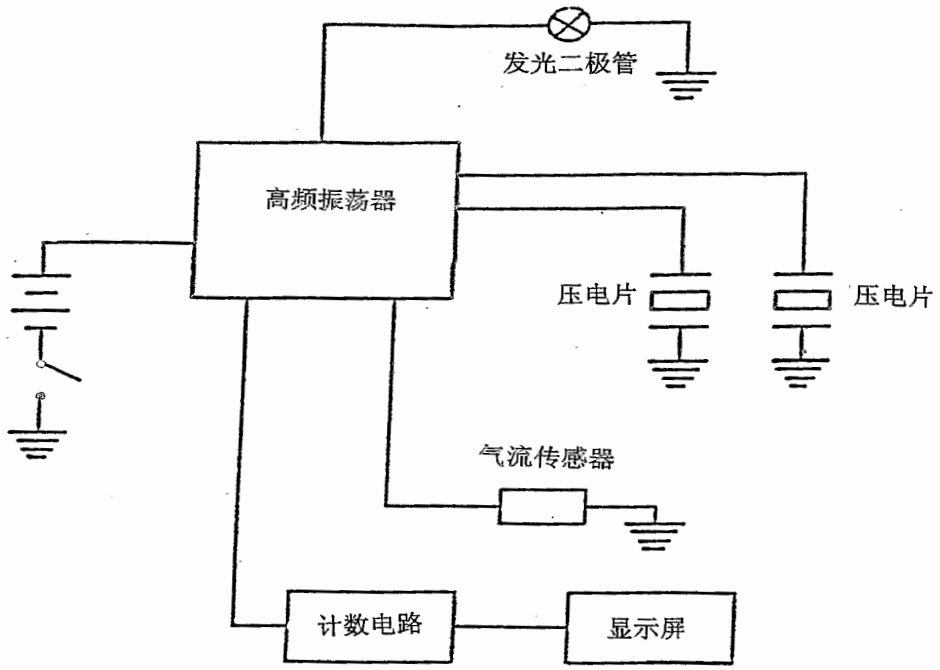


图 2

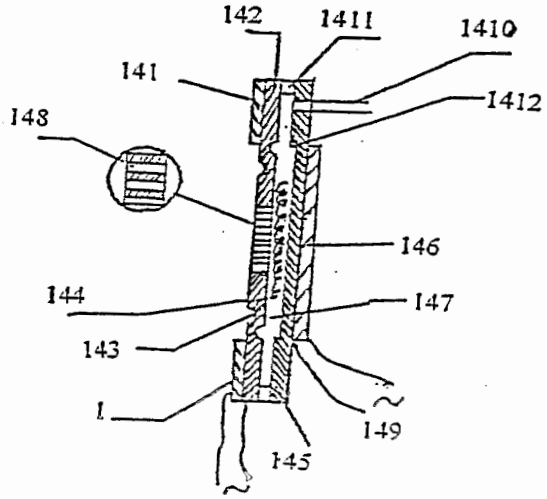


图 3

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2004/000183

A. CLASSIFICATION OF SUBJECT MATTER

IPC7:A24815/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7:A24B15/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC7:A24B+,A24C+,A24D+,A24F+

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC,PAJ,WPI,CNPAT nicotine,cigarette+,electronic+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO,A2,00/49901(WEBER-QUITZAU,et al),31.Aug .2004,the whole document	1-10
A	US,A,5190060(B.A.Cigarettenfabriken GmbH),02.Mar.1993,the whole document	1-10
A	CN,U,2047485(ZHAO yuzhong),15.Nov.1989,the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25.May 2004(25.05.2004)	10 JUN 2004 (10·06·2004)
Name and mailing address of the ISA/CN 6 Xitucheng Rd.,Jimen Bridge,Haidian District, 100088 Beijing ,China Facsimile No. (86-10)62019451	Authorized officer Bianxin Telephone No. (86-10)62-85763

Form PCT/ISA /210 (second sheet) (January 2004)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2004/000183

Cited documents	published date	families	published date
WO0049901A2	31.Aug. 2000	CA2360852A	31.Aug. 2000
		EP1178741A	13.Feb. 2002
		JP2003500008T	07.Jan. 2003
US5190060A	02.Mar. 1993	DE3910899A	11.Oct. 1990
CN2047485U	15.Nov. 1989	None	

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国际检索报告

国际申请号
PCT/CN2004/000183

A. 主题的分类

IPC7：A24B15/16

按照国际专利分类表(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC7：A24B15/16

包含在检索领域中的除最低限度文献以外的检索文献

IPC7：A24B+,A24C+,A24D+,A24F+

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

EPODOC,CNPAT,WPI,PAJ

Nicotine,cigarette+,electronic+

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
A	WO,A2,00/49901(WEBER-QUITZAU,et al) ,2000 年 8 月 31 日，全文	1－10
A	US,A,5190060(B.A.T.Cigarettenfabriken GmbH),1993 年 3 月 2 日，全文	1－10
A	CN,U,2047485(赵玉忠)，1989 年 11 月 15 日，全文	1－10

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
25.5 月 2004（25.05.2004）	10 6月 2004 (10·06·2004)
中华人民共和国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	授权官员 边昕 辛昕 电话号码：(86-10)62085763

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国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2004/000183

检索报告中引用的专利文件	公布日期	同族专利	公布日期
WO0049901A2	31.8 月 2000	CA2360852A	31.8 月 2000
		EP1178741A	13.2 月 2002
		JP2003500008T	07.01 月 2003
US5190060A	02.03 月 1993	DE3910899A	11.10 月 1990
CN2047485U	15.11 月 1989	None	

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(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2008 年7 月3 日 (03.07.2008)

PCT

(10) 国际公布号
WO 2008/077271 A1

(51) 国际专利分类号:
A24F 47/00 (2006.01) *A61M 15/06* (2006.01)

(21) 国际申请号: PCT/CN2006/003562

(22) 国际申请日: 2006 年12 月25 日 (25.12.2006)

(25) 申请语言: 中文

(26) 公布语言: 中文

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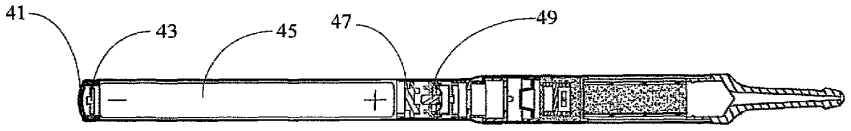
(81) 指定国（除另有指明，要求每一种可提供的国家保护）: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

(84) 指定国（除另有指明，要求每一种可提供的地区保护）: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧洲 (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

[见续页]

(54) **Title:** A COMPUTERIZED HEALTHY SMOKING DEVICE

(54) **发明名称:** 计算机化健康吸烟装置



(57) **Abstract:** . A computerized healthy smoking device includes a cigarette nozzle (10), a battery (45), a pneumatic switch (49), a liquid chamber (73) and an atomizing chamber (75). In use, a user inhales the smoking device, which causes its air pressure to change, so the pneumatic switch (49) is closed and switched on. The smoking device is electrified, and the liquid which flows into the atomizing chamber (75) from the liquid chamber is atomized and dispersed through the cigarette nozzle (10). The smoking device also includes a controller having a safety time, and the liquid usage is controlled through adjusting the safety time.

(57) **摘要:**

一种计算机化健康吸烟装置，包括烟嘴(10)、电池(45)、气动开关(49)、液体室(73)以及雾化室(75)。使用时，用户抽吸吸烟装置使其内部的气压发生变化，使气动开关(49)闭合导通，所述吸烟装置通电，液体室内的液体进入雾化室(75)雾化后由烟嘴(10)散出。该吸烟装置还包括一控制装置，该控制装置设置有一安全时间，通过调节该安全时间的长短来控制上述液体的消耗量。

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本国际公布：
— 包括国际检索报告。

NJOY Exhibit 1002.773

国际检索报告

国际申请号
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第 IV 栏　摘要正文(接第 1 页第 5 项)

一种计算机化健康吸烟装置，包括烟嘴(10)、电池(45)、气动开关(49)、液体室(73)以及雾化室(75)。使用时，用户抽吸吸烟装置使其内部的气压发生变化，使气动开关(49)闭合导通，所述吸烟装置通电，液体室内的液体进入雾化室(75)雾化后由烟嘴(10)散出。该吸烟装置还包括一控制装置，该控制装置设置有一安全时间，通过调节该安全时间的长短来控制上述液体的消耗量。

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计算机化健康吸烟装置

技术领域

本发明涉及一种健康吸烟装置，特别是一种能控制烟液量从而达到控制吸烟量目的的计算机化健康吸烟装置。

背景技术

目前，吸烟有害健康已成为一般的健康常识。数据表明，每年因吸烟造成的死亡人数多达 490 万。但是，全世界现在仍有 10 亿烟民，并且这个数字还在不断扩大中。

香烟的主要有效成份是烟碱（尼古丁），吸烟时烟碱随着香烟燃烧时产生的大量焦油雾滴进入肺泡后被迅速吸收，引起类似兴奋剂的陶醉感，使吸烟者因追求快感而上瘾。因此，尽管吸烟可导致严重和呼吸系统疾病和癌症，但要吸烟者完全戒烟是一桩极其困难的事。

烟碱是小分子生物碱，在小剂量下对人体基本无害，且在血液中的半衰期极短。烟草的有害物质主要是焦油，烟草焦油是由数百种成份组成，其中的数十种是致癌物。因此，出现了许多只含烟碱而不含焦油等害物质的香烟代用品，如“戒烟贴”、“烟碱漱口水”、“烟碱口香糖”、“烟碱饮料”等，多是采用较纯的烟碱制成。这些产品虽然没有焦油的危害，但是未能迎合吸烟者养成依旧的“抽”、“吸”等习惯，因而难以成为真正的戒烟用品或香烟的代用品。

针对上述问题，现有技术中提供了一些仿真的香烟产品，如中国专利申请第 200420031182.0 号中所述的一种雾化电子烟，其包括壳体及吸嘴，壳体的外壁上开有进气孔，壳体内依次设有电子线路板、常压腔、传感器、气液分离器、雾化器、供液瓶；其中电子线路板由电子开关电路及高频发生器组成；在传感器的一侧开有传感器气流通道，传感器内设有负压腔；雾化器与供液瓶相接触，在雾化器的内部设有雾化腔；供液瓶的一侧与壳体之间设有锁定供液瓶的挡圈，供液瓶的另一侧开有雾汽通道；进气孔、常压腔、气液分离器、雾化器、雾汽通道、导气孔、吸嘴依次相连通。该雾化电子烟可以使用户有吸烟的兴奋感觉，但无法控制烟液量从而达到控制吸烟量的目的，难以达到健康吸烟的目的。

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发明内容

本发明所要解决的技术问题在于提供一种健康吸烟装置，特别是一种能控制烟液量从而达到控制吸烟量目的的计算机化健康吸烟装置。

为解决上述技术问题，本发明所采用的技术方案是：一种计算机化健康吸烟装置，该计算机化健康吸烟装置包括烟嘴、电池、气动开关、液体室以及雾化室，用户通过烟嘴抽吸该计算机化健康吸烟装置，聚合物锂电池用于为该计算机化健康吸烟装置供电，气动开关其在气压作用下使所述计算机化健康吸烟装置通电，该液体室内存储有待雾化液体，雾化室用于对待雾化液体进行雾化。使用时，用户抽吸计算机化健康吸烟装置使其内部的气压发生变化，使气动开关闭合导通，计算机化健康吸烟装置通电，液体室内的液体进入雾化室雾化后由烟嘴散出。该计算机化健康吸烟装置还包括一控制装置，该控制装置设置有一安全时间，通过调节该安全时间的长短来控制上述液体的消耗量。

由于本发明的计算机化健康吸烟装置内充入的是 0.2% - 3.8%烟碱溶液，充分雾化后产生大量的雾气类似烟雾，在吸烟过程中并不产生焦油等有害物质，不会对人体产生危害，并且还在此基础上通过计算机化微控制芯片的控制，进一步控制了吸烟量，因此真正达到了健康吸烟的目的。

附图说明

图 1 是本发明计算机化健康吸烟装置的外观示意图。

图 2 是本发明计算机化健康吸烟装置的内部结构示意图。

图 3 是本发明计算机化健康吸烟装置的雾化室的结构示意图。

图 4 是本发明计算机化健康吸烟装置的导液机构与液体室、雾化室的连接结构示意图。

图 5 是本发明计算机化健康吸烟装置的药液雾化过程示意图。

图 6 是本发明计算机化健康吸烟装置的微控制芯片示意图。

具体实施方式

下面结合附图对本发明作进一步的描述。

请一并参阅图 1 与图 2，本发明的计算机化健康吸烟装置包括烟嘴 10、烟杆 40、烟仓 70 三个部分。烟嘴 10 内设有气流通道，其外部套设软硅胶，外形采用流线型设计，以保

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证该计算机化健康吸烟装置具有较好的口感，安全无毒。烟嘴 10 的材料选用仿真普通过滤嘴香烟型，其烟嘴外套增加烟草香味或其他特殊味道，能让吸烟者更加具有吸烟的感觉。在烟杆 40 顶部设有透明的仿形烟头 41，该仿形烟头 41 上开设有一隐蔽的通气孔。

烟杆 40 内部主要包括指示灯 43、电池 45、微控制芯片 47 以及气动开关 49。该电池 43 为聚合物锂电池或防爆锂电池，该指示灯 43 设置于仿形烟头 41 下方，其为一发光二极管，当计算机化健康吸烟装置通电后进入使用状态，指示灯 43 会缓慢点亮，灯光透过仿形烟头以模拟香烟点燃的火光。微控制芯片 45 用于根据用户抽吸的频率来控制烟液量，从而达到控制吸烟量的目的。该气动开关 49 采用镀金或镀银处理，其导电性能良好。在气动开关 49 内设有一薄膜，该薄膜将烟杆 40 与烟仓 70 分成两个相对独立的腔室。

请参阅图 3 至图 5，该烟仓 70 内部主要包括发热部件 71、液体室 73、雾化室 75 和导液机构 79。液体室 73 用于存储待雾化的烟碱溶液，其内设置有多孔体 731，烟碱溶液存储于多孔体 731 内。在本实施例中，多孔体 731 可由聚丙纤维、绦纶纤维或尼龙纤维充填。

该雾化室 75 包括外层的油嘴支架 751 和内部的油嘴座 753。发热部件 71 固定在雾化室 75 内，其为用铂丝、镍铬合金或含有稀土元素的铁铬铝合金制成的丝状体或片状体。在雾化室 75 的外侧固定有陶瓷雾化片 81（超声波振荡片）。在油嘴座 753 上开设有喷射孔 755，该喷射孔 755 连通雾化室 75 内外。此外，油嘴支架 751 上也开有通气孔。

导液机构 79 为多层泡沫镍网，也可以采用不锈钢纤维毡、高分子多聚物发泡体及泡沫陶瓷制成，其外周设有密封圈。该导液机构 79 包裹在油嘴支架 751 和油嘴座 753 的外面，凸起端与液体室 73 中的多孔体 731 接触。导液机构 79 通过毛细浸润将烟液导至雾化室 75 进行雾化，在发热部件 71 的作用下进一步雾化。雾化后的大直径微滴在涡流的作用下附壁，经雾化室 75 上的溢流孔被导液机构 79 重吸收；小直径微滴悬浮在气流中形成气溶胶，经雾气通道再由烟嘴 10 吸出。烟液的雾化过程如图 5 所示。

本发明计算机化健康吸烟装置的工作过程如下：当用户抽吸时，气流经过发热部件 71、雾化室 75，最后由烟嘴 10 吸出。在用户抽吸时，烟仓 70 侧的气流流向烟嘴 10，从而使烟杆 40 独立腔室的气压低于正常大气压。这样在烟杆 40 一侧负气压的作用下，气动开关 49 闭合导通电流。

以下参阅图 6 来说明微控制芯片 45 对烟液用量的控制作用：当用户吸气时，气动开关 49 闭合，使微处理器 IC3 的 7 脚电位被拉低，微处理器 IC3 进入工作状态。此后微处

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理器 IC3 的 8 脚向 Q2 输送触发信号使 Q2 导通工作，Q2 工作后随即拉动雾化头工作使烟液雾化，同时微处理器 IC3 的第 1 脚同时发出脉宽调制信号触发指示灯 43 点亮工作。当用户停止抽吸后，气动开关 49 断开，微处理器 IC3 停止工作，进入睡眠状态。发热部件 71 经过一段时间 T 后停止发热，在本实施方式中，该时间 T 设定为 7.5 秒。此后发热部件 71 进入睡眠状态，由此即可有效控制烟液量从而达到控制吸烟量的目的。同时，也可根据上述时间 T 来控制指示灯 43 延时熄灭，以进一步增加计算机化健康吸烟装置的拟真性。

此外，该微处理器 IC3 具有记数锁存功能和低电压提示功能，当开关动作到 1500 次时微处理器会发出清洗指令，让雾化头自动清洗 8 秒钟；当电池电压过低时，指示灯会连续闪烁 20 秒钟提示电压过低，以提醒用户充电。

工业应用性

由于在液体室 73 内充入的是 0.2%—3.8%的医药级模拟烟碱溶液，充分雾化后产生大量的雾气类似烟雾，但在吸烟过程中不产生焦油等有害物质，不会对人体产生危害。而本发明的计算机化健康吸烟装置还可在此基础进一步控制烟液量从而达到控制吸烟量的目的，因此真正达到了健康吸烟的目的。本发明的计算机化健康吸烟装置也可以通过改变液体室 73 的结构来装入常规药物，作为肺内给药装置使用。

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权利要求

1、一种计算机化健康吸烟装置，所述计算机化健康吸烟装置包括：

烟嘴，用户通过所述烟嘴抽吸所述计算机化健康吸烟装置；

电池，用于为所述计算机化健康吸烟装置供电；

气动开关，其在气压作用下使所述计算机化健康吸烟装置通电；

液体室，其内存储有待雾化液体；

雾化室，用于对所述液体进行雾化；

使用时，用户抽吸所述计算机化健康吸烟装置使其内部的气压发生变化，使气动开关闭合导通，所述计算机化健康吸烟装置通电，所述液体室内的液体进入所述雾化室雾化后由所述烟嘴散出；

其特征在于，所述计算机化健康吸烟装置还包括一控制装置，所述控制装置设置有一安全时间，通过调节所述安全时间的长短来控制所述液体的消耗量。

2、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述控制装置为一微控制芯片，其在所述安全时间内控制所述雾化室工作。

3、如权利要求 2 所述的计算机化健康吸烟装置，其特征在于，所述微控制芯片包括一微处理器，所述微处理器具有记数锁存功能，其在开关动作到一定次数时发出清洗指令，让所述雾化头自动清洗。

4、如权利要求 3 所述的计算机化健康吸烟装置，其特征在于，所述微处理器在开关动作到 1500 次时发出清洗指令。

5、如权利要求 3 所述的计算机化健康吸烟装置，其特征在于，所述雾化头自动清洗 8 秒钟。

6、如权利要求 3 所述的计算机化健康吸烟装置，其特征在于，所述微处理器具有低电压提示功能，当电池电压过低时，指示灯会连续闪烁以提醒用户充电。

7、如权利要求 6 所述的计算机化健康吸烟装置，其特征在于，所述指示灯连续闪烁 8 秒钟。

8、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述计算机化健康吸烟装置还包括一发光元件，所述元件为红色或橙色发光二极管，其在电路接通时点亮，以

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仿真真正的吸烟过程。

9、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述烟嘴呈流线型，其外部套设有软性硅胶。

10、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述烟嘴材料选用仿真普通过滤嘴香烟型，其烟嘴外套增加烟草香味或其他特殊味道。

11、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述雾化室进一步包括一加热元件。

12、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述计算机化健康吸烟装置还包括一导液机构，所述导液机构一端与所述液体室接触。

13、如权利要求 1 所述的液体室具有的设计结构能够充分储液及快速放液。

14、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述电池为聚合物锂电池。

15、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述电池为防爆锂电池。

16、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述气动开关元件采用镀金或镀银处理。

17、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述待雾化液体为模拟烟碱溶液。

18、如权利要求 17 所述的计算机化健康吸烟装置，其特征在于，所述模拟烟碱溶液为 0.2%—3.8%的医药级模拟烟碱溶液。

19、如权利要求 1 所述的计算机化健康吸烟装置，其特征在于，所述待雾化液体为含有某种特定成分药液，用户需要时采用所述装置用于呼吸道系统给药或辅助治疗。

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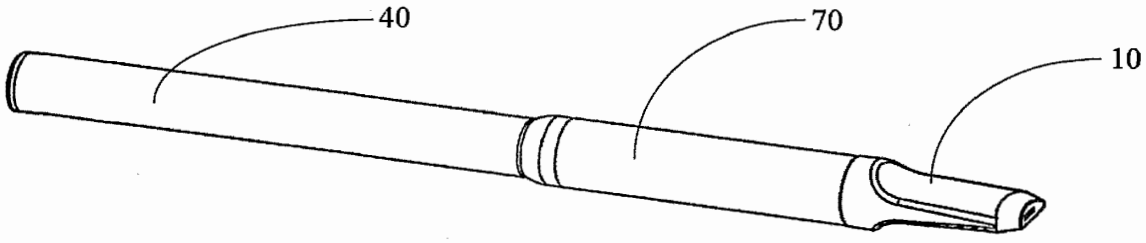


图 1

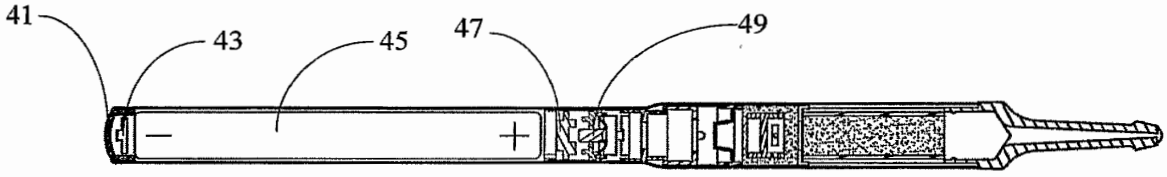


图 2

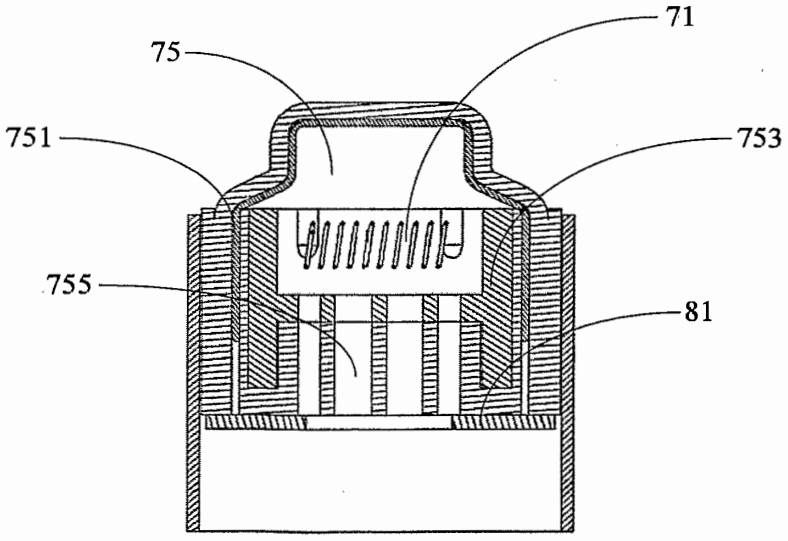


图 3

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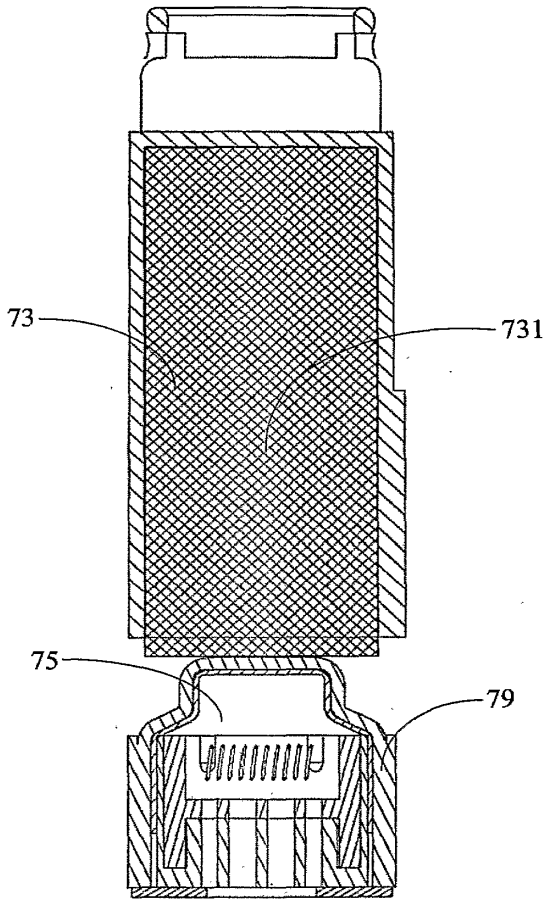


图 4

NJOY Exhibit 1002.782

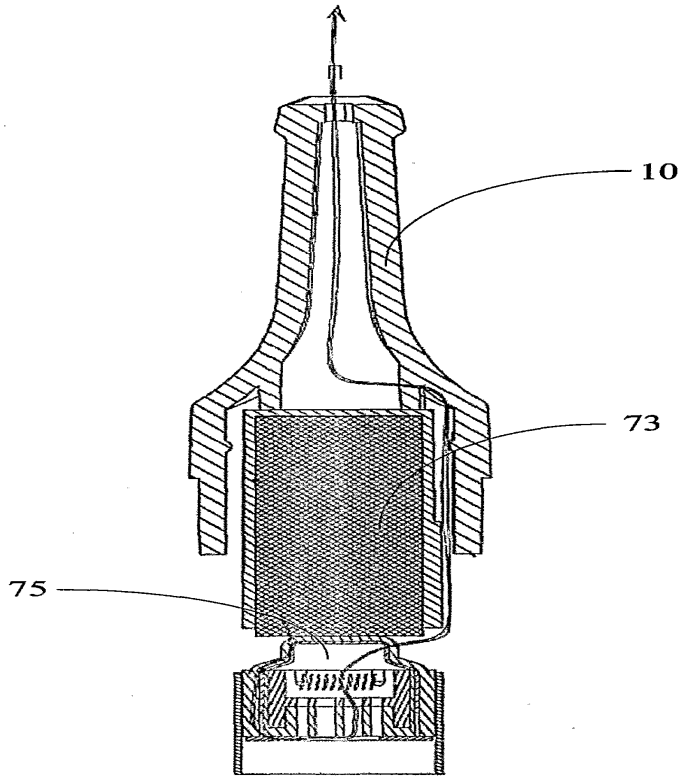


图 5

NJOY Exhibit 1002.783

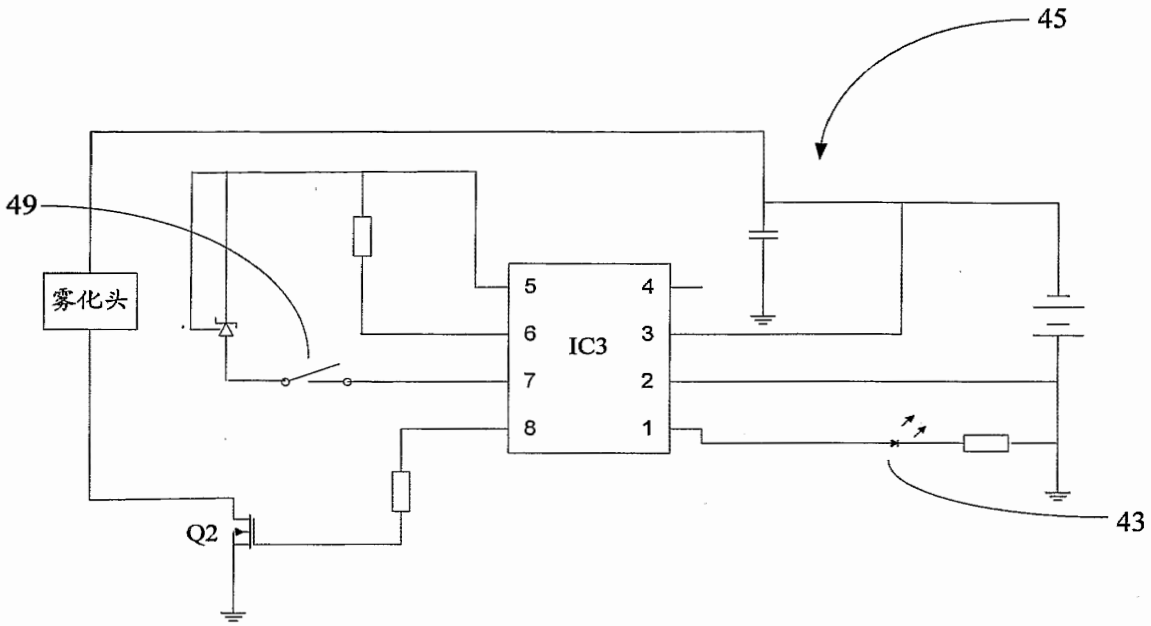


图 6

NJOY Exhibit 1002.784

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2006/003562

A. CLASSIFICATION OF SUBJECT MATTER

see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A24F,A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI&EPODOC&PAJ Chinese patent (1985~) atomi+, aerosol, vapor+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN2719043Y(HAN Li)24 Aug.2005 (24.08.2005) page 6, paragraph 5,6 page 7, first and last paragraph; page 5, paragraph 5; page 8, last paragraph	1-19
Y	CN1127983A(VOGES INNOVATION PTY LTD)31 Jul.1996 (31.07.1996) page10, paragraph 3	1-19
A	CN1541577A(HAN Li)03 Nov.2004 (03.11.2004) the whole document	1-19

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 Aug.2007(27.08.2007)	18 · OCT 2007 (18 · 10 · 2007)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer SUN,Chunmei Telephone No. (86-10)62085751

Form PCT/ISA/210 (second sheet) (April 2007)

NJOY Exhibit 1002.785

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2006/003562

According to International Patent Classification (IPC) or to both national classification and IPC:

A24F47/00(2006.01)i

A61M15/06(2006.01)i

NJOY Exhibit 1002.786

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2006/003562

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US4945929A (BRITISH-AMERICAN TOBACCO CO., LTD.) 07 Aug.1990(07.08.1990) the whole document	1-19
A	CN1575673A(SEIKO EPSON COR) 09 Feb.2005(09.02.2005) the whole document	1-19

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

NJOY Exhibit 1002.787

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2006/003562

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2719043Y	24 Aug.2005	AU2005232354A	27 Oct.2005
		WO2005099494A	27 Oct.2005
		CA2562581A	27 Oct.2005
		EP1736065A	27 Oct.2006
		CN1942114A	04 Apr. 2007
		BRPI0506780A	22 May 2007
CN1127983A	31 Jul.1996	CA2165961A	12 Jan.1995
		WO9501137A1	12 Jan.1995
		AU7063294A	24 Jan.1995
		EP0706352A	17 Apr.1996
		BR9406968A	06 Aug.1996
		JP8511966T	17 Dec.1996
		AU677081B	10 Apr.1997
		US5894841A	20 Apr.1999
		AT214575T	15 Apr.2002
		DE69430196D	25 Apr.2002
		DK706352T	15 Jul.2002
		PT706352T	31 Jul.2002
		ES2171455T	16 Sep.2002
		DE69430196T	31Oct.2002
		CN1788806A	21 Jun.2006
CN1541577A	03 Nov.2004	CA2518174A	11 Nov.2004
		WO2004095955A	11 Nov.2004
		AU2004234199A	11 Nov.2004
		RU2005115958A	10 Nov.2005
		EP1618803A	25 Jan.2006
		BRPI0407944A	07 Mar.2006
		MXPA05009191A	10 Mar.2006
		US2006196518A	07 Sep.2006
		JP2006524494T	02 Nov.2006

NJOY Exhibit 1002.788

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2006/003562

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
US4945929A	07 Aug.1990	GB2191718A	23 Dec.1987
		DE3719718A	23 Dec.1987
		GB2191718B	05 Sep.1990
CN1575673A	09 Feb.2005	US2005016550A1	27 Jan.2005
		JP2005034021A	10 Feb.2005
		CN1284493C	15 Nov.2006

NJOY Exhibit 1002.789

国际检索报告

国际申请号 PCT/CN2006/003562

A. 主题的分类

参见附加页

按照国际专利分类表(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC:A24F,A61M

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

WPI&EPODOC&PAJ 中国专利文献（1985～）雾化，atomi+,aerosol,vapor+

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
Y	CN2719043Y(韩力)24.8 月 2005（24.08.2005） 说明书第六页第五、七段，第七页第一、最后一段， 第五页第五段，第八页最后一段	1-19
Y	CN1127983A(沃盖斯新技术有限公司)31.7 月 1996（31.07.1996） 说明书第十页第三段，第九页第四段	1-19
A	CN1541577A(韩力)03.11 月 2004（03.11.2004）全文	1-19
A	US4945929A (BRITISH-AMERICAN TOBACCO CO., LTD.) 07.8 月 1990（07.08.1990）全文	1-19
A	CN1575673A(精工爱普生株式会社)09.2 月 2005（09.02.2005）全文	1-19

☐ 其余文件在 C 栏的续页中列出。 ☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
27.8 月 2007（27.08.2007）	18·10月 2007 (10·18·2007)
中华人民共和国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号： (86-10)62019451	受权官员 孙春梅 电话号码：(86-10) 62085751

NJOY Exhibit 1002.790

国际检索报告

国际申请号
PCT/CN2006/003562

按照国际专利分类表(IPC)或者同时按照国家分类和 IPC 两种分类：

A24F47/00(2006.01)i

A61M15/06(2006.01)i

NJOY Exhibit 1002.791

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2006/003562

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN2719043Y	24.8 月 2005	AU2005232354A	27.10 月 2005
		WO2005099494A	27.10 月 2005
		CA2562581A	27.10 月 2005
		EP1736065A	27.10 月 2006
		CN1942114A	04.4 月 2007
		BRPI0506780A	22.5 月 2007
CN1127983A	31.7 月 1996	CA2165961A	12.1 月 1995
		WO9501137A	12.1 月 1995
		AU7063294A	24.1 月 1995
		EP0706352A	17.4 月 1996
		BR9406968A	06.8 月 1996
		JP8511966T	17.12 月 1996
		AU677081B	10.4 月 1997
		US5894841A	20.4 月 1999
		AT214575T	15.4 月 2002
		DE69430196D	25.4 月 2002
		DK706352T	15.7 月 2002
		PT706352T	31.7 月 2002
		ES2171455T3	16.9 月 2002
		DE69430196T	31.10 月 2002
		CN1788806A	21.6 月 2006
CN1541577A	03.11 月 2004	CA2518174A	11.11 月 2004
		WO2004095955A	11. 11 月 2004
		AU2004234199A	11. 11 月 2004
		RU2005115958A	10. 11 月 2005
		EP1618803A	25. 1 月 2006
		BRPI0407944A	07. 3 月 2006
		MXPA05009191A	10. 3 月 2006
		US2006196518A	07. 9 月 2006
		JP2006524494T	02. 11 月 2006
US4945929A	07. 8 月 1990	GB2191718A	23.12 月 1987
		DE3719718A	23.12 月 1987
		GB2191718B	05.9 月 1990
CN1575673A	09. 2 月 2005	US2005016550A1	27.1 月 2005
		JP2005034021A	10.2 月 2005
		CN1284493C	15.11 月 2006

NJOY Exhibit 1002.792

(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2010 年 10 月 21 日 (21.10.2010)

PCT

(10) 国际公布号
WO 2010/118644 A1

(51) 国际专利分类号:
A24F 47/00 (2006.01)

(21) 国际申请号: PCT/CN2010/070185

(22) 国际申请日: 2010 年 1 月 14 日 (14.01.2010)

(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
200910082397.2 2009 年 4 月 15 日 (15.04.2009) CN

(71) 申请人 (对除美国外的所有指定国): **中国科学院理化技术研究所 (TECHNICAL INSTITUTE OF PHYSICS AND CHEMISTRY, CHINESE ACADEMY OF SCIENCES)** [CN/CN]; 中国北京市 2711 信箱, Beijing 100190 (CN)。

(72) 发明人; 及

(75) 发明人/申请人 (仅对美国): **邓中山 (DENG, Zhongshan)** [CN/CN]; 中国北京市 2711 信箱, Beijing 100190 (CN)。 **刘静 (LIU, Jing)** [CN/CN]; 中国北京市 2711 信箱, Beijing 100190 (CN)。

(74) 代理人: **北京三友知识产权代理有限公司 (BEIJING SANYOU INTELLECTUAL PROPERTY AGENCY LTD.)**; 中国北京市金融街 35 号国际企业大厦 A 座 16 层, Beijing 100140 (CN)。

(81) 指定国 (除另有指明，要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

(84) 指定国 (除另有指明，要求每一种可提供的地区保护): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧洲 (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)。

本国际公布:
— 包括国际检索报告(条约第 21 条(3))。

(54) Title: HEATING ATOMIZATION ELECTRONIC-CIGARETTE ADOPTING CAPACITOR FOR POWER SUPPLY

(54) 发明名称 : 一种采用电容供电的加热雾化电子烟

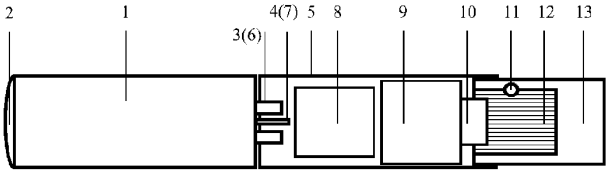


图3 / FIG. 3

(57) Abstract: A heating atomization electric-cigarette adopting capacitor for power supply comprises a power part(1), a cigarette body part and a hollow cigarette holder(13). The power part(1) includes an indication lamp(2) positioned at the rear end of the power(1), a pair of electrode connecting plugs(3) and a lead connecting plug(4) positioned at the front end of the power(1). The cigarette body part includes a pair of electrode connecting plugholes(6) and a lead connecting plughole(7) positioned at the rear end of the hollow cigarette pole(5), a control circuit module(8), a heating atomization device(9), a liquid imbibing head(10) and a nicotine solution storage tank(12) installed in the cavity of the hollow cigarette pole(5) in turn. A sponge is installed in the nicotine solution storage tank(12), and a liquid inlet(11) is provided on the wall of the tank(12). Two ends of the liquid imbibing head(10) are contact connected to the heating atomization device(9) and the sponge respectively. The power(1) and the cigarette body part are separated or connected by plugging the electrode connecting plugs(3) and the lead connecting plug(4) into the electrode connecting plugholes(6) and the lead connecting plughole(7). The front end of the cigarette body and the rear end of the hollow cigarette holder(13) are connected by plugging or thread. The power(1), the indication lamp(2), the control circuit module(8) and the heating atomization device(9) are connected electrically in turn.

[见续页]

WO 2010/118644 A1

NJOY Exhibit 1002.793

(57) 摘要:

一种电容供电加热雾化的电子烟，该电子烟由电源部分(1)、烟体部分和空心烟嘴(3)组成。电源部分(1)包括：装于电源(1)后端的指示灯(2)，装于电源(1)前端的一对电极插接头(3)和一引线插接头(4)。烟体部分包括：装于空心烟杆(5)后端的一对电极插接口(6)和一引线插接口(7)，依次装于空心烟杆(5)的空心腔体内的控制电路模块(8)、加热雾化装置(9)、吸液头(10)和烟碱储液仓(12)。烟碱储液仓(12)内装有海绵体，其仓壁上设有进液口(11)。吸液头(10)的两端分别与加热雾化装置(9)和海绵体接触连接。电源部分(1)与烟体部分可分离或通过电极插接头(3)、引线插接头(4)和电极插接口(6)、引线插接口(7)采用插接方式相连。烟体部分前端与空心烟嘴(13)后端采用插接连接或螺纹连接。电源(1)、指示灯(2)、控制电路模块(8)和加热雾化装置(9)依次电连接。

NJOY Exhibit 1002.794

一种采用电容供电的加热雾化电子烟

技术领域

本发明涉及一种具有加热雾化功能的电子烟，特别涉及一种采用电容供电的加热雾化电子烟。

背景技术

近年来，传统吸烟方式对吸烟者本人及其周围人群造成的危害越来越为人们所共识。为此，许多国家或地区的政府部门已相继出台规定，明令禁止在公共场合吸烟。然而，对于具有香烟依赖（或成瘾）的烟民而言，戒烟必将是一个十分艰难而痛苦的长期过程，不可能立竿见影、一蹴而就。

为满足戒烟需要，目前市场上已推出多种形式的香烟替代品，如烟碱喷雾剂、烟碱药水、烟碱贴剂、烟碱口香糖、可将烟碱溶液雾化的电子烟等。其中，电子烟可实现对烟碱溶液的有效雾化，从而在吸食过程中保留了传统抽烟方式那种吞吐烟雾的特点，可更大程度地满足吸烟者的习惯。此外，电子烟所产生烟雾的主要成分是烟碱，不含焦油等危害人体健康的致癌物。因此，电子烟近年来不断赢得消费者的青睐，正逐步成为一种香烟替代品，在戒烟方面发挥着越来越重要的作用。

现有电子烟雾化的技术方案，主要包括两大类：加热雾化及超声雾化。申请号为 03242914.2，名称为“一种笔式微型蒸汽发生器”的中国实用新型专利，提出了一种可对小空腔内液体实施加热雾化的方案，该方案实施于常规液体及烟碱溶液的雾化，从而可发展出对鼻腔、口腔等部位输送烟碱蒸汽的功能。与加热雾化方案不同的是，申请号为 03111173.4，名称为“一种非可燃性电子雾化香烟”的中国发明专利提出了超声雾化方案，这种雾化方案与家庭用加湿器的雾化原理一样。由于超声雾化技术具有较高的雾化效率，因而已被广泛用于各种雾化领域，如加湿器、喷雾器、医用雾化器、超声雾化治疗仪、超声雾化吸入器、超声波美容仪、香薰雾化器等。然而，由于受体积限制，在电子烟上实现超声雾化，以现有技术还具有相当难度。事实

NJOY Exhibit 1002.795

上，也正因为如此，目前市场上的电子烟产品几乎无一例外最终都采用了加热雾化方案，而不是广告上所宣称的高科技超声雾化。

尽管加热雾化已被成功用于电子烟产品，但目前所采用的加热方式大多为电阻丝加热。这种加热方式的加热效率相对较低，因而存在雾化量偏小、能量利用不充分的问题。申请人曾于 2007 年提出一种纳米尺度超精细空间加热雾化的解决方案（申请号为 200710121524.6 和 200720173030.8，名称为“具有纳米尺度超精细空间加热雾化功能的电子烟”的中国发明专利申请和实用新型专利），可显著提高加热雾化效率，但其制作成本相对较高。

此外，不难发现，目前已公布的电子烟的相关专利大多采用充电电池为其雾化器提供电力。作为香烟替代品，电子烟首先需要结构紧凑，否则重量过大不宜携带或使用。充电电池具有电力续航能力强的优点，但用在戒烟产品中却有其明显缺点。具体表现为：首先，充电电池重量较大，不利于减轻电子烟整体重量；其次，充电电池续航能力强，使得电子烟的可持续吸食时间远长于传统纸烟一支的吸食时间，这样就会导致戒烟者不易控制吸烟量，进而造成不能有效戒烟；除此之外，充电电池充电时间偏长，一般需要多达数个小时，戒烟人士需要购买多套产品才能满足需求，从而增加戒烟成本。

发明内容

为解决上述问题，本发明的目的是提供一种采用电容供电的加热雾化电子烟，该电子烟采用电容充电，解决了传统充电电池进行电子烟充电的上述缺陷；并且本发明电子烟的电源部分、烟体部分以及烟嘴部分都可以采用插接方式连接，使电子烟更便于携带，也能有效避免运输或携带过程的电路自动接通问题。

实现本发明目的的技术方案如下：

本发明提供的电容供电加热雾化的电子烟，其由电源部分、烟体部分和一空心烟嘴组成；所述电源部分包括：一采用电容供电的电源 1；一安装于所述电源 1 后端的指示灯 2；安装于所述电源 1 前端的一对电极插接头 3 和

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一引线插接头 4；所述烟体部分包括：一空心烟杆 5；安装于所述空心烟杆 5 后端的一对电极插接口 6 和一引线插接口 7；依次装于所述空心烟杆 5 的空心腔体内电极插接口 6 和引线插接口 7 之前的控制电路模块 8、加热雾化装置 9、吸液头 10 和烟碱储液仓 12；所述烟碱储液仓 12 内装有海绵体，其仓壁上设有进液口 11；所述吸液头 10 的两端分别与所述加热雾化装置 9 和所述海绵体接触连接；所述电源部分与所述烟体部分分离放置或通过所述电极插接头 3、引线插接头 4 和所述电极插接口 6、引线插接口 7 采用插接方式相连，并在连接处设有机械卡口式防脱装置；所述烟体部分前端与所述空心烟嘴后端采用插接连接或螺纹连接；所述电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 依次电连接。

所述电源 1 为单个超级电容或采用多个超级电容进行串/并联构成的电容组；或者，所述电源 1 为单个电容或由多个电容进行串/并联构成的电容组。

所述空心烟嘴 13 内设置止回阀，仅允许气流单向流动。

所述电子烟的进气通道设置于如下的至少一个位置：烟嘴 13 与空心烟杆 5 连接的缝隙；电极插接口 6 内；引线插接口 7 内。

所述加热雾化装置 9 由雾化腔及电加热器组成；所述雾化腔为陶瓷材质雾化腔；所述电加热器为正温度系数电阻加热器、多孔陶瓷电阻加热器或电阻丝加热器；所述正温度系数电阻加热器的正温度系数电阻的居里温度为 70℃～200℃，电阻值为 0.5 Ω～10 Ω；所述多孔陶瓷电阻加热器的电阻值为 0.5 Ω～10 Ω；所述电阻丝加热器的电阻值为 0.5 Ω～10 Ω。

所述的空心烟杆 5 为不锈钢、铜、铝、钛合金、镁合金、聚四氟乙烯、塑料、玻璃、有机玻璃或透明陶瓷材质的空心烟杆。

所述的空心烟杆 5 和加热雾化装置 9 之间设置空隙或填充隔热材料。

所述的空心烟嘴 13 为中空注塑空心烟嘴或硅胶空心烟嘴，其前端部外部形状为圆形、扁形或收口形。

所述控制电路模块 8 为含有压差感应元件的控制电路；当压差感应元件

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感应到抽吸动作引起的压差时，所述控制电路接通由所述电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 组成的电路；否则断开所述电路；所述控制电路为含有一个升压转换电路的控制电路或为同时含有降压转换电路和升压转换电路的控制电路。

所述的电源部分的充电为交直流转换充电、计算机 USB 接口充电、直流蓄电池充电、充电电池充电、太阳能充电或者人力充电。

所述海绵体为不锈钢纤维、铜纤维、金纤维、铂纤维、银纤维、无纺布纤维、陶瓷纤维、玻璃纤维、活性炭或多孔陶瓷的海绵体。

所述吸液头 10 为泡沫镍材质的吸液头。

本发明的采用电容供电的加热雾化电子烟具有如下优点：

1、电源部分与烟体部分采用插接方式连接，在连接处设有机械卡口防脱装置，该插接方式兼具电连接和机械连接功能，充电方便，且避免了运输或携带过程的电路自动接通问题。

2、电源部分采用超级电容供电，相比于传统锂电池，重量更轻，充电更快；相比于传统电容具有更高的储能密度，体积小、寿命长、内阻低、电容值大，充放电速度快。

3、烟杆采用轻质金属或非金属材料，可进一步减轻电子烟重量，使之更接近传统香烟；烟杆还可采用低导热材料（如聚四氟乙烯），以起到显著隔热的作用。

4、加热雾化部件中的加热器采用正温度系数电阻、多孔陶瓷电阻、泡沫铝、金属纤维或电阻丝制作，可显著增强雾化效果。

5、烟杆和加热雾化部件之间存在空隙或填充有隔热材料，可解决烟杆过热发烫问题。

6、烟嘴内设置止回阀，使气流只能在烟嘴内单向流动，可有效避免误动作（如吹气、振动等导致的气流）造成的电路接通。

7、进气通道可以设置于烟嘴与烟杆之间的缝隙，也可以设置于电极插

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接口或者引线插接口等位置，不需要开设专门的进气口，并且减小了抽吸阻力。

综上所述，本发明的电子烟克服了现有电子烟雾化效率低、电池重量大、充电缓慢以及很难帮助戒烟者有效控制吸烟量的缺点，具有充电快捷、结构简单、易于携带、使用方便等优点。本发明的电容供电加热雾化的电子烟可作为戒烟产品或香烟替代品。此外，本发明除了用于电子烟外，还可用于其它经鼻腔或口腔吸入雾化蒸汽的应用领域如肺部给药、口腔去除异味等。

附图说明

图 1 为本发明电源部分的结构示意图；

图 2 为本发明烟体部分的结构示意图；

图 3 为本发明电子烟的整体结构示意图；

图 4 为本发明一个实施例中的电路连接示意图；

图 5 为本发明又一个实施例中的电路连接示意图；

图 6 为本发明电子烟中控制电路模块的一种实现电路图。

具体实施方式

为使本发明实施例的目的、技术方案和优点更加清楚，下面将结合本发明实施例中的附图，对本发明实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例是本发明一部分实施例，而不是全部的实施例。基于本发明中的实施例，本领域普通技术人员在没有作出创造性劳动前提下所获得的所有其他实施例，都属于本发明保护的范围。

考虑到现有电子烟的电源及烟体控制单元大多采用一体化设计方案，易造成运输或携带过程中由于振动而自动接通电路的缺点，本发明采用插接方式将电源部分与烟体部分分离，以防止运输或携带过程中的电路自动接通。此外，现有电子烟均采用螺纹方式将雾化器与烟体连为一体，充电时需先将雾化器拧下，然后再将烟体与充电器通过螺纹连接上，此过程十分麻烦。本

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发明插接方式的引入将极大地方便电子烟的充电。需要特别指出的是，本发明所引入的插接方式还可以拓展到电子烟的其它部件，可依据不同需要将电子烟制作为多段插接方式，这样可以大大增强电子烟的灵活性。

图 1 为本发明的电容供电加热雾化的电子烟的电源部分的结构示意图；图 2 为本发明的电容供电加热雾化的电子烟的烟体部分的结构示意图；图 3 为本发明电容供电加热雾化的电子烟的整体结构示意图。从图 1-3 可看出，本发明电子烟的电源部分与烟体部分为便于插接的分离结构，充电方便，且避免了运输或携带过程中可能造成的电路自动接通问题。本实施例中，电子烟的外形及尺寸与常规卷烟类似，基本上不会改变吸烟者的使用习惯。

如图 3 所示，本发明提供的电容供电加热雾化的电子烟，由电源部分、烟体部分和一空心烟嘴组成。

具体地，电源部分（如图 1 所示）包括：一采用电容供电的电源 1；一安装于电源 1 后端的指示灯 2；安装于电源 1 前端的一对电极插接头 3 和一引线插接头 4。烟体部分包括（如图 2 所示）：一空心烟杆 5；安装于空心烟杆 5 后端的一对电极插接口 6 和一引线插接口 7；依次装于空心烟杆 5 的空心腔体内电极插接口 6 和引线插接口 7 之前的控制电路模块 8、加热雾化装置 9、吸液头 10 和烟碱储液仓 12；烟碱储液仓 12 内装有海绵体，其仓壁上设有进液口 11；吸液头 10 的两端分别与加热雾化装置 9 和海绵体接触连接。

如图 3 所示，电源部分与烟体部分分离放置或通过电极插接头 3、引线插接头 4 和电极插接口 6、引线插接口 7 采用插接方式相连，并在连接处设有机械卡口式防脱装置；烟体部分前端与空心烟嘴 13 后端采用插接连接或螺纹连接；电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 依次电连接。

下面对每个部件的功能原理进行详细说明：

电源部分由外置电容充电器为其充电，该外置充电器可为交直流转换充

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电器、计算机 USB 接口充电器、直流蓄电池（或充电电池）充电器、太阳能电池充电器或人力充电（（比如手握式、手摇式等充电方式）。充电时，将电源部分从烟体部分拔出，通过电极插接头 3 进行充电。需要指出的是，本发明的充电接口不限于电极插接头 3，该充电接口也可设置于电源部分的前端（靠近指示灯 2），或者电源部分的侧面。本发明电子烟充电方式中的一大特色即为人力充电，因为电容充电速度快的优点使得这一充电方式切实可行，而这一充电方式用在常规充电电池上几乎是不能现实的。

电源 1 由单个超级电容、或多个超级电容并联、或多个超级电容串联提供电力。超级电容是近年来新出现的有别于传统电容的高效储能装置，它的特点是轻便、储能密度高、体积小、寿命长、内阻低、电容值极大、尤其是充放电速度远超于常规电池。由于能够在小体积空间内长时间存储大量的电能，超级电容具有为小型用电设备提供电力能力的同时，还体现出常规充电电池所不具备的独特优势，如内阻明显小于充电电池，充电速度远大于充电电池等，这为电子烟用户根据个人喜好随时充电或吸食带来极大方便。迄今为止，电子烟产品基本上都是采用可充电电池作为电源，其充电速度很慢，完成一次充电需数小时，为用户带来很大不便；而超级电容的充电过程非常快捷，只需 2 分钟左右，实时性好，可以极大地方便用户。此外，常规充电电池还会对环境造成二次污染，而超级电容则无此问题。因此，对于用量极大的电子烟产品而言，超级电容是一种理想的高效长寿命绿色电源。

指示灯 2 可由发光二极管（LED）制作，可依据需要选用不同发光颜色，指示灯与电源部分连接，并由控制电路模块 8 控制其接通和断开。吸烟时，指示灯 2 亮；不吸时，指示灯 2 灭。

电源部分的电极插接头 3 与烟体部分的电极插接口 6，以及电源部分的引线插接头 4 与烟体部分的引线插接口 7 通过插接方式连接，其间设有机械卡口式防脱装置，该插接方式同时兼具电连接和机械连接功能。这种连接方式与现有螺纹连接方式相比，操作更为方便且连接可靠，具有明显的优势，

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此前也从未被应用在电子烟或其它直流消费电子设备中。另外，需要特别指出的是，现有电容或超级电容一般采用焊接方式与用电装置连接，本发明采用的快速插接方式，是电容类储能设备的一种新的连接方式，这种连接方式便于与用电装置快速连接和分离，用于电子烟产品中一方面可有效解决运输或携带过程中的自动接通问题，另一方面还具有使用方便快捷的优点。

控制电路模块 8 为包括压差感应元件的控制电路。其中，压差感应元件用于感应由抽吸动作产生的微压差接通控制电路，当压差感应元件感应到抽吸动作引起的压差时，该控制电路接通由电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 组成的电回路；否则断开所述电回路。为了使电源组件能提供稳定的电力输出（恒压或恒流输出），本发明控制电路还含有一个升压转换电路或同时含有降压转换电路和升压转换电路。

并且，本发明控制电路中不设延时电路。现有电子烟中一般采用延时电路以增加烟液的雾化量，早期采用这种做法一方面是因为所采用雾化方法的效率低的原因，另一方面是因为所用充电电池放电速度有限，从而进一步导致低的加热雾化效率。虽然这种做法一定程度上可以弥补现有技术雾化量小的缺点，但雾化时间明显大于抽吸时间，从而导致与传统吸烟方式的差异。本发明一方面通过雾化技术的改进，可明显增强加热雾化效率，另一方面采用超级电容供电方式，放电速度也明显大于充电电池，从而可以保证不采用延时电路就能实现高效雾化。

空心烟杆 5 为一空心薄壁管，可由金属材料如不锈钢、铜、铝、钛合金、镁合金等制作，也可由导热性能较差的非金属材料如聚四氟乙烯、塑料等制作，还可由透明材料如玻璃、有机玻璃、透明陶瓷等制作，让使用者亲眼看到烟雾的产生过程，从而体验到常规吸烟方式无法感受的乐趣。

优选地，烟杆 5 可采用低导热材料如聚四氟乙烯（热导率为 0.2 W/m．℃）等。现有电子烟产品的烟杆一般采用不锈钢管（热导率约为 16 W/m．℃）或铜管（热导率为 398 W/m．℃）。由于聚四氟乙烯的热导率远小于不

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锈钢和铜，因此可起到显著的隔热作用，防止加热雾化器件产生的热量传至烟杆表面。这样一方面可以有效缓解现有电子烟产品的烟杆发热问题，另一方面还可以改善电子烟的手感（若采用不锈钢或铜的材质，当气温较低时手握电子烟会有冰冷的不适感觉）。另外，聚四氟乙烯的密度约为 2200kg/m^3，不锈钢的密度约为 7800kg/m^3，铜的密度约为 8900kg/m^3，因此采用聚四氟乙烯作为烟杆材料还可以有效减轻电子烟的重量，使之更接近常规香烟的轻便性。此外，采用聚四氟乙烯材料，还可以增加烟杆的透明度，让雾化过程可视化，增加使用者的乐趣。

加热雾化装置 9 由雾化腔及电加热器组成；雾化腔为陶瓷材质雾化腔；电加热器为正温度系数电阻加热器、多孔陶瓷电阻加热器、金属纤维或电阻丝加热器；正温度系数电阻加热器的正温度系数电阻的居里温度为 70℃～200℃，电阻值为 0.5 Ω～10 Ω；多孔陶瓷电阻加热器的电阻值为 0.5 Ω～10 Ω；电阻丝加热器的电阻值为 0.5 Ω～10 Ω。可选地，在空心烟杆 5 和加热雾化装置 9 之间可以设置空隙或填充隔热材料，以进一步的实现隔热的效果。

烟碱储液仓 11 用于储存液体烟碱溶液，其内部设置有吸液用海绵体，并通过吸液头 10 为加热雾化装置 9 提供液体烟碱。烟碱加液口 11 位于烟碱储液仓 12 的外壁，当卸下空心烟嘴 13 后，烟碱加液口 11 需露出空心烟杆 5 之外，以便于添加液体烟碱溶液。烟碱加液口 11 采用压盖密封，防止漏液；添加烟碱时，临时揭开压盖即可。空心烟嘴 13 安装于烟杆 5 靠近烟碱储液仓 12 的一端，通过插接方式连接或螺纹连接，更换十分方便。烟碱储液仓 12 的加液方式除采用上述设计方案外，也可采用笔胆式设计，类似于钢笔吸取墨水的方式。烟碱储液仓 12 中的海绵体为不锈钢纤维、铜纤维、金纤维、铂纤维、银纤维、无纺布纤维、陶瓷纤维、玻璃纤维、活性炭或多孔陶瓷的海绵体。可选地，吸液头(10)为泡沫镍材质的吸液头。

空心烟嘴 13 为中空注塑空心烟嘴或硅胶空心烟嘴，其前端部外部形状为圆形、扁形或收口形。烟嘴 13 内可设置止回阀，使气流只能在烟嘴内单

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向流动，可有效避免误动作（如吹气、振动等导致的气流）造成的电路接通。

本发明的电子烟还可于烟嘴 13 与烟杆 5 之间设置进气通道，也可于电极插接口 6 或引线超接口 7 内设置进气通道，或者同时于烟嘴 13 与烟杆 5 之间、电极插接口 6 内以及引线超接口 7 内设置进气通道，以减小抽吸阻力。吸烟时气流经进气孔进入空心烟杆 5 内，并与雾化烟碱气体混合形成气溶胶状烟雾。这种进气通道设置方式与现有电子烟进气通道设置方式的区别在于，现有电子烟的进气通道一般设置于螺纹连接间隙中，或专门开设进气孔。

本发明的电容供电加热雾化的电子烟外形及尺寸可与常规卷烟、雪茄或烟斗类似，也可设计为各种个性化形状。

本发明提供的电子烟，采用分体设计的电源部分对具有高效雾化功能的加热雾化部件及指示灯供电，体现出很多不同于现有技术的突出优点。由于采用了电容供电，相比于传统锂电池重量更轻，特别是该电子烟的一个显著特点是充电极为迅速，并且一次充电仅提供相当于常规卷烟一支的吸烟量，从而帮助戒烟者有效控制吸食量。电源外壁无须另行设置外壳，能确保电子烟单位质量内供电能力得以提升。

此外，烟杆采用轻质金属及非金属材料，可进一步减轻电子烟重量，更接近传统香烟。由于采用分体设计方式，该电子烟的显著特点是充电方便，且运输或携带过程无自动接通问题。更进一步，因采用正温度系数电阻、多孔陶瓷电阻、金属纤维、泡沫铝或电阻丝制作电加热雾化器，该电子烟的显著特点是具有十分高效的雾化功能。该电子烟的形式不限于常规卷烟，也可制作成雪茄、烟斗、或其它个性化的形式。

本发明电子烟的雾化器采用正温度系数电阻（PTC）、多孔陶瓷电阻、金属纤维、泡沫铝或电阻丝制作。由于采用了电容，电容的一次充电过程一般在 1～2 分钟内完成，可以很好的满足快速充电的要求，并且电容一次充

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电后其电力能够达到与传统一支香烟相当的雾化量，在满足戒烟者烟瘾的同时可以很容易控制吸烟量；此外，电容还具有重量轻的优点；采用 PTC、多孔陶瓷电阻、泡沫铝或金属纤维制作电加热雾化器，可显著增强雾化效果。至今，国内外文献及专利中尚未有采用电容对 PTC、多孔陶瓷电阻、金属纤维或电阻丝雾化器进行供电的电子烟，本发明开辟了一条对这类采用 PTC、多孔陶瓷电阻、金属纤维或电阻丝雾化器的电子烟实施快速充电的技术方案。

下面结合具体的实施例详细说明本发明电子烟的各种变形。需要声明的是，下述每个实施例中电子烟所共同的结构和工作原理已经在前述具体实施方式中进行了详细描述，这些描述适用于本发明的所有实施例。

实施例 1：

本实施例中，电源 1 与空心烟杆 5 的外径相同，均为 8 mm 左右，与常规卷烟尺寸相当；电源 1 可采用单个电容或多个电容的串联、并联或串并联结合，当采用单个电容时，电容参数可选用 2.7 V（电压）、5 F（电容）、Φ8.2 mm（外径）× 25.8 mm（长度），该款电容市场有售(Samsung STARCAP® Capacitor)。除该款电容产品外，也可选用其它参数满足要求的电容。

本实施例中，电源 1 外壳可直接作为电源部分外壳，从而确保电子烟单位质量内供电能力得以提升。需要说明的是，本实施例也不排除依据需要另行设置电源部分的外壳。指示灯 2 位于电源 1 的后一端，电极插接头 3 和引线插接头 4 位于电源 1 另一端；引线插接头 4 与指示灯 2 的一个引线通过导线连接，指示灯 2 的另一个引线通过导线与电极插接头 3 中的一个电极直接相连；指示灯 2 由发光二极管（LED）颗粒制作，可依据需要选用红光、绿光、蓝光以及其它任何一种发光颜色；吸烟时，指示灯 2 亮；不吸时，指示灯 2 灭。空心烟杆 5 为一空心薄壁管，可由轻质金属材料如钛合金、镁合金等制作，也可由非金属材料如聚四氟乙烯、塑料等制作，还可由透明材料如

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玻璃、有机玻璃、透明陶瓷等制作，让使用者亲眼看到烟雾的产生过程，从而体验到常规吸烟方式无法感受的乐趣。电极插接口 6 中的两个插接口对应电源的正负极，分别与两个电极插接头 3 连接；引线插接口 7 为一个插接口，与引线插接头 4 相连接；电极插接口 6 及引线插接口 7 安装于空心烟杆 5 的一端。控制电路模块 8 由压差感应元件及控制电路组成，吸烟时压差感应元件通过感应抽吸动作产生的微压差接通控制电路，从而接通指示灯 2、加热雾化装置 9 与电源部件之间的电路；停止吸烟时，控制电路自动关断，从而切断指示灯 2、加热雾化装置 9 与电源 1 之间的电路。

本实施例中，加热雾化装置 9 由雾化腔及电加热器，其中雾化腔可由陶瓷制作；本实施例中，加热雾化装置 9 中的电加热器由正温度系数电阻（PTC）制作，其居里温度介于 70℃～200℃之间，电阻值范围为 0.5 Ω～10 Ω；为防止烟杆发热或发烫，加热雾化装置 9 与空心烟杆 5 之间填充有隔热材料；烟碱储液仓 12 用于储存液体烟碱溶液，可采用普通金属材料如不锈钢或塑料制作（但不限于此）；烟碱储液仓 12 内部设置有吸液用的海绵体，海绵体可由金属纤维（不锈钢、铜、金、铂、银等纤维）、无纺布纤维、陶瓷纤维、玻璃纤维、活性炭或多孔陶瓷等吸液能力强的材料制造。吸液头 10 由泡沫金属（如泡沫镍）制作，其一端与烟碱储液仓 12 内的海绵体接触，另一端与加热雾化装置 9 接触，为加热雾化装置 9 提供烟碱溶液；烟碱加液口 11 位于烟碱储液仓 12 的外壁，当卸下烟嘴 13 后，烟碱加液口 11 露出空心烟杆 5 之外，可通过烟碱加液口 11 向烟碱储液仓 12 内添加液体烟碱溶液；烟碱加液口 11 采用压盖密封，防止漏液，添加烟碱时，临时揭开压盖即可；空心烟嘴 13 外径与空心烟杆 5 内径匹配，通过插接方式或螺纹连接于烟碱储液仓 12 之后；空心烟嘴 13 为可更换的中空注塑件，依据需求可制作成不同形状如圆形、扁形或收口形等，其制作材料选用对人体无害的食品级材料，可依据需要选择塑料或硅胶等，材料中还可添加银离子等抗菌剂。

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本实施例中，电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 通过电极插接头 3、引线插接头 4、电极插接口 6、引线插接口 7 以及导线形成电连接并构成电路回路，电连接关系如图 4 所示：指示灯 2 及加热雾化装置 9 采用并联方式分别与电源 1 的一极直接连接；电源 1 的另一极与控制电路模块 8 直接连接，该极经控制电路模块 8 后分别与指示灯 2 及加热雾化装置 9 连接。吸烟时，抽吸动作产生微压差将控制电路接通；停止吸烟时，控制电路自动关断。

本实施例的控制电路模块 8 在实际的实现中可以有多种具体的实现方式，图 6 为一种可选的控制电路，该电路仅用于说明本发明，而不用对其进行限定。图 6 中，VCC 高电平端接电源 1 的正极，GND 低电平端接电源 1 的负极，压差感应开关通过抽吸动作产生的压差控制电路的连通，从而接通指示灯和加热雾化装置，停止抽吸后，压差感应开关自动断开。

实施例 2：

本实施例与实施例 1 的区别在于：本实施例中，加热雾化装置 9 的电加热器由多孔陶瓷电阻制作，其电阻值范围仍为 0.5 Ω～10 Ω。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 3：

本实施例与实施例 1 和实施例 2 的区别在于：本实施例中，加热雾化装置 9 的电加热器由金属纤维（如不锈钢金属纤维）、或电阻丝制作，其电阻值范围仍为 0.5 Ω～10 Ω。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 4：

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本实施例中，加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、或电阻丝制作。本实施例与上述实施例的区别在于：本实施例中，电源组件、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接采用图 5 所示方式。指示灯 2 的一个引线与电源 1 的一极直接连接，指示灯 2 的另一个引线与控制电路模块 8 连接；控制电路模块 8 直接与电源 1 的两极连接；加热雾化装置 9 的两个引线连接于控制电路模块 8 之上。吸烟时，抽吸动作产生的微压差接通控制电路模块 8，从而接通各用电部件与电源 1 之间的电路；停止吸烟时，控制电路模块 8 自动关断，从而切断各用电部件与电源 1 之间的电路。除此之外，其它部件的位置结构与实施例 1 相同。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 5：

本实施例中，加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、泡沫铝、或电阻丝制作；电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接既可采用图 4 所示方式，也可采用图 5 所示方式。本实施例与上述实施例的区别在于：本实施例中，控制电路模块 8 的控制电路含有一个升压转换电路；除此之外，其它部件的位置结构与实施例 1 相同。电容在放电过程中，电压会随之下降，升压转换电路的作用就是保障本发明的电源组件能提供稳定的电力输出（恒压或恒流输出）。当电源组件的电压降到低于某一设定值后，升压转换电路就会将其电压值升至设定值。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 6：

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本实施例中，加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、泡沫铝或电阻丝制作；电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接既可采用图 4 所示方式，也可采用图 5 所示方式。本实施例与上述实施例的区别在于：本实施例中，控制电路模块 8 的控制电路同时含有降压和升压转换电路；除此之外，其它部件的位置结构与实施例 1 相同。电子烟的电源组件在满冲状态下，电压值相对较高，降压转换电路将其降至设定值；使用过程中，随着电容的放电，电压会随之下降，当电源组件的电压降到低于设定值后，升压转换电路就会将其电压值升至设定值。这样，通过降压和升压转换电路就可实现稳定的电力输出。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 7：

上述实施例所描述的电子烟的外形类似于常规卷烟，本实施例提供一种外形类似于雪茄的电子烟，也采用电容进行供电。

由于雪茄的外形尺寸明显大于常规卷烟，因此所用电容可采用尺寸及容量更大的产品。本实施例中，电源 1 可采用单个电容或多个电容的串并联，其中涉及的电容的参数可选用 2.7 V（电压）、10 F（电容）、Φ10.2 mm（外径）× 26.2 mm（长度），该款电容市场有售(Samsung STARCAP® Capacitor)；除该款电容产品外，也可选用其它参数满足要求的电容。除此之外，其它部件的位置结构与实施例 1 相同。

本实施例中，电源组件、空心烟杆 5 的外形尺寸与雪茄的外形尺寸相当；加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、或电阻丝制作；电源组件、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接既可采用图 4 所示方式，也可采用图 5 所示方式。

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本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 8：

本实施例提供一种外形类似于烟斗的电子烟，仍然采用电容进行供电。

由于烟斗的外形尺寸大，因此所用电容可采用尺寸及容量更大的产品。本实施例中，电源组件可采用单个电容或多个电容的串并联，其中涉及的电容的参数可选用 2.3 V（电压）、120 F（电容）、Φ18.2 mm（外径）× 41.2 mm（长度），该款电容市场有售(Samsung STARCAP® Capacitor)；除该款电容产品外，也可选用其它参数满足要求的电容。除此之外，其它部件的位置结构与实施例 1 相同。

本实施例中，电源组件、空心烟杆 5 的外形尺寸与雪茄的外形尺寸相当；加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、或电阻丝制作；电源 1、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接既可采用图 4 所示方式，也可采用图 5 所示方式。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

实施例 9：

针对人们对个性化的需求，本实施例提供一种具有个性化外形的电子烟，仍然采用电容进行供电。

本实施例中，电源 1 可采用单个电容或多个电容的串并联，其中涉及的电容依据个性化电子烟的形状及尺寸等要求具体选用。依据不同的个性化需求，电子烟的外形可制作成任意外形，且长度不限，包括：截面为三角形、四边形、五边形、六边形等多边形、圆形、椭圆形、扁形、或其它不规则形状的等截面外形；截面为三角形、四边形、五边形、六边形等多边形、圆形、椭圆形、扁形、或其它不规则形状的非等截面外形（如收口形、渐进

NJOY Exhibit 1002.810

形、抛物形、双曲形、中间凸起形、中间凹陷形等）；截面为三角形、四边形、五边形、六边形等多边形、圆形、椭圆形、扁形、或其它不规则形状的变截面外形（即不同位置的截面形状不一样）等。除此之外，其它部件的位置结构与实施例 1 相同。

本实施例中，加热雾化装置 9 的电加热器可采用正温度系数电阻、多孔陶瓷电阻、金属纤维、或电阻丝制作；电源组件、指示灯 2、控制电路模块 8 和加热雾化装置 9 之间的电路连接既可采用图 4 所示方式，也可采用图 5 所示方式。

本实施例中，其它所有部件已在实施例 1 中进行了深入的解释说明，因此在本实施例中不再做详细说明。

最后应说明的是，以上采用电容驱动加热雾化器这一基本技术路线的几个实施例仅用以说明本发明的技术方案而非限制。尽管参照实施例对本发明进行了详细说明，本领域的普通技术人员应当理解，对本发明的技术方案进行修改或者等同替换，都不脱离本发明技术方案的精神和范围，其均应涵盖在本发明的权利要求范围当中。

NJOY Exhibit 1002.811

权利要求书

1、一种电容供电加热雾化的电子烟，所述电子烟包括电源部分、烟体部分和一空心烟嘴(13)；其特征在于：

所述电源部分包括：一采用电容供电的电源(1)；一安装于所述电源(1)后端的指示灯(2)；安装于所述电源(1)前端的一对电极插接头(3)和一引线插接头(4)；

所述烟体部分包括：一空心烟杆(5)；安装于所述空心烟杆(5)后端的一对电极插接口(6)和一引线插接口(7)；依次装于所述空心烟杆(5)的空心腔体内电极插接口(6)和引线插接口(7)之前的控制电路模块(8)、加热雾化装置(9)、吸液头(10)和烟碱储液仓(12)；所述烟碱储液仓(12) 内装有海绵体，其仓壁上设有进液口（11）；所述吸液头(10)的两端分别与所述加热雾化装置(9)和所述海绵体接触连接；

所述电源部分与所述烟体部分分离放置或通过所述电极插接头(3)、引线插接头(4)和所述电极插接口(6)、引线插接口(7)采用插接方式相连，并在连接处设有机械卡口式防脱装置；

所述烟体部分前端与所述空心烟嘴(13)后端采用插接连接或螺纹连接；

所述电源(1)、指示灯(2)、控制电路模块(8)和加热雾化装置(9)依次电连接。

2、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述电源(1)为单个超级电容或采用多个超级电容进行串/并联构成的电容组。

3、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述空心烟嘴(13)内设置止回阀，仅允许气流单向流动。

4、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述电子烟的进气通道设置于如下的至少一个位置：

NJOY Exhibit 1002.812

烟嘴(13)与空心烟杆(5)连接的缝隙；电极插接口(6)内；引线插接口(7)内。

5、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述加热雾化装置(9)由雾化腔及电加热器组成；所述雾化腔为陶瓷材质雾化腔；所述电加热器为正温度系数电阻加热器、多孔陶瓷电阻加热器、金属纤维或电阻丝加热器；

所述正温度系数电阻加热器的正温度系数电阻的居里温度为 70℃～200℃，电阻值为 0.5 Ω～10 Ω；

所述多孔陶瓷电阻加热器的电阻值为 0.5 Ω～10 Ω；

所述电阻丝加热器的电阻值为 0.5 Ω～10 Ω。

6、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述的空心烟杆(5)为不锈钢、铜、铝、钛合金、镁合金、聚四氟乙烯、塑料、玻璃、有机玻璃或透明陶瓷材质的空心烟杆。

7、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述的空心烟杆(5)和加热雾化装置(9)之间设置空隙或填充隔热材料。

8、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述的空心烟嘴(13)为中空注塑空心烟嘴或硅胶空心烟嘴，其前端部外部形状为圆形、扁形或收口形。

9、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述控制电路模块(8)为含有压差感应元件的控制电路；

当压差感应元件感应到抽吸动作引起的压差时，所述控制电路接通由所述电源(1)、指示灯(2)、控制电路模块(8)和加热雾化装置(9)组成的电回路；否则断开所述电回路；

所述控制电路含有一个升压转换电路或同时含有降压转换电路和升压转换电路。

NJOY Exhibit 1002.813

10、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述的电源部分的充电为交直流转换充电、计算机 USB 接口充电、直流蓄电池充电、充电电池充电、太阳能充电或者人力充电。

11、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述海绵体为不锈钢纤维、铜纤维、金纤维、铂纤维、银纤维、无纺布纤维、陶瓷纤维、玻璃纤维、活性炭或多孔陶瓷的海绵体。

12、根据权利要求 1 所述的电容供电加热雾化的电子烟，其特征在于，所述吸液头(10)为泡沫镍材质的吸液头。

NJOY Exhibit 1002.814

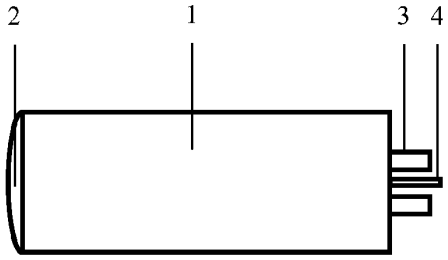


图1

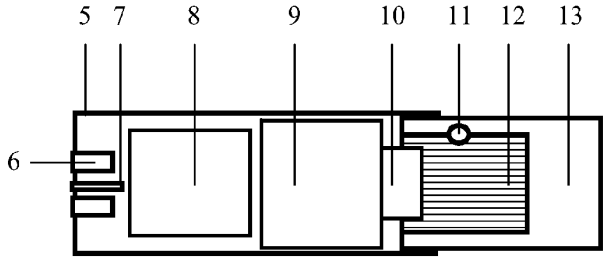


图2

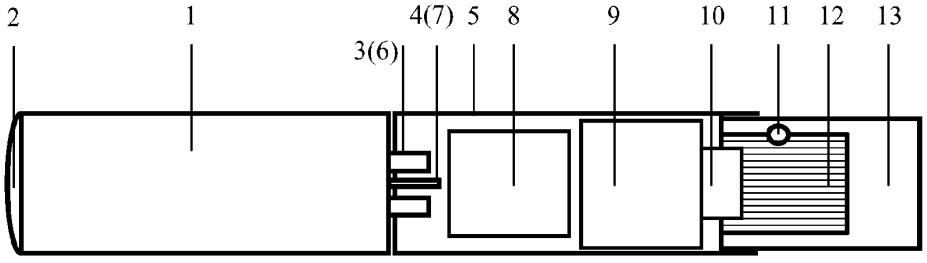


图3

NJOY Exhibit 1002.815

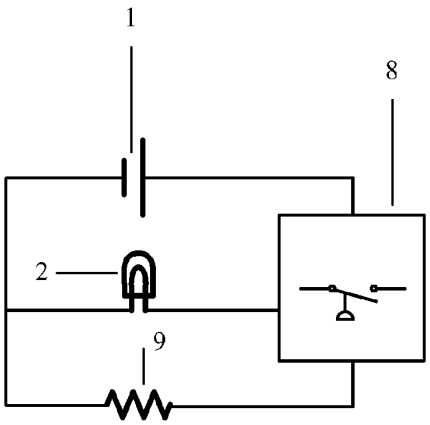


图4

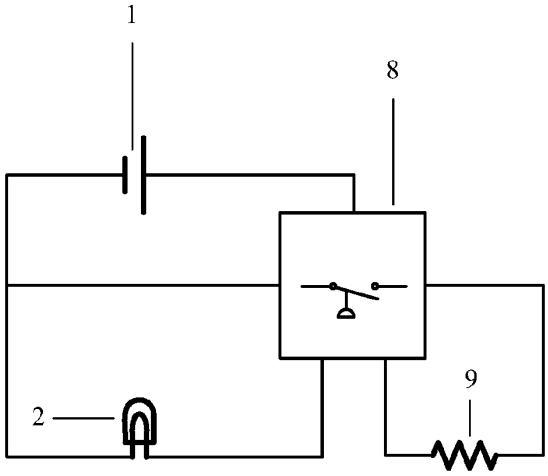


图5

NJOY Exhibit 1002.816

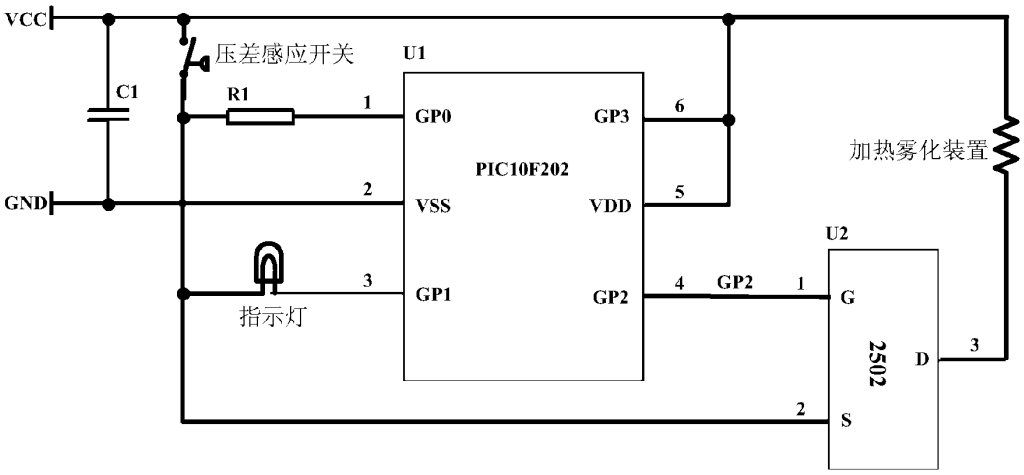


图6

NJOY Exhibit 1002.817

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2010/070185

A. CLASSIFICATION OF SUBJECT MATTER

A24F 47/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC A24 H02J15

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT WPI EPODOC

CAPACITOR? POWER HEAT+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN201375023Y (CHINESE ACAD TECH INST PHYSICS), 06 Jan. 2010 (06.01.2010), claims 1-7, page 7, line 5 to page 14, line 1 in the specification, figures 1-5.	1-2, 4-12
PY		3
Y	CN201079011Y (HAN, Li), 02 July 2008 (02.07.2008), page 9, line 12 in the specification.	3
Y	CN201079011Y (HAN, Li), 02 July 2008 (02.07.2008), page 7, line 7 to page 12, line 12 in the specification, figures 1-24.	1-12
Y	CN101116542A (CHINESE ACAD TECH INST PHYSICS), 06 Feb. 2008 (06.02.2008), page 4, line 20 to page 9, line 16 in the specification, figures 1-4.	1-12
A	US5249586A (PHILIP MORRIS INC), 05 Oct. 1993 (05.10.1993), the whole document.	1-12
A	US5095921A (PHILIP MORRIS INC), 17 Mar. 1992 (17.03.1992), the whole document.	1-12

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 Feb. 2010 (24.02.2010)	**01 Apr. 2010 (01.04.2010)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer SUN,Xiaojing Telephone No. (86-10)62085632

Form PCT/ISA /210 (second sheet) (July 2009)

NJOY Exhibit 1002.818

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/070185

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN201375023Y	06.01.2010	None	
CN201079011Y	02.07.2008	WO2007131450 A	22.11.2007
		WO2007131449 A	22.11.2007
		CA2647234 A	22.11.2007
		CA2647212 A	22.11.2007
		AU2007250368 A	22.11.2007
		AU2007250367 A	22.11.2007
		CN201067079Y	04.06.2008
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		KR20090005139 A	12.01.2009
		EP2022350 A	11.02.2009
		EP2022349 A	11.02.2009
		KR20090018039 A	19.02.2009
		EA200802046 A	27.02.2009
		EA200802045 A	27.02.2009
		EA012481 B	30.10.2009
		US2009095311 A	16.04.2009
		US2009126745 A	21.05.2009
		JP2009537120T	29.10.2009
		JP2009537119T	29.10.2009
		INDELNP200808528E	01.05.2009
CN101116542A	06.02.2008	None	
US5249586 A	05.10.1993	CA2062539 A	12.09.1992
		NO920937 A	14.09.1992
		NO304673B	01.02.1999
		EP0503767 A	16.09.1992
		AU643372B	11.11.1993
		AU1280292 A	17.09.1992
		JP5115272 A	14.05.1993
		JP2574716B2	22.01.1997

NJOY Exhibit 1002.819

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/070185

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
		TR25798 A	01.09.1993
		KR100193885B	15.06.1999
		US5388594 A	14.02.1995
		AT121909T	15.05.1995
		ES2072093T	01.07.1995
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		EP0503767 B1	03.05.1995
		DE69202288E	08.06.1995
		CA2062539 C	23.06.1998
US5095921 A	17.03.1992	DE69102862T	05.01.1995
		NO910355 A	20.05.1992
		NO176545B	16.01.1995
		NO176545C	26.04.1995
		CA2035761 A	20.05.1992
		AU642460B	21.10.1993
		AU7013991 A	21.05.1992
		EP0488488 A1	03.06.1992

NJOY Exhibit 1002.820

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/070185

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
		DK0488488T	21.11.1994
		TR25275 A	01.01.1993
		US5179966 A	19.01.1993
		AT108311T	15.07.1994
		ES2057751T	16.10.1994
		JP6315366 A	15.11.1994
		JP3078033B2	21.08.2000
		EP0488488 B1	13.07.1994
		CA2035761 C	24.04.2001
		DE69102862E	18.08.1994

NJOY Exhibit 1002.821

国际检索报告

国际申请号
PCT/CN2010/070185

A. 主题的分类

A24F 47/00 (2006.01) i

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC　A24　H02J15

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CNPAT WPI EPODOC

烟 电子 电容 加热 CAPACITOR? POWER　HEAT+

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
PX	CN201375023Y(中科院理化技术研究所), 06.1 月 2010(06.01.2010), 权利要求 1-7，说明书第 7 页第 5 行至第 14 页第 1 行，图 1-5。	1-2,4-12
PY		3
Y	CN201079011Y(韩力), 02.7 月 2008(02.07.2008), 说明书第 9 页 12 行。	3
Y	CN201079011Y(韩力), 02.7 月 2008(02.07.2008), 说明书第 7 页 7 行至第 12 页 12 行，图 1-24。	1-12
Y	CN101116542A(中科院理化技术研究所), 06.2 月 2008(06.02.2008), 说明书第 4 页 20 行至第 9 页 16 行，图 1-4。	1-12
A	US5249586A(PHILIP MORRIS INC), 05.10 月 1993(05.10.1993), 全文。	1-12
A	US5095921A(PHILIP MORRIS INC), 17.3 月 1992(17.03.1992), 全文	1-12

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
24.2 月 2010(24.02.2010)	**01.4 月 2010 (01.04.2010)**
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 孙晓静 电话号码：(86-10) **62085632**

NJOY Exhibit 1002.822

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2010/070185

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN201375023Y	06.01.2010	无	
CN201079011Y	02.07.2008	WO2007131450 A	22.11.2007
		WO2007131449 A	22.11.2007
		CA2647234 A	22.11.2007
		CA2647212 A	22.11.2007
		AU2007250368 A	22.11.2007
		AU2007250367 A	22.11.2007
		CN201067079Y	04.06.2008
		MX2008013527 A	04.11.2008
		MX2008013526 A	04.11.2008
		KR20090005139 A	12.01.2009
		EP2022350 A	11.02.2009
		EP2022349 A	11.02.2009
		KR20090018039 A	19.02.2009
		EA200802046 A	27.02.2009
		EA200802045 A	27.02.2009
		EA012481 B	30.10.2009
		US2009095311 A	16.04.2009
		US2009126745 A	21.05.2009
		JP2009537120T	29.10.2009
		JP2009537119T	29.10.2009
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(54) **Title:** A PORTABLE HANDHELD VAPORISING DEVICE

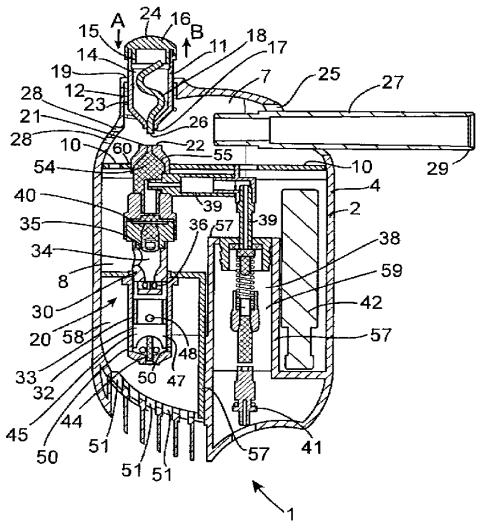


Fig. 3

(57) **Abstract:** A portable handheld vaporising device (1) comprises a housing (2) within which a vaporising chamber (7) is formed, wherein a liquid in a container (11) is vaporised to form an aerosol. A heatable element (21) having a dished abutment surface (22) is located in the vaporising chamber (7), and is heated by a gas powered heater (20) located in a main chamber (8) of the housing (2). A wick (18) extending through a port (17) of the container (11) is located spaced apart from the heatable element (21) when the container (11) is in a first state illustrated in Fig. 3. The container (11) is depressable into the housing (2) into a second state for engaging the wick (18) with the abutment surface (22) of the heatable element (21) for evaporating liquid which is wicked through the wick (18) from the container (11). A draw pipe (27) terminating in a mouthpiece (29) draws an aerosol of the vapour evaporated from the liquid for inhaling thereof. Inlet ports (28) accommodate air into the vaporising chamber (7) for forming the aerosol during drawing on the draw pipe (27).

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"A portable handheld vaporising device"

The present invention relates to a portable handheld vaporising device for vaporising a liquid to produce a vapour thereof, and in particular, though not limited to a portable handheld vaporising device to produce an aerosol of such a vapour.

Portable handheld vaporising devices are known for vaporising liquids to form an aerosol, which can then be inhaled. Such vaporising devices typically are provided for vaporising a liquid which carries a medicinal drug, nicotine or any other chemical, be it naturally occurring or a synthesised chemical for inhaling thereof. Where such portable handheld vaporising devices are provided for vaporising a liquid which includes nicotine, they are commonly referred to as 'E cigarettes".

In general, vaporising devices of the type commonly referred to as E cigarettes comprise a housing within which a vaporising chamber is located, and a container for a nicotine carrying liquid is located adjacent the vaporising chamber. An absorbent pad of spongy material into which the nicotine carrying liquid is absorbed is located in the container, and a portion of the absorbent pad is exposed and is in continuous contact with a hot plate which is located in the vaporising chamber, and which is heated to evaporate the nicotine carrying liquid absorbed in the absorbent pad adjacent the hot plate. A battery powered electrical heater is provided to heat the hot plate for evaporating the nicotine carrying liquid. In order to conserve power in the battery, the heater is only powered up when a person wishes to draw a puff of an aerosol containing the vaporised nicotine carrying liquid from the vaporising chamber.

A pressure sensor is suitably located to detect a drop in pressure resulting from a person commencing to draw a puff of the aerosol. The electrically powered heater is activated in response to a drop in pressure being detected by the pressure sensor, and commences to heat the hot plate. However, this results in a delay before an aerosol of the nicotine carrying liquid is available, since it takes some time for the hot plate to be raised to a temperature sufficient to evaporate the nicotine carrying liquid

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in the absorbent pad adjacent the hot plate. Indeed, in many cases it can take between two and three seconds, and in some cases up to five seconds for the hot plate to be brought up to a suitable temperature by the electrically powered heater in order to evaporate the nicotine carrying liquid to form the aerosol. This is undesirable.

Indeed, a further problem with such devices is that in general it is necessary to maintain the draw on the vaporising chamber while the hot plate is being brought up to temperature by the heater, otherwise, in the absence of a pressure drop being detected by the pressure sensor, the heater is deactivated. This is likewise undesirable, since some people may not have sufficient drawing power to continuously draw on the vaporising chamber until the aerosol becomes available.

A further problem with such devices is that by virtue of the fact that the absorbent pad in which the nicotine carrying liquid is absorbed in the container is in continuous contact with the hot plate, the absorbent pad rapidly deteriorates due to the heat applied to the pad by the hot plate, to the extent that its wicking capacity is significantly reduced, and in particular, is significantly reduced adjacent the hot plate. Thereby the capacity of the absorbent pad to wick the nicotine carrying liquid to the hot plate for evaporation thereof is compromised.

A further problem with such devices is that in general, in order to activate the heater, a relatively high pressure drop is required to be detected by the pressure sensor. This is also undesirable, and can cause discomfort to a person using the device.

Other such vaporising devices which are adapted for vaporising a liquid, which carries other constituents besides nicotine, to produce an inhalable aerosol are known, and in general, such devices suffer from all or some of the problems discussed above.

The present invention is directed towards addressing at least some of the problems of known portable handheld vaporising devices.

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According to the invention there is provided a portable handheld vaporising device comprising a housing defining a vaporising device comprising a vaporising chamber, a heatable element located in the vaporising chamber, a container defining a hollow interior region for a liquid, an applicator means for applying liquid from the container to the heatable element for evaporation thereof, one of the applicator means and the heatable element being adapted for selectively applying liquid from the container to the heatable element, an outlet port from the vaporising chamber for accommodating one of a vapour and an aerosol of the vapour from the vaporising chamber, and a heating means for heating the heatable element.

In one embodiment of the invention the one of the applicator means and the heatable element is moveable relative to the other of the applicator means and the heatable element for applying liquid from the container to the heatable element.

In another embodiment of the invention the applicator means comprises a wick extending outwardly from the container and communicating with the hollow interior region of the container. Preferably, the one of the wick and the heatable element is moveable between a first state with the wick and the heatable element spaced apart from each other, and a second state with the wick and the heatable element in engagement with each other for applying liquid from the container to the heatable element. Advantageously, the wick is moveable relative to the heatable element between the first state and the second state.

In another embodiment of the invention the container is mounted in the housing, and is moveable with the wick between the first state and the second state. Preferably, the container is slideably mounted in the main housing, and is slideable between the first state and the second state. Advantageously, the container is slideable into the vaporising chamber from the first state to the second state. Ideally, the container is manually slideable from the first state to the second state.

In one aspect of the invention a portion of the container extends outwardly through

the housing, and terminates in a finger accommodating button for engagement by a thumb or a finger of a person for manual urging the container from the first state to the second state.

In another aspect of the invention an urging means is provided for urging the container in a direction from the second state to the first state. Preferably, the urging means comprises a resilient element. Advantageously, the resilient element is located to act between the container and the housing. Ideally, the urging means comprises a spring.

In another aspect of the invention the wick extends outwardly from the container in a direction towards the heatable element. Preferably, a portion of the wick extending from the container terminates in a distal end, and the distal end of the wick is engageable with the heatable element when the moveable one of the wick and the heatable element is in the second state.

In another aspect of the invention the wick is of a heat resistant material. Preferably, the heat resistant material of the wick is heat resistant at least up to a temperature corresponding to the temperature of vaporisation of the liquid in the container. Advantageously, the wick is of an absorbent material. Preferably, the wick extends into the hollow interior region of the container.

In a further aspect of the invention the container is refillable. Preferably, the container comprises a filling opening located in the container externally of the housing. Advantageously, a closure cap engageable with the container closes the filling opening. Advantageously, the finger accommodating button is formed on the closure cap.

In one embodiment of the invention an inlet port is provided to the vaporising chamber for accommodating air into the vaporising chamber to produce an aerosol of the vapour therein.

In another embodiment of the invention the outlet port from the vaporising chamber is adapted to receive a draw pipe.

In a further embodiment of the invention the vaporising device comprises the draw pipe, and the draw pipe terminates at a distal end thereof in a mouthpiece.

In one aspect of the invention the heatable element defines an abutment surface for receiving liquid from the applicator means. Preferably, the abutment surface is of slightly dished shape. Advantageously, the heatable element is of a heat conductive material.

In one aspect of the invention the heating means is in heat transfer relationship with the heatable element.

In one embodiment of the invention the heating means is adapted to produce a heat output which is matched to the thermal mass of the heatable element so that the heatable element and the heating means are thermally balanced, and the temperature of the heatable element is maintained at a temperature suitable for evaporating liquid from the container.

In a further embodiment of the invention the housing defines a heater accommodating chamber for accommodating the heating means. Preferably, the heater accommodating chamber is sealably isolated from the vaporising chamber.

In one embodiment of the invention the heating means comprises a gas powered heating means.

In another embodiment of the invention the heating means comprises a body member defining a combustion chamber.

In one aspect of the invention a gas catalytic combustion element is located in the combustion chamber for converting fuel gas to heat.

Preferably, the body member is of heat conducting material.

In another aspect of the invention an ignition means is provided for igniting the fuel gas to initially burn with a flame for raising the temperature of the gas catalytic combustion element to its ignition temperature. Preferably, the gas catalytic combustion element is located so that on the gas catalytic combustion element being raised to its ignition temperature, the flame of the initial flame combustion is starved of fuel gas and is extinguished.

In another embodiment of the invention a thermostatic control means is provided for controlling the temperature of the heatable element. Preferably, the thermostatic control means is adapted for controlling the temperature of the heatable element by controlling flow of fuel gas to the combustion chamber.

In another embodiment of the invention a thermal mass is located in heat conducting engagement with the gas catalytic combustion element for maintaining a portion of the gas catalytic combustion element adjacent the thermal mass at a temperature at or above the ignition temperature of the gas catalytic combustion element during short time periods during which the gas catalytic combustion element is isolated from the fuel gas by the thermostatic control means.

Ideally, the body member of the heating means is in heat conducting engagement with the heatable element.

In another embodiment of the invention a fuel gas reservoir is provided for storing fuel gas, the fuel gas reservoir being coupled to the heating means. Preferably, the fuel gas reservoir is refillable.

In another embodiment of the invention a reservoir chamber is located in the housing for accommodating the fuel gas reservoir.

In an alternative embodiment of the invention the heating means comprises an electrically powered heating means.

In one aspect of the invention the heating means comprises an electrically powered heating element.

In another aspect of the invention the electrically powered heating element comprises a resistive heating element.

In one aspect of the invention the electrically powered heating element comprises a positive temperature coefficient device.

In another aspect of the invention the electrically powered heating element comprises a ceramic device.

In a further aspect of the invention the electrically powered heating element comprises a carbon element.

Preferably, the electrically powered heating means is battery powered.

In another embodiment of the invention the heatable element is of a specific thermal mass, and preferably, the heatable element is connected to the heating means by a heat transfer means for controlling heat transfer from the heating means to the heatable element.

In another aspect of the invention the housing is formed by a pair of shells, which when joined together form the vaporising chamber. Preferably, the shells when joined together define the heater accommodating chamber. Advantageously, the pair of shells when joined together to form the housing define the reservoir accommodating chamber.

In one aspect of the invention a partition wall extending between the shells when

joined together to form the housing isolates the vaporising chamber from the heater accommodating chamber.

In another aspect of the invention the housing is of a plastics material.

In a further aspect of the invention the housing is of a heat resistant plastics material.

The advantages of the invention are many. A particularly important advantage of the invention is that there is no delay between drawing on the draw pipe and an aerosol of the vaporised liquid being available. This is achieved by virtue of the fact that the heating means is maintained active while the vaporising device is in use, and thus, once the one of the applicator means and the heatable element is urged from the first state to the second state for depositing liquid onto the heatable element, liquid applied to the heatable element is immediately evaporated to form a vapour which in turn forms the aerosol, as air is being drawn through the vaporising chamber. Thus, once the moveable one of the applicator means and the heatable element is moved for bringing the moveable one of the applicator means and the heatable element into engagement with the other one of the application means and the heatable element either just prior to or simultaneously with the commencement of drawing of the aerosol from the vaporising chamber, the aerosol will be immediately available and will be drawn from the vaporising chamber.

By providing the applicator means in the form of a wick, the liquid is readily easily wicked from the container and applied to the heatable element, without any leakage or loss of liquid.

A further advantage of the invention is that the quantity of liquid to be applied to the heatable element can be readily controlled. This advantage is achieved in particular when the applicator means is provided by a wick. The provision of the wick provides a relatively constant rate of transfer of the liquid therethrough, and thus, the quantity of the liquid to be evaporated applied to the heatable element is determined by the length of time the wick is brought into engagement with the heatable element. A

further and particularly important advantage of the invention is achieved by virtue of the fact that when the applicator means is provided by a wick, the wick is only brought into engagement with the heatable element when it is desired to apply the liquid to the heatable element. Thus, the wick is only in contact with the heatable element for relatively short time periods, and thus, little or no deterioration of the wick or its wicking capacity occurs. Indeed, by virtue of the fact that the wick is only in engagement with the heatable element for such relatively short periods of time, the wick will be sufficiently wetted by the liquid to avoid virtually any deterioration of the wick.

The invention will be more clearly understood from the following description of a preferred embodiment thereof, which is given by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a side elevational view of a vaporising device according to the invention,

Fig. 2 is a front end elevational view of the vaporising device of Fig. 1,

Fig. 3 is a transverse cross-sectional side elevational view of the vaporising device of Fig. 1 on the line III-III of Fig. 2, and

Fig. 4 is a transverse cross-sectional side elevational view of a portion of the vaporising device of Fig. 1.

Referring to the drawings, there is illustrated a portable handheld vaporising device according to the invention, indicated generally by the reference numeral 1, for vaporising a liquid to produce an inhalable aerosol. The liquid may be any suitable vaporisable liquid. Typical liquids would include a mixture of propylene glycol or vegetable glycerine along with flavourings and/or pure nicotine or other optional additive. The vaporising device 1 comprises a housing 2 of injection moulded plastics material formed in two half shells 4, which when joined together along a

seam 5 define a vaporising chamber 7 within which the liquid is vaporised, and a main chamber 8 which will be described below. The vaporising chamber 7 is sealably isolated from the main chamber 8 by a partition wall 10 which is integrally formed in two parts with the shells 4, so that when the shells 4 are joined together along the seam 5 to form the housing 2, the partition wall 10 sealably isolates the vaporising chamber 7 from the main chamber 8.

A container 11 for the liquid to be vaporised is located in a bore 12 of circular transverse cross-section in the housing 2, and defines a hollow interior region 14 for the liquid. The container 11 is refillable with liquid to be vaporised through a filling opening 15, which is sealably closed by a closure cap 16 which is sealably engageable in the filling opening 15. The container 11 is of cylindrical shape and tapers towards an outlet port 17. A flange 19 extends around and inwardly into the bore 12, and slideably accommodates the container 11 in the bore 12 for a purpose to be described below. An applicator means comprising a heat resistant absorbent wick 18 extends through the outlet port 17 from the container 11, and extends into the hollow interior region 14 of the container 11 for absorbing the liquid therein and for dispensing the liquid from the hollow interior region 14 by a capillary wicking action.

A heatable element 21 extends from the main chamber 8 of the housing 2 into the vaporising chamber 7, and co-operates with a distal end 26 of the wick 18 for selectively evaporating liquid from the container 11, as will be described below. The heatable element 21 is of heat conductive material, namely, aluminium, and defines a slightly dished shape abutment surface 22 for engaging the distal end 26 of the wick 18. A heating means, in this embodiment of the invention comprising a gas powered heater 20, which is described below, is located in the main chamber 8 of the housing 2, and is in heat conducting engagement with the heatable element 21 for heating thereof.

The container 11, as mentioned above, is slideably mounted in the bore 12, and is manually urgeable in the direction of the arrow A from a first state illustrated in Fig. 3

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with the distal end 26 of the wick 18 spaced apart from the heatable element 21 to a second state illustrated in Fig. 4 with the distal end 26 of the wick 18 abutting the abutment surface 22 of the heatable element 21 for selectively applying the liquid from the container 11 to the abutment surface 22 of the heatable element 21 for vaporising the liquid. An urging means comprising a compression spring 23 located in the bore 12 and appropriately acting between the housing 2 and the container 11 resiliently urges the container 11 in the direction of the arrow B outwardly of the vaporising chamber 7 into the first state, and retains the container 11 in the first state with the distal end 26 of the wick 18 spaced apart from the abutment surface 22 of the heatable element 21. The closure cap 16 forms a finger accommodating push button 24 engageable by a finger or thumb of a person using the vaporising device 1 for manually urging the container 11 in the direction of the arrow A from the first state to the second state to thereby selectively apply liquid from the container 11 to the abutment surface 22 of the heatable element 21 for vaporising the liquid.

An outlet port 25 through the housing 2 from the vaporising chamber 7 engages and accommodates a hollow tubular draw pipe 27 from the vaporising chamber 7 for accommodating an aerosol of the evaporated liquid therefrom. The draw pipe 27 terminates at its distal end in a mouthpiece 29 for facilitating drawing on the draw pipe 27 for drawing the aerosol from the vaporising chamber 7 for inhaling thereof.

Air inlet ports 28 through the housing 2 to the vaporising chamber 7 accommodate air into the vaporising chamber 7 as the aerosol is being drawn from the vaporising chamber 7 through the draw pipe 27. Vapour evaporated by the surface 22 of the heatable member 21 is entrained in the air as it is being drawn through the vaporising chamber 7 to form the aerosol, which is then drawn through the draw pipe 27.

Turning now to the gas powered heater 20, the gas powered heater 20 is substantially similar to a gas powered heater which is disclosed in PCT published Application Specification No. WO 2006/082571, and comprises a body member 30 which is constructed from a number of components all of heat conducting material,

which in this embodiment of the invention is aluminium, and which are in heat conducting engagement with each other. The body member 30 defines a combustion chamber 32 within which a gas catalytic combustion element 33 is located for converting fuel gas to heat. In this embodiment of the invention the gas catalytic combustion element comprises a perforated metal substrate coated with a precious metal. A venture mixer 34 formed in the body member 30 mixes air with the fuel gas which is delivered into the venture mixer 34 by a jet orifice 35, and the gas/air mixture is delivered from the venture mixer 34 into the combustion chamber 32 through a diffuser 36.

A fuel gas reservoir 38 is located in the main chamber 8 for storing the fuel gas in liquid form. The fuel gas is delivered from the fuel gas reservoir 38 to the venturi mixer 34 through a fuel supply pipe 39 and a thermostatic control means, namely, a thermostatic control valve 40, which is located in the body member 30. The thermostatic control valve 40 controls the temperature of the body member 30, and in turn the heatable element 21 by controlling the flow of fuel gas to the venturi mixer 34. A filler valve 41 is provided for facilitating refilling of the fuel gas reservoir 38.

A piezoelectric igniter 42 is located in the main chamber 8 for generating a high voltage which is applied to an electrode 44 which extends into the combustion chamber 32. The electrode 44 is located adjacent an end 45 of the combustion chamber 32 which defines a flame combustion chamber 47. The electrode 44 is located within the flame combustion chamber 47 spaced apart from the portion of the body member 30 which forms the flame combustion chamber 47, so that when the high voltage is applied to the electrode 44 by the piezoelectric igniter 42, a spark arcs from the electrode 44 to the body member 30 within the flame combustion chamber 47 for initially igniting the fuel gas to burn in a flame in the flame combustion chamber 47.

The gas catalytic combustion element 33 is located relative to the flame combustion chamber 47 so that the root of the flame commences to raise the temperature of the gas catalytic combustion element 33 to its ignition temperature. On being raised to

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its ignition temperature, the gas catalytic combustion element 33 commences to convert the fuel gas to heat by catalytic conversion. In due course the flame is starved of fuel gas and is extinguished.

An on/off switch (not shown) in the housing 2 controls an isolating valve (also not shown) in the fuel supply pipe 39 for selectively controlling the supply of fuel gas from the reservoir to the thermostatic control valve 40. A linkage (not shown) in the housing 2 connects the on/off switch (not shown) to the piezoelectric igniter 42 for activating the piezoelectric igniter 42 for activating the piezoelectric igniter 42 to apply the high voltage to the electrode 44 after the isolating valve (not shown) has been operated into the open state by the on/off switch (not shown) to ignite the fuel gas/air mixture in the flame combustion chamber 47 to burn with a flame.

A thermal mass 48 is secured to a portion of the gas catalytic combustion element 33. The thermal mass 48 is of heat conducting material and is sized in order to maintain the portion of the gas catalytic combustion element 33 adjacent the thermal mass 48 at its ignition temperature during relatively short periods while the supply of fuel gas to the combustion chamber 32 is interrupted by the thermostatic control valve 40 as the temperature of the body member 30 is being controlled. Thus when fuel gas is reinstated to the gas catalytic combustion element 33, the portion of the gas catalytic combustion element 33 adjacent the thermal mass 48 commences to convert fuel gas to heat. Thereafter, the remainder of the gas catalytic combustion element 33 rapidly rises to its ignition temperature.

These aspects of the gas powered heater 20 and its operation, as well as the thermostatic control valve 40 and the thermal mass 48 are described in PCT published Application Specification No. WO 2006/082571.

Primary exhaust gas ports 50 extend through the body member 30 from the combustion chamber 32 for accommodating exhaust gases from the combustion chamber 32 into the main compartment 8. A plurality of secondary exhaust gas ports 51 extend through the housing 2 from the main chamber 8 for exhausting the

exhaust gases to atmosphere.

A portion 54 of the body member 30 extends into a bore 55 in the heatable element 21 and engages the bore 55 with heat conducting engagement for transferring heat from the body member 30 to the heatable element 21, and for maintaining the heatable element 21 at the appropriate temperature for vaporising the liquid when it is applied to the abutment surface 22 thereof by the wick 18.

Partition walls 57 located in the main chamber 8 divide the main chamber 8 into a heater accommodating chamber 58 for accommodating the heater 20, and a reservoir accommodating chamber 59 for accommodating the fuel gas reservoir 38. Fuel gas from the combustion chamber 32 is exhausted into the heater accommodating chamber 58 from where it is in turn exhausted to atmosphere through the secondary exhaust ports 51. The partition walls 57 sealably isolate the reservoir chamber 59 from the heater accommodating chamber 58. The partition wall 10 sealably isolates the vaporising chamber 7 from the heater accommodating chamber 58 to avoid any danger of exhaust gases in the heater accommodating chamber 58 entering the vaporising chamber 7. An opening 60 in the partition wall 10 accommodates the heatable element 21 into the vaporising chamber 7, and the heatable element 21 is sealably located in the opening 60, in order to avoid any danger of exhaust gases in the heater accommodating chamber 58 migrating into the vaporising chamber 7.

In use, with the fuel gas reservoir 38 charged with liquid fuel gas and the container 11 charged with the liquid to be vaporised, the vaporising device 1 is ready for use. The on/off switch (not shown) is operated for delivering fuel gas from the fuel gas reservoir 38 to the combustion chamber 32. Operation of the on/off switch (not shown) also activates the piezoelectric igniter 42 to apply the high voltage to the electrode 44, to in turn produce a spark in the flame combustion chamber 47 which causes the fuel gas/air mixture from the venture mixer 34 to burn in a flame in the flame combustion chamber 47. The gas catalytic combustion element 33 is rapidly raised to its ignition temperature by the root of the flame burning in the flame

combustion chamber 47, and then commences to convert the fuel gas to heat by a catalytic reaction. Thereafter the flame is quickly starved of fuel gas and is extinguished. The gas powered heater 20 continues to operate with the gas catalytic combustion element 33 converting the fuel gas/air mixture to heat. Heat is conducted from the combustion chamber 32 through the body member 30 of the heater 20 to the heatable element 21, which is rapidly raised to an appropriate temperature by the gas powered heater 20 for evaporating the liquid.

When it is desired to inhale an aerosol of vapour of the liquid, the push button 24 is depressed in the direction of the arrow A into the housing 2 for urging the container 11 through the bore 12 from the first state to the second state with the distal end 26 of the wick 18 engaging the abutment surface 22 of the heatable element 21, thereby applying liquid from the distal end 26 of the wick 18 from the container 11 to the abutment surface 22 of the heatable element 21. The liquid is evaporated on coming into contact with the abutment surface 22 of the heatable element 21. By drawing on the mouthpiece 29, air is drawn into the vaporising chamber 7 through the air inlet ports 28 where it entrains the vapour of the liquid evaporated by the heatable element 21 to form an aerosol, which is then drawn through the draw pipe 27. On release of the push button 24, the spring 23 returns the container 11 in the direction of the arrow B to the first state with the distal end 26 of the wick 18 spaced apart from the heatable element 21.

The fuel gas supply from the fuel gas reservoir 38 to the heater 20 is maintained during a session of use of the vaporising device 1. At the end of a session, the on/off switch (not shown) is operated into an off state in order to operate the isolating valve (not shown) in the fuel gas supply pipe 39 into an isolating state for isolating the heater 20 from the fuel gas reservoir 18. The thermostatic control valve 40 controls the supply of fuel gas to the combustion chamber 32 for maintaining the heatable element 21 at the appropriate temperature to vaporise the liquid, both during periods when the wick 18 is engaged with the heatable element 21 and when the wick 18 is disengaged from the heatable element 21.

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When the container 11 requires to be recharged, the closure cap 16 is removed from the filling opening 15, and the hollow interior region 14 of the container 11 is charged with a fresh supply of the liquid. The closure cap 16 is then sealably engaged in the filling opening 15.

Thereafter operation of the vaporising device continues, and each time a draw of the aerosol is required, the push button 24 is depressed towards the housing 2 for urging the container 11 from the first state to the second state for engaging the distal end 26 of the wick 18 with the abutment surface 22 of the heatable element 21 to vaporise the liquid.

While the liquid to be evaporated may be any suitable liquid, and may be a mixture of propylene glycol and/or vegetable glycerine along with one or more flavourings and/or pure nicotine, in this particular embodiment of the invention the vaporising device is particularly suitable for vaporising nicotine in a liquid carrier. Typically, it is envisaged that the nicotine will be concentrated nicotine in liquid form, and will be carried in a liquid propylene glycol carrier liquid. Typically, a liquid flavouring concentrate will also be included in the liquid carrier, which typically would provide a tobacco flavour, and the tobacco flavour could be a specific tobacco flavour specific to a particular type of tobacco plant or a blend of tobacco leaves. Alternatively, or additionally, a peppermint or other such flavouring concentrate which would similarly be in liquid form could be included in the liquid carrier along with the concentrated liquid nicotine and the liquid tobacco flavouring concentrate, or instead of the liquid tobacco flavouring concentrate.

While the means for selectively applying the liquid to be vaporised to the surface of the heatable element has been described as being provided by locating the container 11 to be moveable into and out of the vaporising chamber 7, any other suitable means for selectively applying the liquid to the heatable element may be used. For example, in certain cases, the gas powered heater 20 may be moveable relative to the container for bringing the heatable element into engagement with the wick.

It is also envisaged that instead of providing a wick for applying the liquid from the container 11 to the surface of the heatable element, any other suitable means for selectively applying the liquid from the container 11 to the heatable element may be provided. For example, in certain cases, it is envisaged that a valve may be provided in the outlet port 17 of the container 11 which would be selectively operable for selective drip feeding of the liquid in the container 11 onto the abutment surface of the heatable element. In which case, the container 11 would be fixed relative to the housing 2, and could be formed as an integral part of the housing 2. It is also envisaged that a precision drip feed mechanism may be provided in the outlet port 17 of the container 11 which would be adapted to dispense a specific predefined volume of the liquid on each activation.

While the heating means has been described as comprising a gas powered heater, any other suitable heating means may be provided. While the gas powered heater has been described as comprising a gas catalytic combustion element for converting the fuel gas to heat by a catalytic reaction, it is envisaged in certain cases that the gas powered heater may be of the type which converts fuel gas to heat by flame combustion only. It is also envisaged that the heating means may be provided by an electrical heating means, for example, an electrically powered heating element or the like, and in which case, it is envisaged that the electrically powered heating element may comprise an electrical resistive heating element, a positive temperature coefficient element, an electrically powered ceramic heater element, a carbon heater element, an infrared heater, or heat emitted from a halogen light bulb.

While the body member 30 of the heater 20 has been described as being of aluminium, the body member may be of any other suitable heat conductive material, for example, brass, copper, or an alloy or any other suitable material. Additionally, it is envisaged that the heatable element may be of any other suitable heat conductive material, for example, brass, copper, or an alloy of any other suitable material. Further, it is envisaged that the heatable element may be of a ceramics material, as could the body member of the heater be of a ceramics material.

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It is also envisaged that instead of providing the heater 20 with a thermostatic control valve, the heater 20 may be provided without any thermostatic control means, and in which case, it is envisaged that the heater and the heatable element would be thermally balanced. This would be achieved by providing the body member and the heatable element to be of a thermal mass which would be matched to the heat output produced by the gas catalytic combustion element, so that the temperature of the heatable element would be maintained at a substantially constant temperature, which would be selected to be an appropriate temperature for vaporising the liquid. Furthermore, where a thermostatic control means is provided for controlling the flow of fuel gas to the heater, or where the body member of the heater and the heatable element are selected to be of a thermal mass to match the heat output of the gas catalytic combustion element, it will be appreciated that the thermostatic control means will be set, and the heat output from the gas catalytic combustion element will be such that the heatable element will be maintained at a substantially constant temperature, which will be suitable for evaporating the constituent to be evaporated from the liquid.

It is also envisaged that the heatable element may have a specific thermal capacity, and heat transfer from the heater to the heatable element would be controlled so that a quantity of heat corresponding to the thermal capacity of the heatable element would be transferred from the heater to the heatable element in a predefined time period. Where the heater is provided as a gas powered heater with a heat conductive body member, the body member of the heater would be connected to the heatable element by a heat transfer means, such as a heat conductive connector which would be connected to the heater and the heatable element with heat conducting engagement, and would be sized in order to control the heat transfer from the heater to the heatable element.

Needless to say, it is envisaged that the vaporising device may be adapted for vaporising any liquid, and it will of course be appreciated that where a thermostatic control means is provided for controlling the flow of fuel gas to the gas catalytic

combustion element, or where the thermal mass of the body member of the heater and the heatable element are matched to the heat output from the gas catalytic combustion element, or where the heatable element is provided to have a specific thermal mass, it is envisaged that the temperature at which the heatable element is being maintained will be a temperature suitable for evaporating the liquid, and in particular, the constituent carried in the liquid for producing a vapour thereof in order to form the aerosol.

While the container for the liquid to be evaporated has been described as being of cylindrical shape and tapering towards the outlet port, it will be appreciated that the container for the liquid to be evaporated may be of any other suitable shape or construction. Indeed, in certain cases, it is envisaged that the container may be of square transverse cross-section, rectangular transverse cross-section, triangular transverse cross-section or any other polygonal transverse cross-section, oval transverse cross-section or the like.

It is also envisaged that the heater may be operated to be powered up each time a puff of the aerosol is to be drawn from the vaporising chamber, and on completion of drawing of the puff of the aerosol, the heater would be deactivated. The heater could be powered up in response to urging of the applicator means into engagement with the heatable element, and could be deactivated after a predefined time period had been timed out after powering up.

Claims

1. A portable handheld vaporising device comprising a housing defining a vaporising device comprising a vaporising chamber, a heatable element located in the vaporising chamber, a container defining a hollow interior region for a liquid, an applicator means for applying liquid from the container to the heatable element for evaporation thereof, one of the applicator means and the heatable element being adapted for selectively applying liquid from the container to the heatable element, an outlet port from the vaporising chamber for accommodating one of a vapour and an aerosol of the vapour from the vaporising chamber, and a heating means for heating the heatable element.

2. A vaporising device as claimed in Claim 1 in which the one of the applicator means and the heatable element is moveable relative to the other of the applicator means and the heatable element for applying liquid from the container to the heatable element.

3. A vaporising device as claimed in Claim 1 or 2 in which the applicator means comprises a wick extending outwardly from the container and communicating with the hollow interior region of the container.

4. A vaporising device as claimed in Claim 3 in which the one of the wick and the heatable element is moveable between a first state with the wick and the heatable element spaced apart from each other, and a second state with the wick and the heatable element in engagement with each other for applying liquid from the container to the heatable element.

5. A vaporising device as claimed in Claim 4 in which the wick is moveable relative to the heatable element between the first state and the second state.

6. A vaporising device as claimed in Claim 4 or 5 in which the container is mounted in the housing, and is moveable with the wick between the first state and the second state.

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7. A vaporising device as claimed in any of Claims 4 to 6 in which the container is slideably mounted in the main housing, and is slideable between the first state and the second state.

8. A vaporising device as claimed in any of Claims 4 to 7 in which the container is slideable into the vaporising chamber from the first state to the second state.

9. A vaporising device as claimed in any of Claims 4 to 8 in which the container is manually slideable from the first state to the second state.

10. A vaporising device as claimed in any of Claims 4 to 9 in which a portion of the container extends outwardly through the housing, and terminates in a finger accommodating button for engagement by a thumb or a finger of a person for manual urging the container from the first state to the second state.

11. A vaporising device as claimed in any of Claims 4 to 10 in which an urging means is provided for urging the container in a direction from the second state to the first state.

12. A vaporising device as claimed in Claim 11 in which the urging means comprises a resilient element.

13. A vaporising device as claimed in Claim 12 in which the resilient element is located to act between the container and the housing.

14. A vaporising device as claimed in any of Claims 11 to 13 in which the urging means comprises a spring.

15. A vaporising device as claimed in any of Claims 3 to 14 in which the wick extends outwardly from the container in a direction towards the heatable element.

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16. A vaporising device as claimed in any of Claims 3 to 15 in which a portion of the wick extending from the container terminates in a distal end, and the distal end of the wick is engageable with the heatable element when the moveable one of the wick and the heatable element is in the second state.

17. A vaporising device as claimed in any of Claims 3 to 16 in which the wick is of a heat resistant material.

18. A vaporising device as claimed in Claim 17 in which the heat resistant material of the wick is heat resistant at least up to a temperature corresponding to the temperature of vaporisation of the liquid in the container.

19. A vaporising device as claimed in any of Claims 3 to 18 in which the wick is of an absorbent material.

20. A vaporising device as claimed in any of Claims 3 to 19 in which the wick extends into the hollow interior region of the container.

21. A vaporising device as claimed in any preceding claim in which the container is refillable.

22. A vaporising device as claimed in any preceding claim in which the container comprises a filling opening located in the container externally of the housing.

23. A vaporising device as claimed in Claim 22 in which a closure cap engageable with the container closes the filling opening.

24. A vaporising device as claimed in Claim 23 in which the finger accommodating button is formed on the closure cap.

25. A vaporising device as claimed in any preceding claim in which an inlet port is provided to the vaporising chamber for accommodating air into the vaporising

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chamber to produce an aerosol of the vapour therein.

26. A vaporising device as claimed in any preceding claim in which the outlet port from the vaporising chamber is adapted to receive a draw pipe.

27. A vaporising device as claimed in Claim 26 in which the vaporising device comprises the draw pipe, and the draw pipe terminates at a distal end thereof in a mouthpiece.

28. A vaporising device as claimed in any preceding claim in which the heatable element defines an abutment surface for receiving liquid from the applicator means.

29. A vaporising device as claimed in Claim 28 in which the abutment surface is of slightly dished shape.

30. A vaporising device as claimed in any preceding claim in which the heatable element is of a heat conductive material.

31. A vaporising device as claimed any preceding clam in which the heating means is in heat transfer relationship with the heatable element.

32. A vaporising device as claimed in any preceding claim in which the heating means is adapted to produce a heat output which is matched to the thermal mass of the heatable element so that the heatable element and the heating means are thermally balanced, and the temperature of the heatable element is maintained at a temperature suitable for evaporating liquid from the container.

33. A vaporising device as claimed in any preceding claim in which the housing defines a heater accommodating chamber for accommodating the heating means.

34. A vaporising device as claimed in Claim 33 in which the heater accommodating chamber is sealably isolated from the vaporising chamber.

35. A vaporising device as claimed in any preceding claim in which the heating means comprises a gas powered heating means.

36. A vaporising device as claimed in Claim 35 in which the heating means comprises a body member defining a combustion chamber.

37. A vaporising device as claimed in Claim 36 in which a gas catalytic combustion element is located in the combustion chamber for converting fuel gas to heat.

38. A vaporising device as claimed in Claim 36 or 37 in which the body member is of heat conducting material.

39. A vaporising device as claimed in Claim 37 or 38 in which an ignition means is provided for igniting the fuel gas to initially burn with a flame for raising the temperature of the gas catalytic combustion element to its ignition temperature.

40. A vaporising device as claimed in Claim 39 in which the gas catalytic combustion element is located so that on the gas catalytic combustion element being raised to its ignition temperature, the flame of the initial flame combustion is starved of fuel gas and is extinguished.

41. A vaporising device as claimed in any of Claims 37 to 40 in which a thermostatic control means is provided for controlling the temperature of the heatable element.

42. A vaporising device as claimed in Claim 41 in which the thermostatic control means is adapted for controlling the temperature of the heatable element by controlling flow of fuel gas to the combustion chamber.

43. A vaporising device as claimed in Claim 41 or 42 in which a thermal mass is

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located in heat conducting engagement with the gas catalytic combustion element for maintaining a portion of the gas catalytic combustion element adjacent the thermal mass at a temperature at or above the ignition temperature of the gas catalytic combustion element during short time periods during which the gas catalytic combustion element is isolated from the fuel gas by the thermostatic control means.

44. A vaporising device as claimed in any of Claims 36 to 43 in which the body member of the heating means is in heat conducting engagement with the heatable element.

45. A vaporising device as claimed in any of Claims 35 to 44 in which a fuel gas reservoir is provided for storing fuel gas, the fuel gas reservoir being coupled to the heating means.

46. A vaporising device as claimed in Claim 45 in which the fuel gas reservoir is refillable.

47. A vaporising device as claimed in Claim 45 or 46 in which a reservoir chamber is located in the housing for accommodating the fuel gas reservoir.

48. A vaporising device as claimed in any of Claims 1 to 34 in which the heating means comprises an electrically powered heating means.

49. A vaporising device as claimed in Claim 48 in which the heating means comprises an electrically powered heating element.

50. A vaporising device as claimed in Claim 49 in which the electrically powered heating element comprises a resistive heating element.

51. A vaporising device as claimed in Claim 49 in which the electrically powered heating element comprises a positive temperature coefficient device.

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52. A vaporising device as claimed in Claim 49 in which the electrically powered heating element comprises a ceramic device.

53. A vaporising device as claimed in Claim 49 in which the electrically powered heating element comprises a carbon element.

54. A vaporising device as claimed in any of Claims 48 to 53 in which the electrically powered heating means is battery powered.

55. A vaporising device as claimed in any preceding claim in which the heatable element is of a specific thermal mass.

56. A vaporising device as claimed in Claim 55 in which the heatable element is connected to the heating means by a heat transfer means for controlling heat transfer from the heating means to the heatable element.

57. A vaporising device as claimed in any preceding claim in which the housing is formed by a pair of shells, which when joined together form the vaporising chamber.

58. A vaporising device as claimed in Claim 57 in which the shells when joined together define the heater accommodating chamber.

59. A vaporising device as claimed in Claim 57 or 58 in which the pair of shells when joined together to form the housing define the reservoir accommodating chamber.

60. A vaporising device as claimed in any of Claims 57 to 59 in which a partition wall extending between the shells when joined together to form the housing isolates the vaporising chamber from the heater accommodating chamber.

61. A vaporising device as claimed in any preceding claim in which the housing

is of a plastics material.

62. A vaporising device as claimed in any preceding claim in which the housing is of a heat resistant plastics material.

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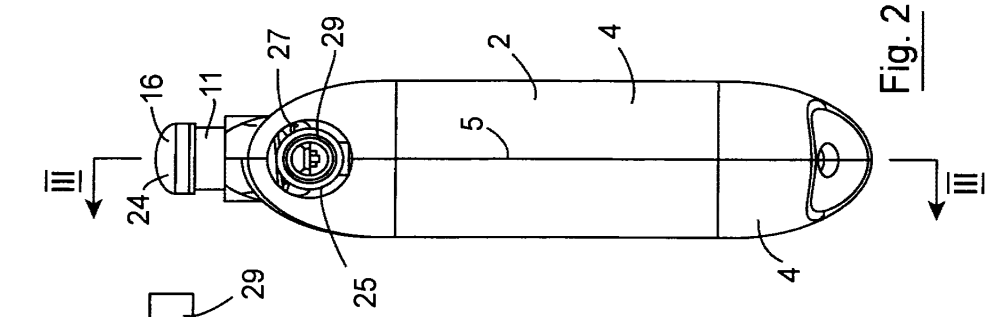


Fig. 2

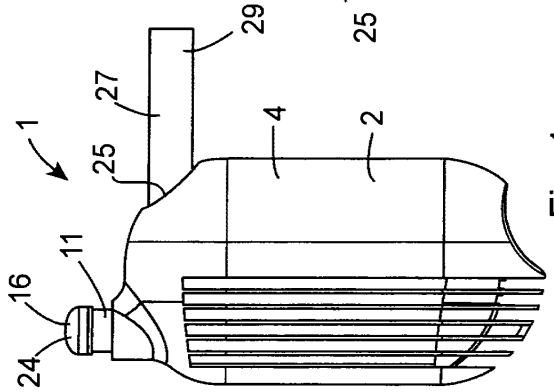


Fig. 1

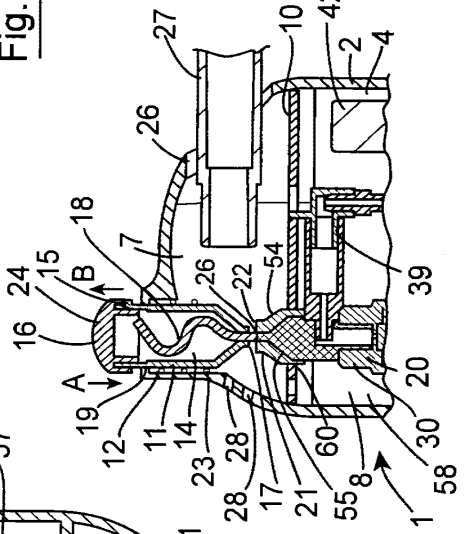


Fig. 4

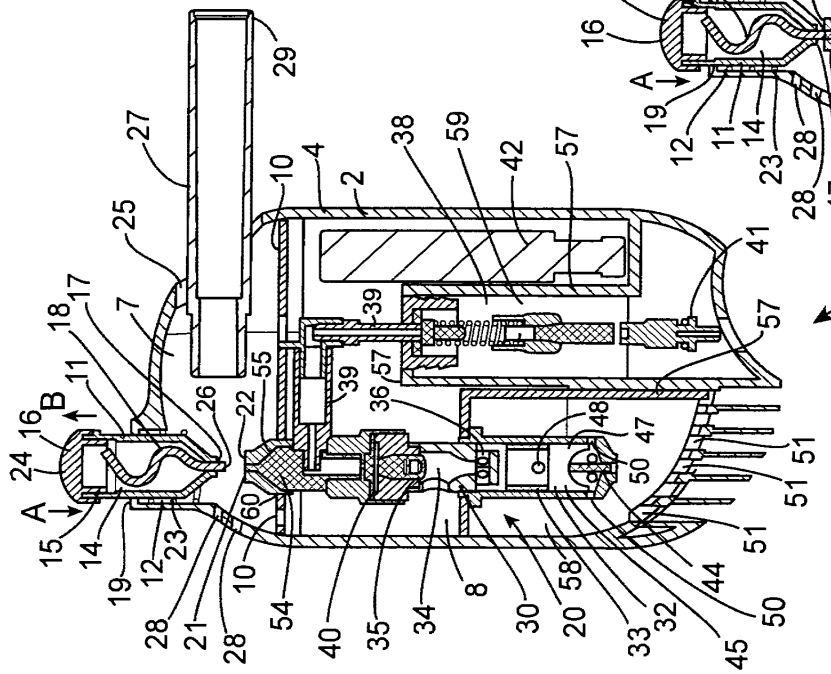


Fig. 3

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IE2011/000021

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24F47/00 A61M11/04 A61M15/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24F A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/069519 A1 (JAPAN TOBACCO INC [JP] ; KATAYAMA KAZUHIKO [JP] ; YAJIMA M0RI0 [JP]) 4 June 2009 (2009-06-04)	1,2, 21-23 , 25-28, 30-32 , 48-56
Y	paragraphs [0019] - [0026] ; figure 1 & EP 2 218 760 A1 (JAPAN TOBACCO INC [JP]) 18 August 2010 (2010-08-18)	33-47 , 57-62
Y	US 2010/024834 A1 (0GLESBY ALFRED PETER [IE] ET AL) 4 February 2010 (2010-02-04) paragraphs [0082] - [0085] ; figures 3-6	33-47 , 57-62

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2011	20/07/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Bbttcher, Stephani e

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IE2011/000021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009069519 A1	04-06-2009	CA 2706928 A1	04-06-2009
		CN 101883833 A	10-11-2010
		EP 2218760 A1	18-08-2010
		KR 20100080844 A	12-07-2010
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US 2010024834 A1	04-02-2010	EP 2068985 A2	17-06-2009
		IE 20070633 A2	17-09-2008
		WO 2008029381 A2	13-03-2008

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(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) **Title**: APPARATUS FOR GENERATING HYDROXYL RADICALS

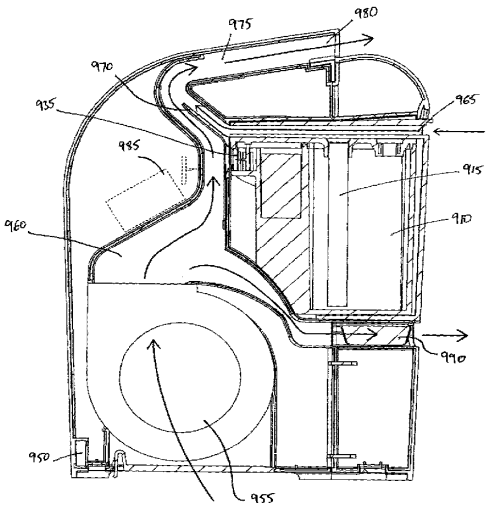


Figure 9

(57) **Abstract**: The invention provides a consumable cartridge for use in a hydroxyl radical generating apparatus, the consumable cartridge comprising: a reactant supply comprising a supply of a substance that reacts with ozone to form hydroxyl radicals; and an ozone supply comprising an ozone generator; wherein the ozone supply is fixed to the reactant supply. By supplying both a reactant supply and an ozone generator in the same consumable cartridge, maintenance operations on an associated base unit in a hydroxyl radical generating system can be minimised.

WO 2012/059726 A2

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Apparatus for Generating Hydroxyl Radicals

Field of the Invention

The present invention relates to an apparatus for producing hydroxyl radicals for delivery to an indoor environment. In particular, the invention relates to an apparatus comprising a consumable cartridge for use with a base unit, wherein the consumable cartridge and base unit operate together to provide and deliver hydroxyl radicals.

Background to the Invention

The use of hydroxyl radicals as an airborne disinfectant in hospitals and other indoor environments is now becoming widespread. The disinfectant property of hydroxyl radicals has been known since the publication of research conducted in the 1960s at Porton Down in the UK and TNO in The Netherlands. Air based disinfection using hydroxyl radicals mimics a naturally occurring process in the outdoor environment, and so the concentration of hydroxyl radicals in the air is sometimes referred to as the "open air factor".

One example of an apparatus for generating hydroxyl radicals for airborne disinfectant is described in WO 2005/026044. A further apparatus is described in WO 2008/125879. The essential components of the apparatuses described in these documents are a supply of olefin, such as terpene, and a supply of ozone. An olefin vapour is produced from the supply of olefin and is mixed and reacts with the ozone to produce hydroxyl radicals.

While this basic chemistry for producing hydroxyl radicals is now well understood, there is a need to provide a convenient, safe and effective system for supplying hydroxyl radicals to an indoor environment. In particular, it would be desirable to provide a system that can be continuously and effectively operated by consumers with minimal interruption for maintenance and replenishment.

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Summary of the Invention

The present invention is defined in the appended independent claims, to which reference should be made. Preferred features of the invention are set out in the dependent claims.

In a first aspect, the invention provides a consumable cartridge for use in a hydroxyl radical generating apparatus, the consumable cartridge comprising:

a reactant supply comprising a supply of a substance that reacts with ozone to produce hydroxyl radicals, and

an ozone supply comprising an ozone generator;

wherein the ozone supply is fixed to the reactant supply.

By supplying both a reactant supply and an ozone generator in the same consumable cartridge, maintenance operations on an associated base unit in a hydroxyl radical generating system can be minimised.

The reactant supply is consumed and will become exhausted during use. It therefore needs to be replenished. The rate at which the reactant supply is used up depends on the pattern of usage of the apparatus and the size of the supply, but in view of a number of factors, including the physical size of the device, a reactant refill is typically designed to last a few months. In the system as described in WO 2008/125879, for example, olefin cartridges are replaced approximately every three months.

In prior apparatuses employing a base unit and refill cartridges, such as described in WO 2008/125879, an electronic ozone generator has been provided within the base unit together with the other electronic elements of the system. The base unit typically includes electronics for controlling a pump or fan to drive air through the base unit and power control electronics for providing the correct voltage to the ozone supply.

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However, the inventors have recognised that electronic ozone generators, although not consumable, also have a limited lifetime, particularly with continuous usage. The performance of an electric ozone generator, such as a corona discharge ozone generator, will degrade over time. An electric ozone generator might be expected to provide an acceptable level of performance for three or four months of continuous use. The other electronic elements of the system typically have a longer lifetime than the ozone generator, and accordingly it is the ozone generator that usually needs replacing first and most frequently from the electronic components.

Clearly, in environments such as hospitals and schools, it is vital to have disinfecting systems that are able to operate continuously and effectively, and any time in which the apparatus is out of service in order to replace faulty components is undesirable. By placing an ozone generator in the consumable cartridge, the ozone generator can be replaced at the same time as the reactant supply by an end user, and the need to call out technically trained service personnel to replace faulty or broken ozone generators can be avoided. The reactant supply and the ozone generator can be designed to have the same expected operating life.

Preferably, the ozone generator is an electrically powered ozone generator, such as corona discharge ozone generator or plasma ion generator. Other types of electrically powered ozone generator can be used, for example a cold plasma ozone generator, a UV type ozone generator, or a stainless steel filament in a dielectric tube. Preferably, the consumable cartridge includes at least one electrical contact configured to allow connection of an external power supply to the ozone generator.

Preferably, the consumable cartridge comprises an external housing, the reactant supply and the ozone supply being positioned within the external housing, wherein the electrical contact is accessible from an exterior of the external housing.

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The consumable cartridge may include a transformer and other electronic components. The transformer is used to provide the required voltage to the ozone generator, which is typically between 10 and 20 kV. Alternatively, the consumable cartridge may be configured for use with a base unit which contains an appropriate high voltage power source or a transformer for converting an external or battery supply voltage. As an alternative, the consumable cartridge may include a battery together with a suitable transformer.

The reactant supply is preferably a reservoir containing the substance that reacts with ozone to produce hydroxyl radicals. The substance may be delivered from the reservoir by a capillary wick or membrane. The liquid may be vaporised by a flow of air past the wick or membrane. Additionally, a heater may be employed to aid vaporisation.

The cartridge may comprise a first air inlet and a first outlet, wherein the first outlet is in fluid communication with the reactant in the reactant supply and the first inlet, and

the cartridge may comprise a second air inlet and a second outlet, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet.

Alternatively, the first air inlet and first air outlet may be defined by an associated base unit or by a combination of the consumable cartridge and the base unit, wherein the first outlet is in fluid communication with the reactant in the reactant supply and the first inlet. Similarly, the second air inlet and second air outlet may be defined by an associated base unit or by a combination of the consumable cartridge and the base unit, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet.

The first outlet may be positioned adjacent the second outlet, and the cartridge (and/or base unit) may be configured so that air flow through one of the first outlet and the second outlet draws air through the other of the first outlet and

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the second outlet. This suction of air exploits the Venturi effect, which is a well understood effect in fluid dynamics.

The suction due to the Venturi effect can be controlled by appropriate geometry of the air flow conduits. For example, the consumable cartridge may define a first air conduit between the first air inlet and the first outlet that narrows between the first air inlet and the first outlet. Narrowing the conduit in this way increases the magnitude of the Venturi effect and so provides greater suction through the second outlet. Alternatively, or in addition, the consumable cartridge may define a second air conduit between the second air inlet and the second outlet, the second air conduit narrowing between the second air inlet and the second outlet. However, in practical devices, the required air flow past the reactant supply has been found to be so small that narrowing of the ozone conduit is often not necessary, and parallel sided conduits can be used.

The consumable cartridge or base unit may include a mixing chamber having a dispensing opening, the mixing chamber in fluid communication with both the first outlet and the second outlet, and configured to ensure a substantially complete reaction of vapours from the reactant supply with ozone from the ozone supply before release to the user environment through the dispensing opening.

The reactant supply may comprise a supply of olefin, such as D-Limonene, or may be a supply of another substance such as hydrogen peroxide.

When the reactant is hydrogen peroxide the consumable cartridge or the base unit may advantageously further comprise an ion generator. The interaction of ions with ozone and hydrogen peroxide increases the yield of hydroxyl radicals and so reduces both the amount of ozone that needs to be generated and the amount of ozone that remains unreacted with the hydrogen peroxide.

The ion generator may be a separate device to the ozone generator and may be in the base unit or in the consumable cartridge, providing ions within the first or second air conduits. However, advantageously, the ion generator may be

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the same device as the ozone generator. In this case, the ozone generator may be a plasma ion generator.

The ion generator is also preferably configured to ionize air at a relatively low voltage in order to avoid excessive ozone generation and nitric oxide generation. To achieve this, one of the electrodes in the ion generator may be configured with a plurality of fine spikes. This produces a high potential gradient around the spikes, increasing ionization for a given applied voltage when compared to electrode designs producing smaller potential gradients. The ion generator is preferably configured to generate negative ions, as this reduces ozone generation and nitric oxide generation compared with positive ions.

In a second aspect, the invention provides an apparatus for generating hydroxyl radicals comprising a base unit and a consumable cartridge, the consumable cartridge being in accordance with the first aspect of the invention, and the base unit comprising a means for providing electrical power to the consumable cartridge, and a means for driving air through the apparatus.

The base unit may comprise a transformer for transforming a mains voltage or other external supply voltage to a voltage suitable for the ozone generator in the consumable cartridge. The base unit may comprise a mixing chamber in fluid communication with an outlet in fluid communication with the reactant supply and an outlet in fluid communication with the ozone supply, the mixing chamber further comprising a dispensing outlet.

The base unit may comprise a base unit air inlet and base unit air conduit between the base unit air inlet and an air inlet on the consumable cartridge, or partially defined by the consumable cartridge, wherein the inlet conduit narrows between the base unit air inlet and the air inlet on, or partially defined by, the consumable cartridge. The narrowing of the inlet conduit accelerates the air flow towards the air inlet on, or partially defined by, the consumable cartridge. The speed of the air flow past the ozone generator affects the concentration of ozone in the air supplied to the mixing chamber. The narrowing of the inlet

conduit can therefore be designed to provide a predetermined ozone concentration. Other ways to control ozone and olefin concentration include controlling the speed of a pump or blower used as the means for driving air through the apparatus, and controlling the voltage supplied to the ozone generator.

The base unit may comprise an ion generator within or adjacent the base unit air conduit. The ion generator is also preferably configured to ionize air at a relatively low voltage in order to avoid excessive ozone generation and nitric oxide generation. To achieve this, electrodes in the ion generator may be configured as a plurality of fine spikes. This produces a high potential gradient around the spikes, increasing ionization for a given applied voltage when compared to electrode designs producing smaller potential gradients. The ion generator is preferably configured to generate negative ions, again to reduce ozone generation and nitric oxide generation.

In a third aspect, the invention provides a base unit for producing hydroxyl radicals, the base unit suitable for use with a consumable cartridge in accordance with the first aspect of the invention and a means for connection with a power supply, a base unit air inlet, a means for moving air through the consumable cartridge, and a socket configured to receive the consumable cartridge, the socket including electrical contacts suitable for supplying electrical power from the means for connection with a power supply to the consumable cartridge.

The base unit may comprise a base unit air conduit between the base unit air inlet and an air inlet on, or partially defined by, the consumable cartridge, wherein the base unit air inlet conduit narrows between the base unit air inlet and air inlet on, or partially defined by, the consumable cartridge. The narrowing of the air inlet conduit accelerates the air flow to the air inlet on the consumable cartridge.

The base unit may comprise an ion generator within or adjacent the base unit air conduit. The ion generator is also preferably configured to ionize air at a

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relatively low voltage in order to avoid excessive ozone generation and nitric oxide generation. To achieve this, electrodes in the ion generator may be configured as a plurality of fine spikes. This produces a high potential gradient around the spikes, increasing ionization for a given applied voltage when compared to electrode designs producing smaller potential gradients. The ion generator is preferably configured to generate negative ions, again to reduce ozone generation and nitric oxide generation.

In a fourth aspect, the invention provides a hydroxyl radical generating apparatus, comprising:

at least one air inlet and a dispensing outlet, and an air flow path between the air inlet and the dispensing outlet;

a supply of hydrogen peroxide configured to supply hydrogen peroxide into the air flow path;

a supply of ozone configured to supply ozone into the air flow path; and

an ioniser configured to generate and supply ions into the air flow path.

The apparatus may comprise a first air inlet and a second air inlet. The apparatus may further comprise a mixing chamber, the mixing chamber in fluid communication with the first and second air inlets and the dispensing outlet. The supply of hydrogen peroxide may be positioned between the first air inlet and the mixing chamber. The supply of ozone may be positioned between the second air inlet and the dispensing outlet. The supply of hydrogen peroxide may be provided in one or more cartridges. The supply of ozone may also be provided in one or more cartridges, which may be the same as or different to cartridge(s) containing the supply of hydrogen peroxide.

The apparatus may comprise a first outlet, wherein the first outlet is in fluid communication with the hydrogen peroxide supply and the first inlet, and a second outlet, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet. The first outlet may be positioned adjacent the second outlet, and the apparatus may be configured so that air flow through one of the first outlet and the second outlet draws air through the other of the first outlet and the second outlet. This suction of air exploits the

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Venturi effect, which is a well understood effect in fluid dynamics. The first and second outlets may open into the mixing chamber.

The suction due to the Venturi effect can be controlled by appropriate geometry of the air flow conduits. For example, the apparatus may define a first air conduit between the first air inlet and the first outlet that narrows between the first air inlet and the first outlet. Narrowing the conduit in this way increases the magnitude of the Venturi effect and so provides greater suction through the second outlet. Alternatively, or in addition, the apparatus may define a second air conduit between the second air inlet and the second outlet, the second air conduit narrowing between the second air inlet and the second outlet.

A means to drive air through the air flow path may be provided, such as a fan, pump or blower. The means to drive air may be provided between the second air inlet and the mixing chamber, between the first air inlet and the mixing chamber or between the mixing chamber and the air outlet. More than one means to drive air through the apparatus may be provided, in different locations.

The ozone supply may be an ozone generator. Preferably, the ozone generator is an electrically powered ozone generator. Most preferably, the ozone generator also acts as the ioniser. An example of a suitable ozone generator is a corona discharge ozone generator or plasma ion generator. Other types of electrically powered ozone generator can be used, for example a cold plasma ozone generator, a UV type ozone generator, or a stainless steel filament in a dielectric tube.

If an ioniser is provided as a separate element to the ozone generator, any suitable ioniser may be used.

The apparatus may include a transformer and other electronic components. The transformer is used to provide the required voltage to the ozone generator, which is typically between 10 and 20 kV.

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The hydrogen peroxide supply preferably comprises a liquid reservoir within a

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Figures 4a and 4b illustrate a consumable cartridge in accordance with the second embodiment of the present invention;

Figure 5 illustrates the ozone generator module of the cartridge shown in Figures 4a and 4b;

Figure 6 illustrates the consumable cartridge of the second embodiment installed in a base unit, with the casing in a removed position;

Figure 7 illustrates the flow path of air through the ozone generator shown in Figures 5 and 6;

Figure 8 is a perspective view of the dosing head shown in Figure 4;

Figure 9 is a cross-sectional view of an apparatus in accordance with a third embodiment of the invention; and

Figures 10a and 10b are a perspective view and a cross-sectional view of a cartridge for use in the apparatus of Figure 9.

Detailed description

Figures 1a, 1b and 1c illustrate a consumable cartridge in accordance with a first embodiment of the invention. Figure 1a is a side view of the cartridge, Figure 1b is an end view of the cartridge and Figure 1c is a cross-sectional view of the cartridge. The cartridge 100 comprises an olefin supply 110 and an ozone generator 120. The olefin supply comprises a container 112 in which an amount of liquid olefin, such as terpene, is stored. A wick 114 is inserted in the container and extends out of a top end of the container for delivery of olefin to an olefin outlet. This is illustrated most clearly in Figure 1c which shows the wick extending from within the container to a conduit extending between air inlet 116 and an outlet 118. Air entering the inlet 116 passes over the wick 114 and picks up an olefin vapour as it does so, before exiting through outlet 118.

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The wick 114 may be formed from any suitable fibrous material, such as polypropylene fibre.

The reactant in this example is an olefin or mixture of olefins. However, other substances that react with ozone to produce hydroxyl radicals may be used, for example, hydrogen peroxide or cinnamaldehyde.

It should also be noted that the reactant supply need not be in liquid form and might be solid or gaseous instead. For example, solid beeswax may be used as an olefin source. Also, the wick illustrated in Figures 1a, 1b and 1c may be replaced by other means of conveying reactant vapour to an air flow. For example, a vapour permeable membrane may be used to separate the reactant supply from the associated air flow.

The ozone supply 120 comprises an electronic ozone generator 122 located adjacent an air passage having an inlet 124 and an outlet 126. Oxygen in the air entering through inlet passage 124 passes over the ozone generator, which in this example is a corona discharge device, and ozone is thereby formed. The ozone rich air exits through outlet 126. Suitable corona discharge ozone generators, such as plasma ion generators, are available from Trump Electronics of East Yongfu Road, Tianchang, China 201100 (www.trumpxp.com) and may be formed from aluminium oxide or calcium silicate for example. Alternative forms of ozone generator may also be used, such as UV type ozone generators, cold plasma ozone generators or a stainless steel filament in a dielectric tube.

In order to provide the necessary voltage to the ozone generator 122, electrical contacts 128a and 128b are provided on a back surface of the ozone generator. The outlets 118 and 126 are immediately adjacent one another within a unitary moulding which defines the conduits though which the air passes. The arrangement shown in Figure 1c, with the outlets immediately adjacent one another, is configured such that an air flow past the ozone generator and out of outlet 126, draws air through inlet 116 past the olefin wick and out of outlet 118. The flow of air past the olefin supply is a result of the

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Venturi effect, which is a well-understood effect in fluid dynamics. The air flow exiting outlet 126 causes a reduction in pressure in the region of outlet 126, which pulls air through inlet 116. This is illustrated more clearly in Figure 3.

The moulding defining the air inlets and outlets of the ozone supply and the olefin supply can be connected to the container 112 using a screw fitting or push fitting.

The electrical contacts 128a and 128b are formed from any suitable conducting material, such as copper, and are spaced apart to avoid arcing. Corona discharge ozone generators operate at very high voltages so that arcing is possible problem if the electrical contacts are placed too close together.

Figures 2a, 2b and 2c illustrate the cartridge shown in Figures 1a, 1b and 1c, and its relationship with a base unit which is configured to connect directly to a mains power supply. Figure 2a is a side view, Figure 2b is a perspective view and Figure 2c is a cut-away view with an element of the base unit housing removed. The base unit 200 comprises a housing 210 and a hinged lid section 214, together with a standard bayonet-type plug for connection to a mains power supply. The hinged lid 214 is shown in an open position to allow for insertion or removal of the cartridge 100. As shown in Figure 2c, within the base unit there are electronic components 230 including a transformer which is used to transform the mains supply voltage to the high voltage required for the ozone generator in the cartridge. Electrical contacts 232 and 234 are provided for contact with corresponding contacts 128a and 128b on the cartridge. The electrical contacts 232,234 in the base unit are spring loaded to ensure good electrical contact.

Figure 3 is a cross-section of the base unit of Figures 2a to 2c together with the cartridge, with the cartridge installed within the base unit. The base unit includes a fan 220 which draws air in through air inlet 222 up into a narrowing air conduit 224 which connects to inlet 124 on the cartridge. Air drawn in by the fan is accelerated as the conduit narrows. The accelerated air flow then passes over the ozone generator 122 in the cartridge and out of outlet 126 into

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mixing chamber 228 formed within the lid 214 of the base unit. The reduced pressure of the air flowing out through outlet 126 draws air in through inlet 226 in the lid 214 through inlet 116 in the cartridge and over the wick 114 containing the olefin, in this case terpene. The olefin rich air then exits through outlet 118 into mixing chamber 228 where it mixes with and reacts with the ozone to form hydroxyl radicals. The hydroxyl radicals then leave the mixing chamber through dispensing outlet 240.

The apparatus may be designed for different airflow. For example the fan may be provided in the conduit with the wick 114 and the internal geometry of the base unit and cartridge configured to use the Venturi effect to suck air through the ozone generator. Equally the narrowing of the air flow conduits may be provided in the cartridge instead of or as well as in the base unit. Furthermore, the Venturi effect may be exploited within the base unit rather than at the outlets of the cartridge. For example, the base unit may include output conduits that match the position of the outlets on the consumable cartridge and act as continuations of the air flow passages formed in the cartridge. These output conduits may debouche into a mixing chamber, and the Venturi effect at that point may cause air to be sucked through the conduit in contact with the olefin supply.

Alternatively, the ozone generator and olefin supply may be placed in the same conduit, one after the other in the direct of air flow, or substantially opposite each other within the same conduit. However, this is not the preferred option because residues resulting from olefin vapour and the products of reactions with ozone may build up on the ozone generator or on the olefin wick or membrane. This reduces the performance of the system, and so having separate conduits for the olefin supply and the ozone supply so that they mix and react in a downstream location is preferable.

Figure 3 also shows the position of the transformer and associated electronics 230 that supplies a high voltage to contacts 234 and 232, which are shown in contact with electrical contacts 128a and 128b on the consumable cartridge.

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Electrical connection of the mains power supply to the electronics 230 is not shown, but is provided by suitable wiring components.

The mixing chamber 228 formed within the lid 214 includes a dispensing outlet 240 through which hydroxyl radicals pass to the user environment. The mixing chamber may have a complex geometry in order to ensure that the ozone rich air from outlet 126 and olefin rich air from outlet 118 have sufficient time, and are sufficiently turbulent to provide complete mixing. WO 2008/125879 describes a mixing chamber for this purpose, and the same or a similar geometry can be used in the embodiment shown in Figure 3.

The combination of base unit and cartridge shown in Figure 3 can be configured to operate continuously or may include control electronics that provide power to the fan and the ozone generator intermittently so that hydroxyl radicals are released into the atmosphere on an intermittent or periodic basis. A user interface may be included on the base unit to allow a user to program the mode of operation of the device so that hydroxyl radicals are only provided during times when users are in the immediate vicinity. This might be useful, for example in a school environment. An electronic timer or cycle counter may also be provided together with an audible or visible alarm to alert the user when a cartridge requires replacement.

The first embodiment can also be implemented using hydrogen peroxide as the reactant, instead of (or in addition to) olefin. When using hydrogen peroxide, there is a particular benefit to the generation of ions within the air flow through the device, as is explained with reference to Figure 9. An ion generator may be included in the base unit or in the consumable cartridge, but in the first embodiment the ozone generator also functions as an ion generator. The use of a plasma ion generator to produce ozone and to ionize air is both effective and economical.

It is desirable to produce ions at the lowest possible voltage level with the ozone generator in order to keep the production of ozone low and to minimize the production of any nitric oxide. In order to achieve this, the electrodes within

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the plasma ion generator comprise a plurality of sharp spikes. The sharp spikes produce a large potential gradient within the ozone generator increasing the likelihood of ionization for a given applied voltage. The plasma ion generator is also configured to produce negative ions, again to keep ozone production within desirable levels. A suitable plasma ion generator to this design is available from Trump Electronics, referenced above.

Figures 4a and 4b show a second embodiment of a consumable cartridge in accordance with the invention. Figure 4a is a side view and Figure 4b is a perspective view from the underside. The cartridge shown in Figure 4a includes not only an ozone generator, but also the transformer required to convert an external supply voltage to the voltage required by the ozone generator.

Referring now to Figure 4a, the consumable cartridge 400 of the second embodiment comprises an ozone supply 410, an olefin supply 440 and a dosing head 450 in which olefin rich air and ozone rich air is mixed in order to generate hydroxyl radicals. Figure 4b shows an electrical contact pad 416 on the underside of cartridge 400 for connection to a power supply in the base unit.

As in the first embodiment, the reactant supply (again in this example an olefin supply) consists of a container 442 within which a wick 444 is placed. Olefins within the container are drawn into the wick and can be extracted from an open end of the wick as a vapour. As with the previous embodiment, it should be clear that a solid or gaseous reactant source may be used instead of a liquid source, and that a membrane may be used in place of a wick.

In this embodiment the ozone supply is provided underneath the olefin supply and is shaped so that the cartridge is substantially cylindrical. Alternative relative positioning of the olefin supply and the ozone generator is equally possible with alternative configurations of the air conduits used to supply olefin rich air and ozone rich air to the mixing chamber in the dosing head.

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The configuration of the ozone supply is shown in more detail in Figure 5. The ozone generator 412 is provided as a downward facing component to which a suitable transformer 420 is connected. The transformer is connected to an external electric contact pad 416 formed on a dual sided printed circuit board by wiring 424 extending within the housing of the ozone supply. A component 430 is provided in order to separate the air conduit 418 in which ozone rich air is generated from the electrical contact pad 416 and the associated electronics 420. This is important to prevent oxidation of the electronic components. Component 430 may be integral with the housing of the consumable cartridge or may be provided as a separate component. Air enters the ozone supply through inlet 414 and exits through a similar outlet on the opposite side of the housing. This flow of air not only provides oxygen from which ozone is generated, but also provides some cooling for the electronics, and in particular for the transformer.

Figure 6 shows the consumable cartridge 400 installed within a base unit, with the casing 500 of the base unit shown removed above the cartridge. The cartridge 400 is inserted through an opening (not shown) formed in the top of the casing 500 and engages both with air flow hoses and with an electrical contact pad in the base unit.

The base unit includes an air inlet 505 through which air from the external environment can enter the base unit through the casing 500. The base unit air inlet 505 is in fluid communication with hoses 510 and 515 which are connected to the olefin supply and ozone generator respectively. A further hose 520 connects an output of the ozone generator to the dosing head 450. Within the dosing head the ozone rich air and olefin rich air streams are mixed before being exhausted to the external environment. A fan or pump 525 is provided in the base unit to move air from the base unit air inlet 505 through the hoses 510 and 515.

The dosing head 450 on the consumable cartridge includes sockets which mate with connectors provided on the end of hoses 510 and 520 when the cartridge is inserted in the base unit. The bottom of the cartridge, containing

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the ozone generator engages with a sealing skirt 530 in the base unit, as shown in Figure 7.

Figure 7 shows the flow path of the air through the ozone generator in more detail, and in particular shows the sealing skirt 530 which engages with the bottom of the cartridge to provide both electrical power and a sealed air flow passage from hose 515 past the ozone generator to hose 520. The sealing skirt 530 is tapered to engage the tapered end of the cartridge 400, and includes an inlet opening 532 and an outlet opening 534, which are connected to hoses 515 and 520 respectively. The inlet and outlet openings provide a sealed connection to the inlet and outlet of the ozone generator. The skirt also includes an electrical contact 540 that engages with contact 416 formed on the cartridge when the cartridge is positioned within the sealing skirt 530, for providing power to electronics 420 within the cartridge.

Figure 6 does not show the further electrical components within the base unit, but the electronics can be placed anywhere with in the casing 500 and connect to contact 416 on the cartridge through the sealing skirt.

Figure 8 is a schematic perspective view of the dosing head 450, showing the flow paths through the dosing head 450 to the dispensing outlets 840. The ozone rich air from the ozone generator is shown as line 800. The air stream from hose 510 for the olefin supply is shown as line 810. The ozone rich air entering the dosing head is circulated along path 805 to mixing chamber 830. The air for the olefin supply is split in the dosing head, with some of the air passing over wick 444 along path 815 to extract olefin vapour and some of the air passing through an air bypass flow path 820 that bypasses the wick. Both flow paths 815 and 820 meet at mixing chamber 830 together with the ozone rich air. The ozone and olefins react in mixing chamber 830 to produce hydroxyl radicals, which are then released into the environment through dispensing outlets 840.

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The dosing head 450 is formed from moulded plastic component. A more detailed description of the dosing head shown in Figure 8 can be found in WO2008/125879, the contents of which are incorporated by reference.

The dosing head provides a mixing chamber downstream of the olefin supply and the ozone generator and ensures that substantially all of the ozone from the ozone generator is reacted with olefin molecules. This ensures both safe levels of ozone in the environment and high levels of hydroxyl radicals.

The base unit can be designed to accommodate other configurations of consumable cartridge. For example, if the ozone generator and olefin supply are arranged side by side in the insertion direction of the cartridge into the base unit, the hoses and sealing skirt could be redesigned to provide the necessary fluid flow paths and electrical connection without changing the principle of operation.

Figures 9, 10 and 10a illustrate an alternative design of base unit and cartridge. Figure 9 is a cross-sectional view. The base unit 900 is configured to receive a cartridge 905. The cartridge is illustrated in more detail in Figures 10a and 10b.

The apparatus shown in Figure 9 uses hydrogen peroxide as the reactant. Liquid hydrogen peroxide is contained in a reservoir 910 in the cartridge 905. A wick 915 (not shown in Figure 9) is inserted in the reservoir and extends out of a top end of the cartridge for delivery of hydrogen peroxide to an outlet 920. This is illustrated most clearly in Figure 10b which shows the wick extending from within the reservoir to the exterior of the cartridge. The wick is covered by a removable cap 925, which is placed over the opening 920 and protects the wick and prevents spillage. The cap 925 is removed by the user before inserting the cartridge into the base unit. A filling aperture 930 is also shown, through which the reservoir is filled with hydrogen peroxide. It is covered with a breathable cap to prevent liquid spillage, but to allow for the escape of gas. The wick 915 may be formed from any suitable fibrous material, such as polypropylene fibre.

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An ozone generator 935 is provided in the cartridge. The ozone generator is a corona discharge ozone generator that generates ions as well as ozone in operation. Suitable corona discharge ozone generators, such as plasma ion generators, are available from Trump Electronics of East Yongfu Road, Tianchang, China 201100 (www.trumpxp.com) and may be formed from aluminium oxide or calcium silicate for example. The ozone generator comprises a series of openings 940 that allow air to pass to and from between the plates of the ozone generator.

The generation of ions as well as ozone is beneficial when using hydrogen peroxide as a reactant. The ozone reacts with hydrogen peroxide, generating a number of radical species as illustrated in the equations below, and the ions accelerate the process and provide additional pathways for the generation of radicals.

$$H_2O_2 \rightarrow HO_2^- + H^+$$
$$O_3 + HO_2^- \rightarrow \bullet OH + O_2^-\bullet + O_2$$
$$O_3 + O_2^-\bullet \rightarrow O_3^-\bullet + O_2$$
$$O_3^-\bullet + H^+ \rightarrow HO_3\bullet$$
$$HO_3\bullet \rightarrow \bullet OH + O_2$$

The reaction of hydrogen peroxide with ozone is slow, but that of its anion, HO_2^- is fast, and produces hydroxyl radicals. Another product of the reaction is $O_2^-\bullet$ radical, which also reacts with ozone to produce $O_3^-\bullet$. $O_3^-\bullet$ reacts with H^+ to produce $HO_3\bullet$,which then dissociates into a hydroxyl radical and oxygen.

So a chain reaction is set up, and the yield of hydroxyl radicals is higher for a given amount of ozone than when using an olefin as the reactant.

As the amount of ozone required is very low, it is desirable to produce ions at the lowest possible voltage level with the ozone generator. This keeps the production of ozone low and minimizes the production of any undesirable nitric

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oxide. In order to achieve this, one of the electrodes within the plasma ion generator comprises a plurality of sharp spikes. The sharp spikes produce a large potential gradient within the ozone generator increasing the likelihood of ionization for a given applied voltage. The plasma ion generator is also configured to produce negative ions, again to keep ozone production within desirable levels.

The cartridge 905 includes electrical contact 945 for connecting to power supply in the base unit 900. The cartridge 905 also includes a transformer (not shown) in order to convert a 12V DC supply from the base unit to the necessary voltage for the ozone generator 935. The base unit includes a power supply socket 950 for connection to a power supply, typically a 12V DC supply adapted from the mains. The power socket 950 is electrically connected to contacts on the base unit that interface with the contacts 945 on the cartridge.

The air flow paths with in the apparatus shown in Figure 9 are similar to that shown in Figure 3, and are illustrated by the arrows in Figure 9. The base unit includes a fan 955 which draws air in through an air inlet in the base of the base unit up into a narrowing air conduit 960. Air drawn in by the fan is accelerated as the conduit 960 narrows. The accelerated air flow then passes the ozone generator 935 in the cartridge, where ozone and ions are generated, and into mixing chamber 975 formed in the base unit. As in the embodiment of Figure 3, the flow of air through conduit 960, past partition 970, draws air in through inlet 965 and over the wick 915 containing the hydrogen peroxide. The hydrogen peroxide rich air then exits into mixing chamber 975 where it mixes with and reacts with the ozone and ions from conduit 960 to form hydroxyl radicals, as previously described. The hydroxyl radicals then leave the mixing chamber through dispensing outlet 980.

As with embodiment shown in Figure 3, the apparatus of Figure 9 may be designed for different airflow. For example, the fan may be provided in the conduit with the wick and the internal geometry of the base unit and cartridge configured to use the Venturi effect to suck air past the ozone generator.

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Alternatively, the ozone generator and hydrogen peroxide supply may be placed in the same conduit, one after the other in the direction of air flow, or substantially opposite each other within the same conduit.

The apparatus shown in Figure 9 also allows for the use of an optional scent supply, provided in a cartridge 990. Some of the air passing through conduit 960 is passed through cartridge 990 (as illustrated by the arrow in Figure 9), introducing a scented chemical or chemicals into the environment.

The embodiment shown in Figures 9 and 10a and 10b, include an ozone generator that also ionises air. However, it is possible to include a further or separate ioniser within or adjacent the air flow path through the apparatus. This is particularly useful if the ozone supply does not act as an ioniser. A possible position for a separate ioniser 985 is shown in dotted outline in Figure 9. The ioniser may be any suitable type of negative ion generator. The ioniser may be placed anywhere along the air flow path in order to introduce ions into the air flow prior to dispensing outlet 980, and may be positioned within the base unit or within the cartridge.

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Claims

1. A consumable cartridge for use in a hydroxyl radical generating apparatus, the consumable cartridge comprising:

a reactant supply comprising a supply of a substance that reacts with ozone to produce hydroxyl radicals, and

an ozone supply comprising an ozone generator;

wherein the ozone supply is fixed to the reactant supply.

2. A consumable cartridge according to claim 1, further comprising at least one electrical contact configured to allow connection of an external power supply to the ozone generator.

3. A consumable cartridge according to claim 1 or claim 2, further comprising an external housing, the reactant supply and the ozone supply being positioned within the external housing, wherein the electrical contact is accessible from an exterior of the housing.

4. A consumable cartridge according to any preceding claim, wherein the ozone generator is an electrically powered ozone generator.

5. A consumable cartridge according to any preceding claim, further comprising a transformer connected to the ozone generator.

6. A consumable cartridge according to any preceding claim, wherein the cartridge defines a first air inlet and a first outlet, wherein the first outlet is in fluid communication with the reactant supply and the first inlet; and

wherein the cartridge defines a second air inlet and a second outlet, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet.

7. A consumable cartridge according to claim 6, wherein the first outlet is positioned adjacent the second outlet, and the cartridge is configured so that

air flow through one of the first outlet and the second outlet draws air through the other of the first outlet and the second outlet.

8. A consumable cartridge according to claims 6 or 7, further comprising a mixing chamber having a dispensing opening, the mixing chamber in fluid communication with both the first outlet and the second outlet, and configured to ensure a substantially complete reaction of vapours from the reactant supply with ozone from the ozone supply before release to the user environment through the dispensing opening.

9. A consumable cartridge according any preceding claim, wherein the reactant supply is a supply of olefin or hydrogen peroxide.

10. A consumable cartridge according any preceding claim, comprising an ion generator.

11. a consumable cartridge according to claim 10, wherein the ozone generator functions as the ion generator.

12. An apparatus for generating hydroxyl radicals comprising a base unit and a consumable cartridge in accordance with any preceding claim, the base unit comprising a means for providing electrical power to the consumable cartridge, and a means for driving air through the apparatus.

13. An apparatus for generating hydroxyl radicals according to claim 12, wherein the base unit comprises a transformer for transforming an external supply voltage to a voltage suitable for the ozone generator in the consumable cartridge.

14. An apparatus for generating hydroxyl radicals according to claim 12 or 13, the base unit comprising a mixing chamber in fluid communication with an outlet of the reactant supply and an outlet of the ozone supply, the mixing chamber further comprising a dispensing outlet.

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15. An apparatus for generating hydroxyl radicals according to claim 12, 13 or 14, the base unit comprising a base unit air inlet and base unit air conduit between the base unit air inlet and an air inlet on the consumable cartridge, wherein the inlet conduit narrows between the base unit air inlet and the air inlet on the consumable cartridge.

16. An apparatus according to any one of claims 12 to 15, comprising a first air inlet and a first air outlet, wherein the first outlet is in fluid communication with the reactant in the reactant supply and the first inlet; and

a second air inlet and a second air outlet, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet;

wherein the first outlet is positioned adjacent the second outlet, and the apparatus is configured so that air flow through one of the first outlet and the second outlet draws air through the other of the first outlet and the second outlet.

17. An apparatus according any one of claims 12 to 16, comprising an ion generator in the base unit.

18. A base unit for producing hydroxyl radicals, the base unit suitable for use with a consumable cartridge in accordance with any one of claims 1 to 11, comprising a means for connection with a power supply, a base unit air inlet, a means for moving air through the consumable cartridge, and a socket configured to receive the consumable cartridge, the socket including electrical contacts suitable for supplying electrical power from the means for connection with a power supply to the consumable cartridge.

19. A base unit according to claim 18, comprising a base unit air conduit between the base unit air inlet and either an air inlet on the consumable cartridge, wherein the base unit air inlet conduit narrows between the base unit air inlet and an air inlet on the consumable cartridge.

20. A base unit according to claim 18 or 19, further comprising an ion generator.

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21. A hydroxyl radical generating apparatus, comprising:

at least one air inlet and a dispensing outlet, and an air flow path between the air inlet and the dispensing outlet;

a supply of hydrogen peroxide configured to supply hydrogen peroxide into the air flow path;

a supply of ozone configured to supply ozone into the air flow path; and

an ioniser configured to generate and supply ions into the air flow path.

22. An apparatus according to claim 21, comprising a first air inlet and a second air inlet wherein the supply of hydrogen peroxide is positioned between the first air inlet and the dispensing outlet and the supply of ozone is positioned between the second air inlet and the dispensing outlet.

23. An apparatus according to claim 22, further comprising a mixing chamber, the mixing chamber in fluid communication with the first and second air inlets and the dispensing outlet.

24. An apparatus according to claim 22 or 23, comprising a first outlet, wherein the first outlet is in fluid communication with the hydrogen peroxide supply and the first inlet, and a second outlet, wherein the second outlet is in fluid communication with the ozone generator and the second air inlet;

wherein the first outlet is positioned adjacent the second outlet, such that air flow through one of the first outlet and the second outlet draws air through the other of the first outlet and the second outlet.

25. An apparatus according to any one of claims 21 to 24, further comprising means to drive air through the air flow path.

26. An apparatus according to any one of claims 21 to 25, wherein the ozone supply is an ozone generator.

27. An apparatus according to claim 26, wherein the ozone generator also acts as the ioniser.

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28. An apparatus according to any one of claims 21 to 27, further comprising a scent supply configured to supply a chemical having a scent into the air flow path.

29. A method of producing hydroxyl radicals, comprising:
providing hydrogen peroxide into an air flow path;
providing ozone into the air flow path;
providing ions into the air flow path; and
mixing the hydrogen peroxide, ozone and ions to produce hydroxyl radicals.

30. A method according to claim 29, further comprising: releasing the hydroxyl radicals from the air flow path into an external environment.

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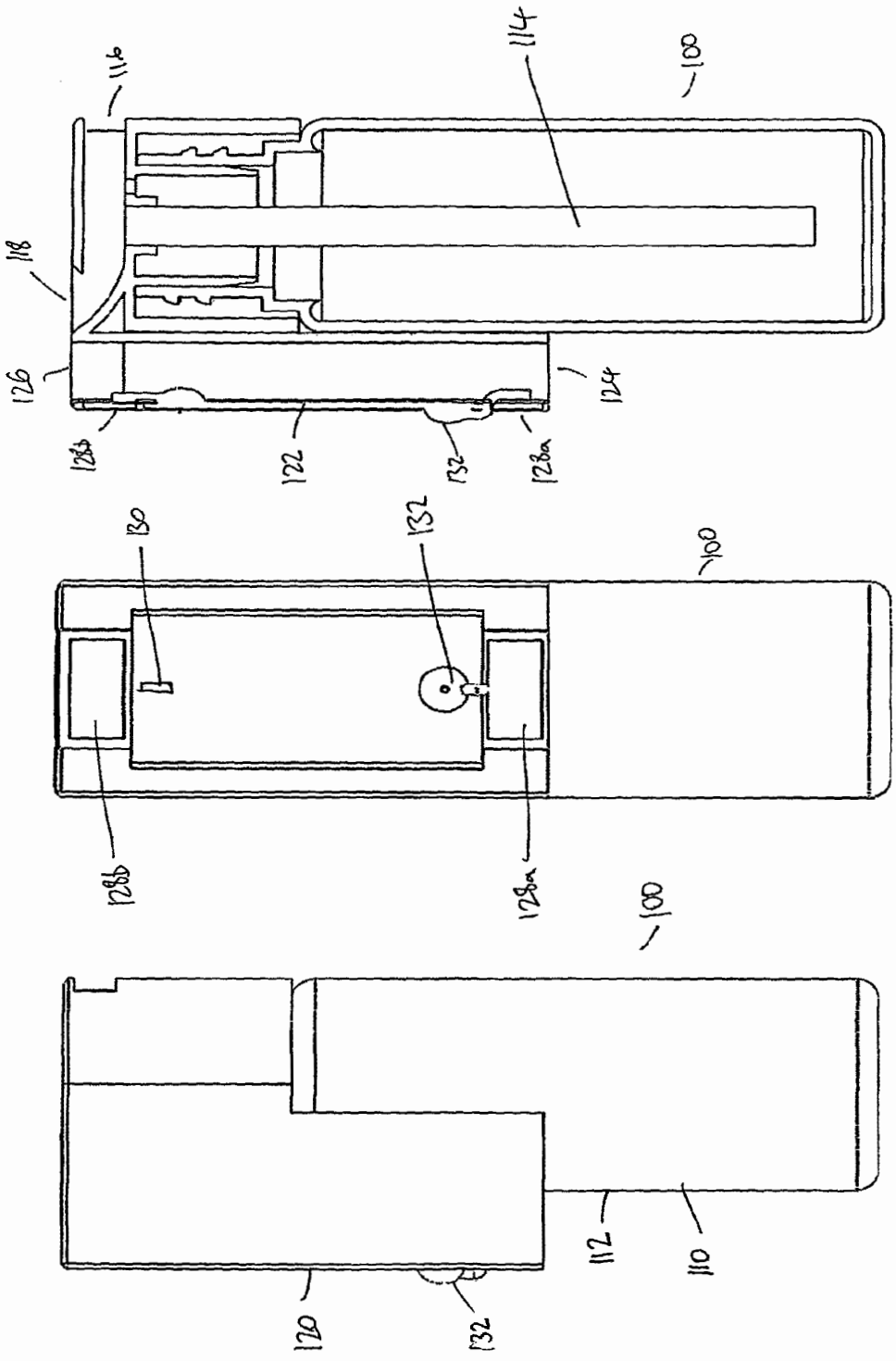


Fig 1c

Fig 1b

Fig 1a

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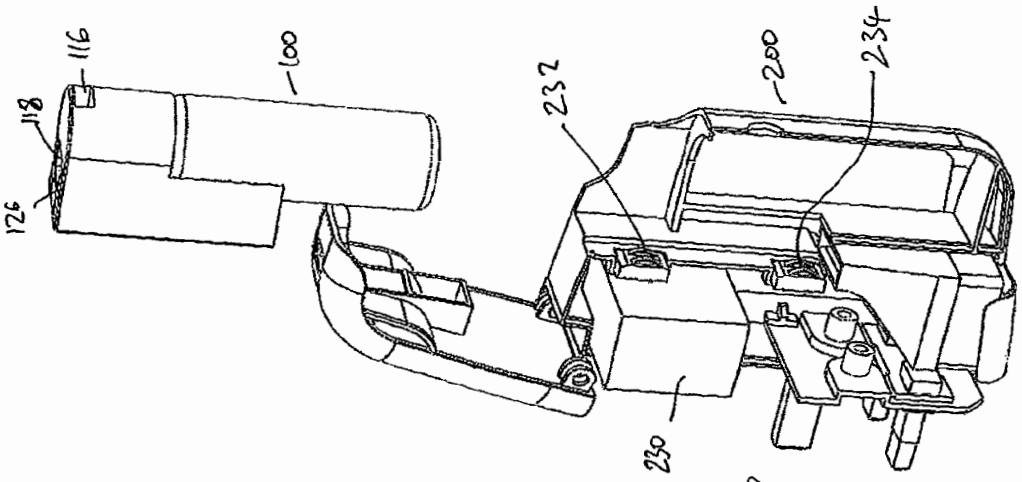


Fig2c

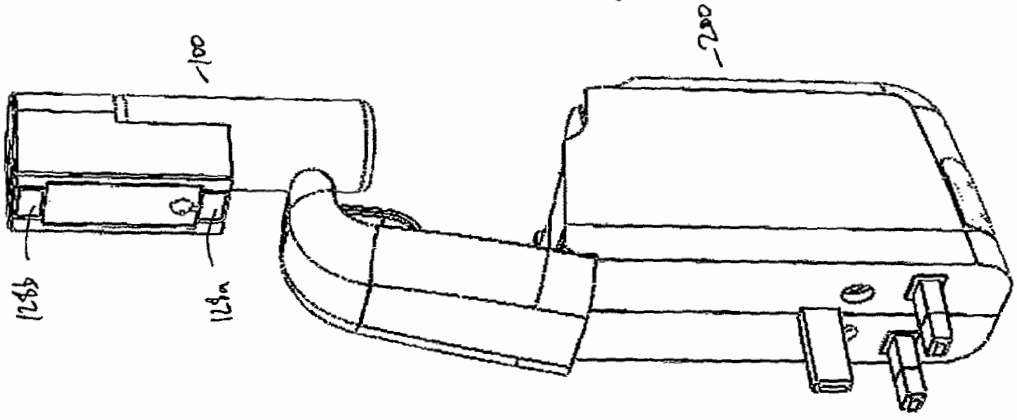


Fig2b

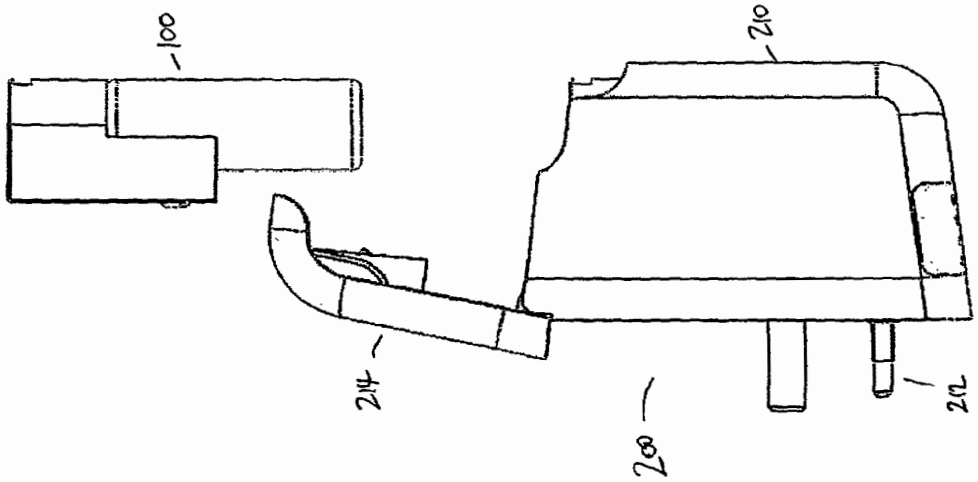


Fig2a

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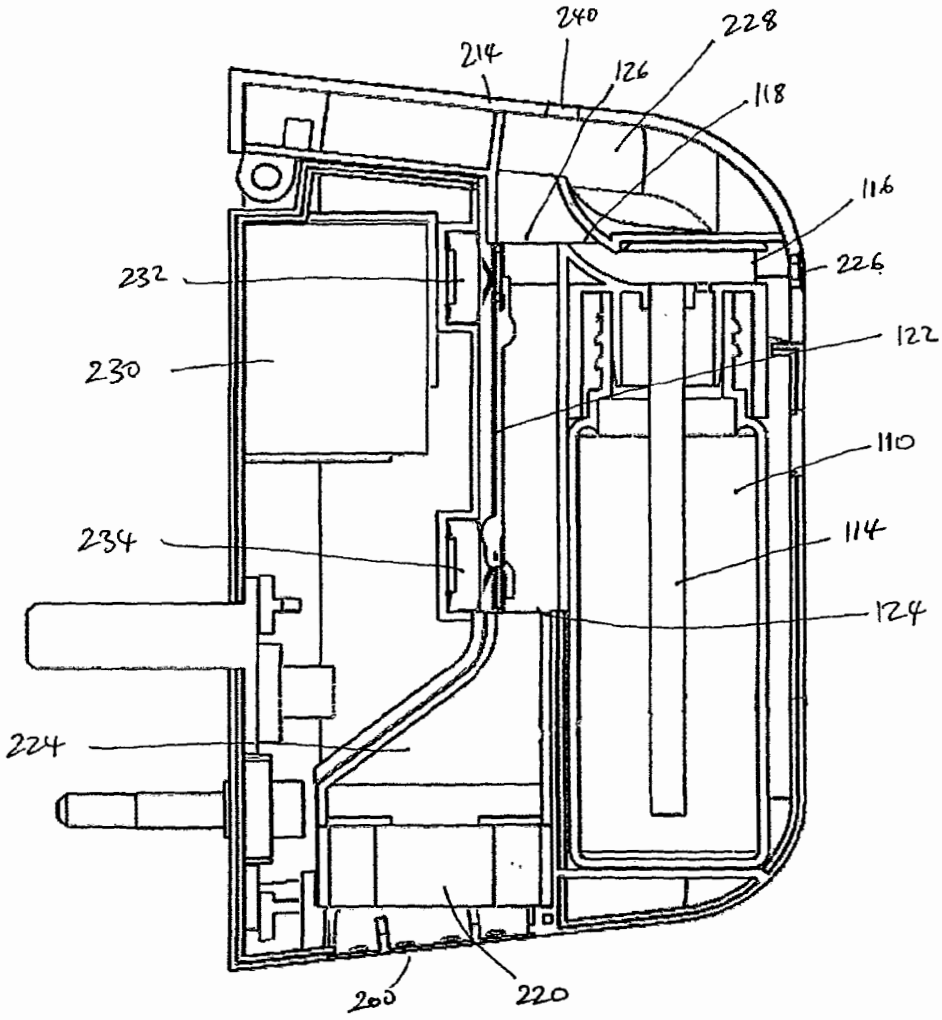


Fig 3

NJOY Exhibit 1002.887

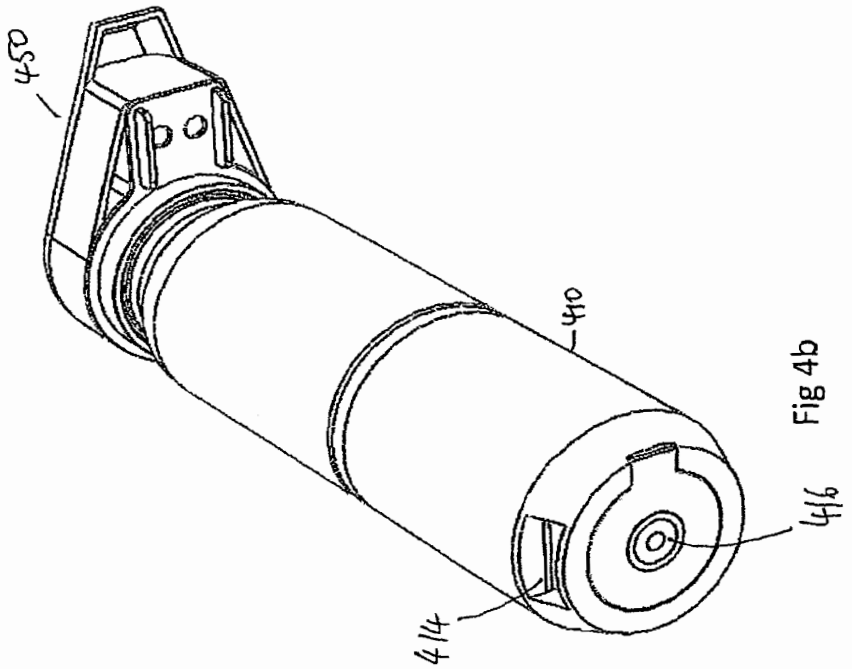


Fig 4b

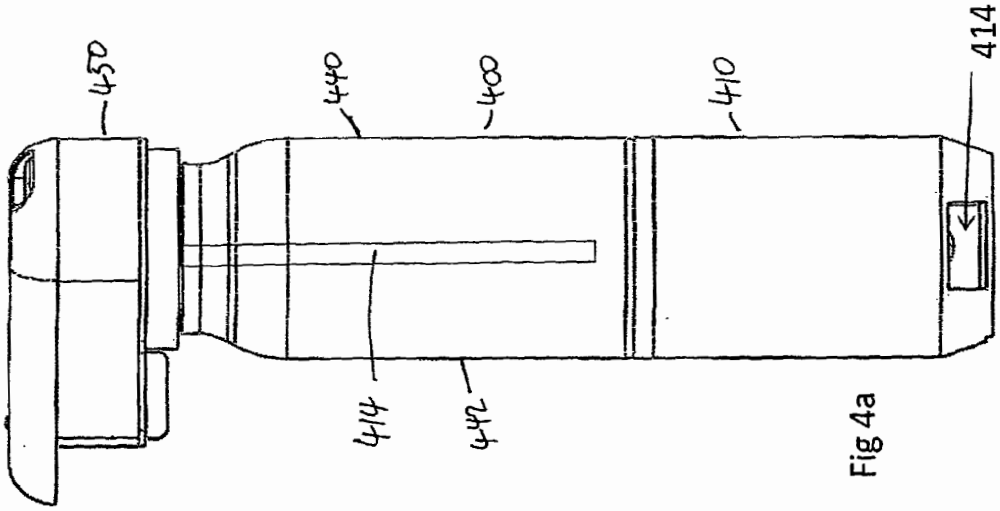


Fig 4a

NJOY Exhibit 1002.888

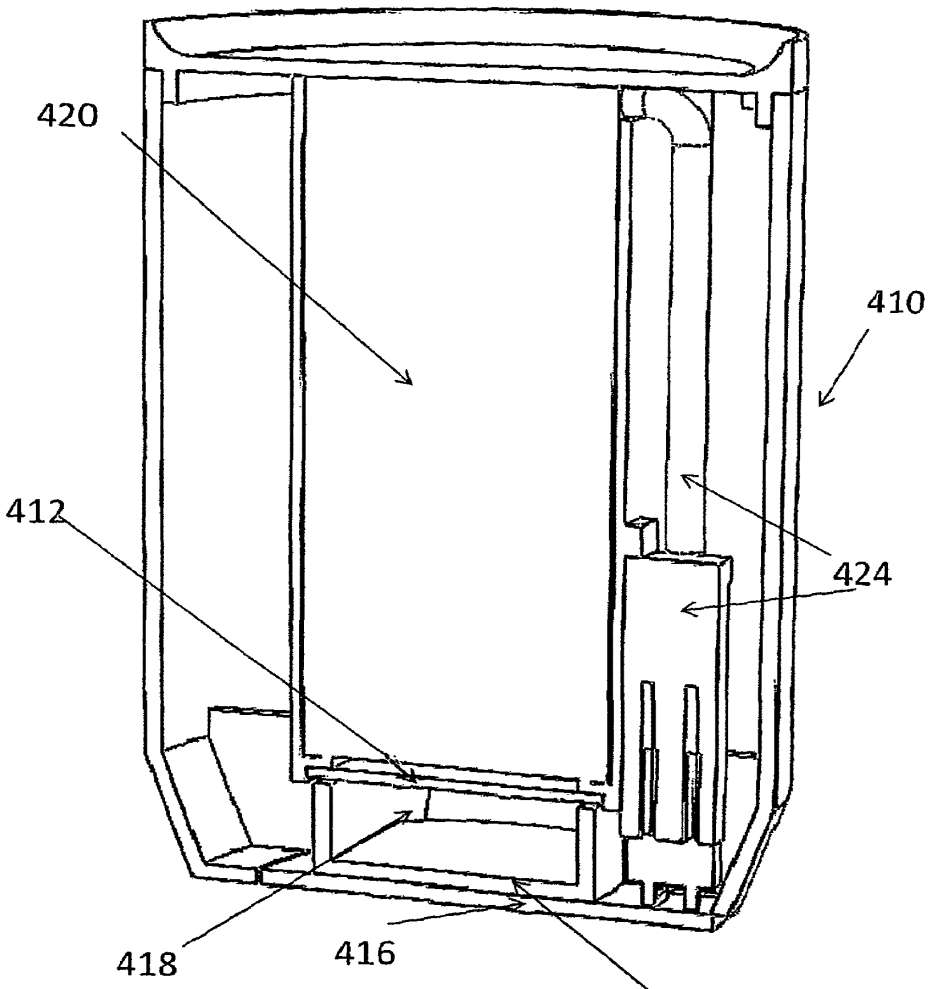


Fig 5

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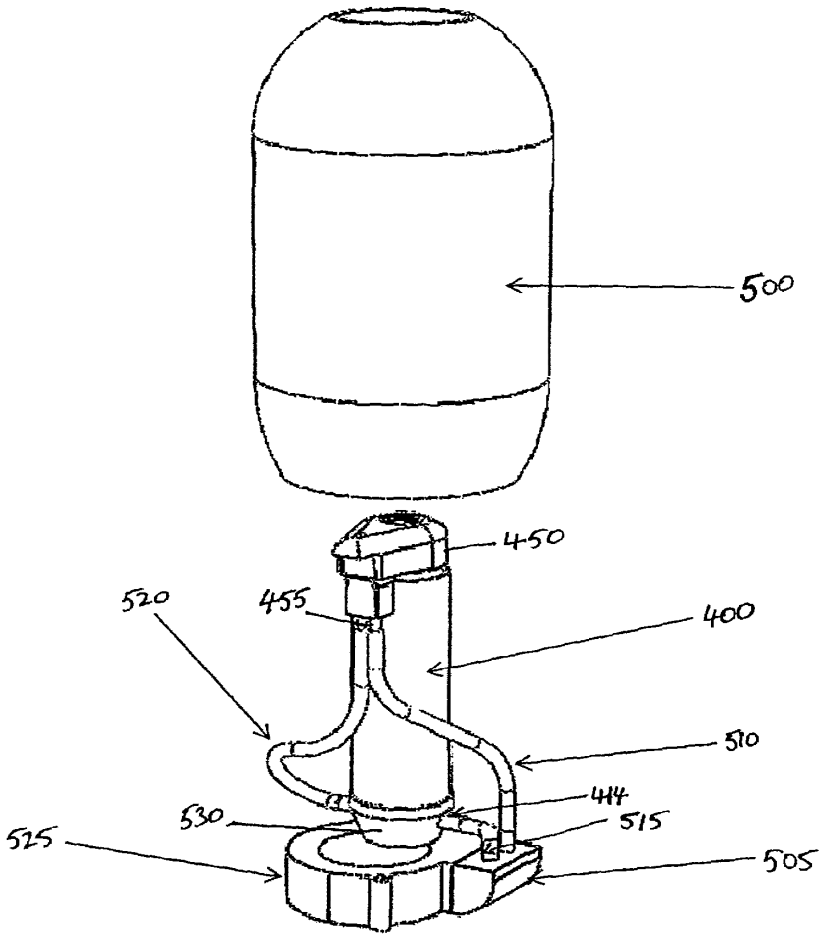


Fig 6

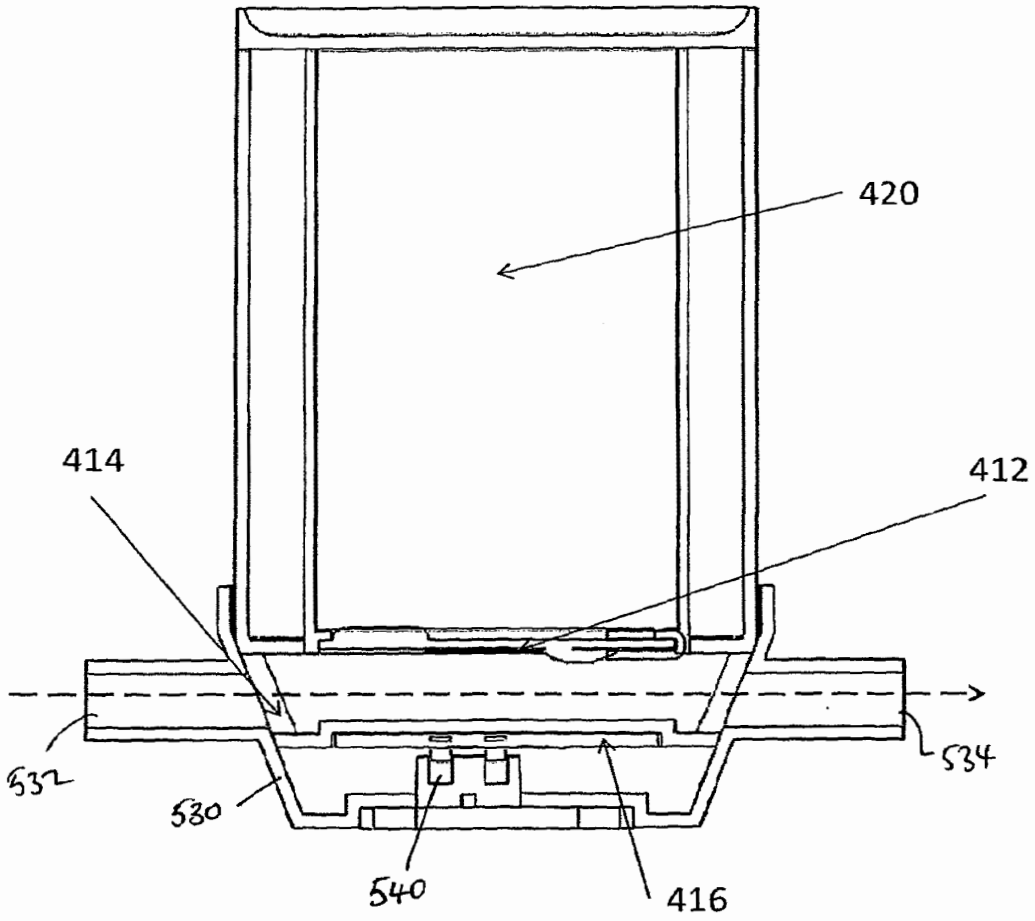
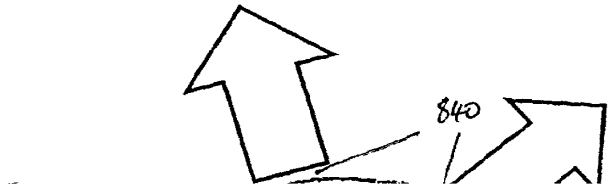


Fig 7

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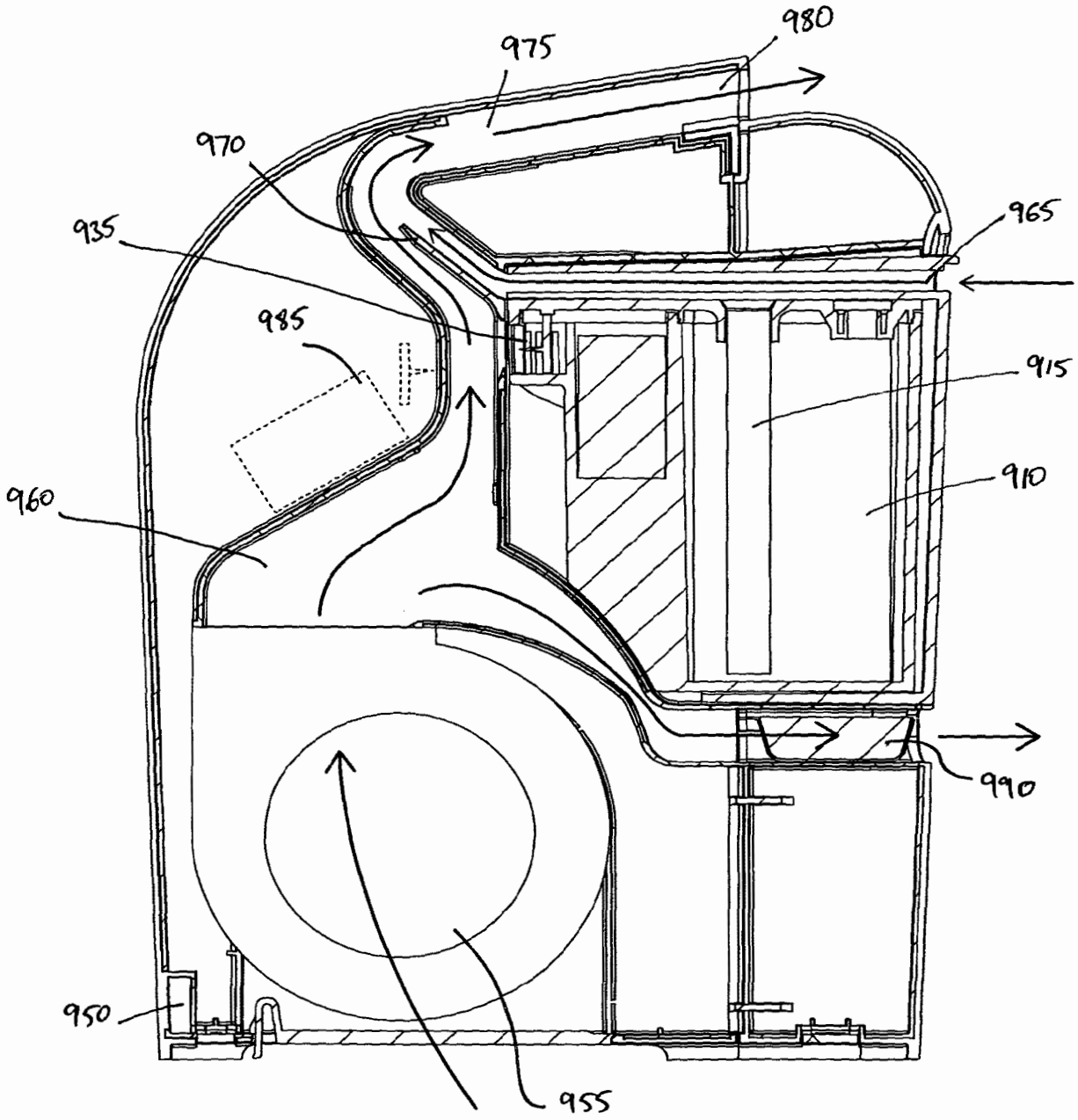


Figure 9

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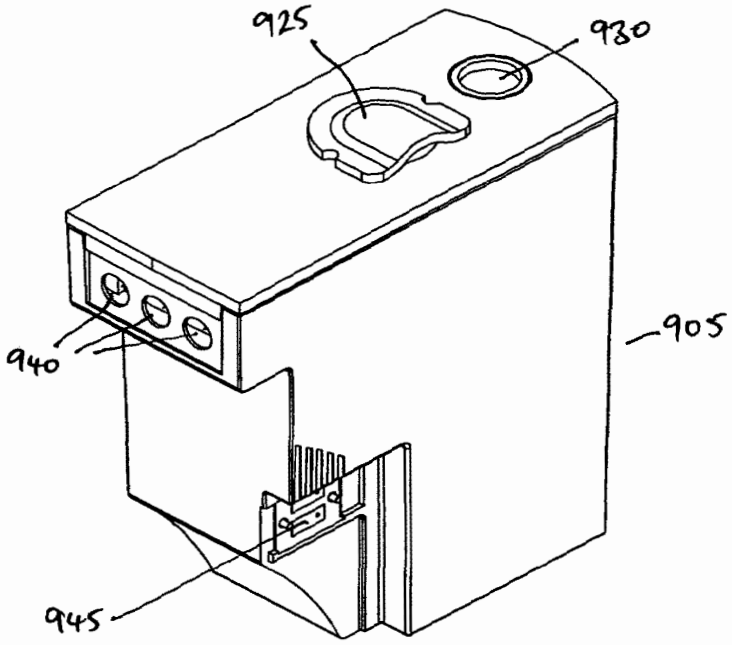


Figure 10a

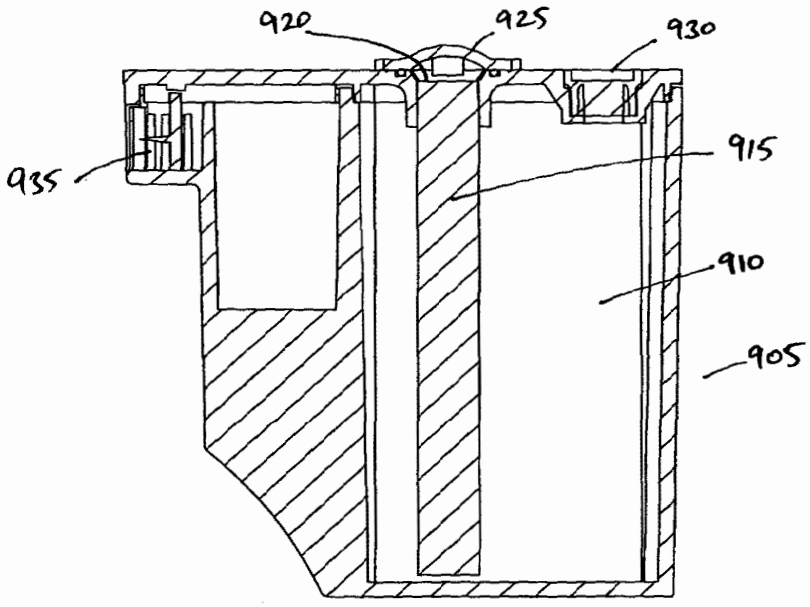


Figure 10b

NJOY Exhibit 1002.894

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(54) **Title:** AEROSOL GENERATOR

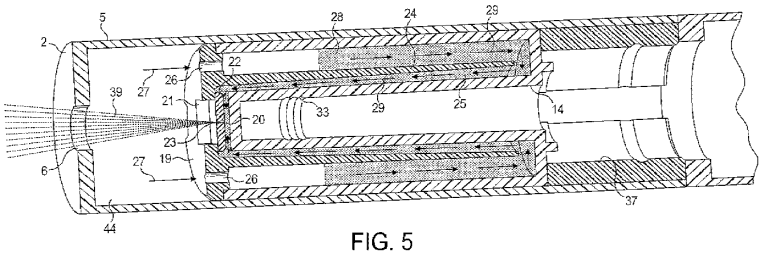


FIG. 5

(57) **Abstract:** A generally cylindrical aerosol generator which can be used as a substitute for a conventional cigarette has a longitudinal extending horn member (8) that carries a piezoelectric actuator (9) mounted within a main housing (4) and a mouthpiece housing (5). A cartridge (7) contains an aerosolizable liquid (28) in a chamber having an inner chamber wall (13) extending longitudinally between the proximal and distal ends (15, 16) of the cartridge, defining a receptacle to receive the horn member (8) from the distal end, a longitudinally extending outer chamber wall (17) surrounding the inner wall, a proximal inner end wall (18) bridging the inner chamber wall at the proximal end, and a proximal outer end wall (19) longitudinally spaced from the inner wall to define a discharge region (20). A nozzle (23) discharges liquid from the discharge region through the outer end wall as an aerosol (39). A capillary driver wall (24) is disposed between the inner and outer chamber walls, spaced from the inner wall to define a longitudinally extending capillary passageway (25) sufficiently narrow to drive liquid within the chamber by capillary action along the gap to the discharge region, where it is aerosolised by the vibratory action of the piezo device that is transmitted along the horn (8) to the discharge region (20).

WO 2012/062600 A1

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Aerosol generator

Field

This invention relates to an aerosol generator which uses a vibratory source such as a piezoelectric device to atomise liquid to produce an aerosol and a cartridge for use in such a generator, and has particular but not exclusive application to providing an aerosol of a liquid containing a nicotine based substance or a flavourant, which may be used as a substitute for a conventional cigarette.

Background

Piezoelectric generators have been proposed hitherto for creating an atomised spray. For example WO 2002/241777 discloses the use of a piezo device both to create vibrations in a fluid flow and also to monitor the flow by using the device as a pressure transducer. FR 2929861 illustrates that it is known to use capillary action to feed liquid to a piezo electric actuator to create an aerosol. Also, JP 2004313871 discloses an atomiser using piezo device which feeds vibrations through a horn to focus them when creating the aerosol spray.

The present invention provides an improved aerosol generator that utilises a cartridge of liquid to be aerosolised, which may be used as a cigarette substitute device.

Summary

The invention provides a cartridge for an aerosol generator, comprising a chamber to receive an aerosolisable liquid, the chamber having proximal and distal ends, a generally tubular inner chamber wall extending longitudinally between the proximal and distal ends, a longitudinally extending outer chamber wall surrounding the inner wall, a proximal inner end wall bridging the inner wall at the proximal end, a proximal outer end wall longitudinally spaced from the inner wall to define a discharge region between the proximal end walls, a nozzle to discharge liquid from the discharge region through the outer end wall as an aerosol, and a capillary driver wall between the inner and outer chamber walls, the capillary driver wall being spaced from the inner chamber wall to provide a longitudinally extending capillary passageway sufficiently narrow to drive liquid within the chamber by capillary action along the capillary passageway to the discharge region.

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The capillary passageway may narrow from the distal end towards the proximal end so that the force due to capillary action on the liquid increases towards the proximal end.

The invention also includes an aerosol generator configured to receive the cartridge, comprising a generally tubular housing, an elongate horn member configured longitudinally within the housing to extend into the distal end of the cartridge chamber to engage the interior surface the inner chamber wall, and a vibratory actuator on the horn member to create vibrations therein to be transmitted to the proximal inner end wall of the chamber to act on liquid in the discharge region to cause discharge thereof through the nozzle.

Brief description of the drawings

In order that the invention may be more fully understood an embodiment will now be described by way of illustrative example with reference to the accompanying drawings in which:

Figure 1 is the schematic perspective view of an aerosol generator,

Figure 2 is a longitudinal sectional view of the generator shown in Figure 1,

Figure 3 is a perspective view of a cartridge for use in the aerosol generator,

Figure 4 is an exploded view of the cartridge illustrated in Figure 3,

Figure 5 is an enlarged sectional view of the cartridge when installed in the mouth piece of the aerosol generator, with the horn removed,

Figure 6 is a sectional view of the cartridge installed in the mouthpiece of the generator, also illustrating the horn in section,

Figure 7 is a schematic circuit diagram of a driver circuit board used in the device to actuate the piezoelectric generator, and

Figure 8 is a schematic circuit diagram of a detection circuit to detect when the user sucks on the mouthpiece, to actuate the device and produce an aerosol with the circuitry shown in Figure 6.

Detailed description

Referring to Figure 1, an aerosol generator 1 has a generally cylindrical outer surface extending from a generally circular proximal end 2 to circular distal end 3. The device 1

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has a main housing 4 and a mouthpiece housing 5 with a proximal end aperture 6 through which aerosol is delivered to a user.

The mouthpiece 5 is removably mounted on the housing 4, for example as a push-fit or bayonet mounting (not shown).

A cartridge 7 containing an aerosolisable liquid is received within the mouthpiece housing 5 and can be interchanged when empty by removal of the housing 5 from the main body housing 4. As illustrated in Figure 2, main housing 4 contains a horn 8 on which is mounted a piezoelectric transducer 9. The housing 4 also contains electrical circuitry 10 coupled to the piezoelectric transducer 9 both to cause it to oscillate and also to detect pressure variations when the user draws on the mouthpiece housing 5. The circuitry 10 is driven by batteries 11 in the housing 4. Also, a LED 12 is mounted at the distal end 3 of the device, to be driven by the circuitry 10 to indicate when the device is in use.

The cartridge 7 is illustrated in more detail in Figures 3 and 4. The cartridge 7 has generally toroidal configuration with a generally tubular inner chamber wall 13 having a distal end opening 14 (shown in Figure 5) and extending from proximal end 15 to distal end 16. A tubular outer chamber wall 17 surrounds the inner chamber wall 13 and also extends between the proximal and distal ends 15, 16. A proximal inner end wall 18 closes the proximal end of the inner chamber wall so that the interior of the inner chamber wall 13 together with the proximal inner end wall 18 define a receptacle open at the distal end 16, that receives the horn 8 as will be described in more detail hereinafter. Also, the outer chamber wall 17 is closed at its proximal end by an outer proximal end wall 19 that is longitudinally spaced from the proximal inner end wall 18 to define a discharge region 20 shown clearly in Figure 5. The proximal outer end wall 19 includes an opening 21 that receives a nozzle plate 22 formed with at least one aperture 23 for forming an aerosol from liquid in the cartridge, to be supplied into the mouthpiece housing 5. A generally frustoconical capillary driver wall 24 is mounted on the interior surface of the proximal outer end wall 19 so as to provide a capillary passageway 25, illustrated in Figures 4 and 5, between the inner chamber wall 13 and the capillary driver wall 24. As illustrated in Figures 4 and 5, the passageway 25 narrows from the distal end 16 towards the proximal end 15.

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As shown in Figures 5 and 6, the space between the inner and the outer chamber walls 13, 17, contains liquid from which aerosol is formed. The capillary driver wall 24 cooperates with the inner chamber wall 13 to drive the liquid by capillary action into the discharge region 20. Apertures 26 in the proximal outer wall 19 allow air to enter into the cartridge 7 in order to prevent an air lock, as illustrated by arrows 27. The liquid is illustrated by reference 28 in Figures 5 and 6. The passage of the liquid 28 towards the discharge region 20 is illustrated by arrows 29. As illustrated in Figure 6, the horn 8 has a frustoconical or cylindrical tongue 30 that fits through the opening 14 closely within the interior of recess 31 formed by the inner chamber wall 13. The tongue 30 has a proximal end 32 that is spaced from the interior surface of the proximal inner end wall 18. The inner surface of the inner chamber wall 13 and the outer surface of the tongue 30 may include cooperating grooves and recesses 33, 34 to releasably hold the tongue within the chamber wall when the cartridge is inserted into the generator. The horn 8 also includes a generally cylindrical base member 35 from which the tongue 30 extends, the base number being mounted in a resilient mounting that comprises an O ring 36, within the main housing 4. The piezoelectric device 9 is mounted on the distal end 38 of the horn 8, on the base number 35 so that on actuation the horn can vibrate back and forth longitudinally within interior cylindrical region 37 of the main housing 4.

In use, the piezoelectric device 9 is actuated and produces ultrasonic vibrations in the base member 35, which are transmitted along and are focussed by the tongue 30 onto the inner chamber wall 13. The spacing between the end 32 of the tongue and the proximal inner chamber wall 18, ensures that the wall 18 is free to vibrate in the manner of a drum which causes liquid in the discharge region 20 to be urged through the aperture 23 to form an aerosol 39 that is illustrated in Figure 5, which is directed through the outlet 6 of the mouthpiece housing 5.

When the user draws on the mouthpiece housing 5, air is drawn into the aerosol 39 as illustrated in Figure 6 by arrows 40. Referring to Figure 1, main housing 4 includes an air inlet aperture 41 which, referring to Figure 6, allows air to enter in the direction of arrows 42 and pass through longitudinal passageways defined by diametrically opposed exterior grooves 43 in the outer chamber wall 17, illustrated in Figures 3 and 4. Referring to

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Figures 5 and 6, the mouthpiece housing 5 defines a plenum 44 between the outlet 6 and the proximal outer end wall 19 of the cartridge 7. In use, the air flow 40 shown in Figure 6 mixes with the aerosol 39 shown in Figure 5 and passes to the user through outlet 6.

When the user draws on the mouthpiece housing 5, the resulting pressure reduction in plenum 44 is detected by the piezoelectric device 9 which is coupled to electrical circuitry that switches an electrical drive to the device 9 in order to cause it to produce the aerosol 39.

The electrical circuitry is shown in Figures 7 and 8 and includes a breath detector circuit 45 together with a driver circuit 46. The driver circuit 46 is shown in detail in Figure 7 and includes a micro controller 47 responsive to an output from the breath detector circuit 45 indicative that the user is drawing on the mouthpiece housing 5. As explained later, the breath detector circuit 45 provides a step voltage change in response to the user drawing on the mouthpiece housing 5, and in response, the micro controller 47 generates a pulsed rectangular waveform as illustrated in graph Gl, which is applied to a driver circuit 48, that acts as a modulator to modulate the output of an oscillator 49 typically operating a frequency in a range of 420 -450 KHz illustrated in graph G2, although other suitable frequencies could be used. The resulting modulated output is shown in graph G3 and supplied to a voltage converter circuit 50 and then to a switching circuit 51 that supplies the modulated waveform to the piezoelectric device 9 at a frequency to cause it to produce ultrasonic vibrations which, as previously explained are transmitted through the horn 8 to the discharge region 20 to cause ejection of liquid 28 through nozzle 23 as the aerosol 39 shown in Figure 5. The components of the driver circuit 46 receive a regulated drive voltage from regulator 52 that is powered by batteries 53 which, as previously explained, are mounted in the battery compartment 11 shown in Figure 2. The batteries may also illuminate the LED 12 shown in Figure 2 either continuously or when the driver circuit 46 is actuated. The batteries 53 may be rechargeable batteries in which case an external battery charger 54 may be provided, for example as a cradle or some other convenient configuration to allow the batteries 53 to be recharged by the user.

Referring to Figure 8, the breath detector circuit 45 comprises a preamplifier 55 which amplifies a signal received via the switching circuit 51 from the piezoelectric element 9, and

the amplified signal is illustrated schematically in graph G4. A signal processor 56 detects the envelope of the signal shown in graph G4 and a threshold detector 57 detects step changes in the signal from the processor 56. As illustrated in graphs G5, G6 and G7, when the user draws on the mouthpiece housing 5, when the flow rate of draw increases above a threshold, in this case around 1.6 litres/minutes as shown in graph G6, a step change occurs in the output of the signal processor 56, due to the air turbulence in the mouthpiece, which can be detected by threshold detector 57 to switch on the driver circuit 46. The voltage output from the threshold detector 57 is illustrated schematically in graph G8. Thus, the piezoelectric element 9 switches from being a pressure sensor to a ultrasonic driver so as to produce the aerosol 39 in response to the user drawing on the mouthpiece housing 5. It will be noted that the piezo detects the air turbulence resulting from drawing on the mouthpiece without actually being directly exposed directly to the airflow itself.

The components of the breath detector circuit 45 are driven by the batteries 53.

Thus, the aerosol generator device can produce an aerosol from the liquid 28 in the cartridge 7. The liquid may contain a suitable active ingredient such as nicotine, which case the device may be used as a substitute for a conventional cigarette. The liquid may contain a flavourant in addition to or instead of nicotine or may contain other active ingredients.

Once the contents of the cartridge have been consumed, the mouthpiece housing 5 may be removed and the cartridge 7 pulled away from the horn 8 and replaced with another.

It has been found that the piezoelectric arrangement provides an efficient aerosol generation technique. In particular, the shape of the tongue 30 of horn 8 amplifies the ultrasonic vibrations from the piezoelectric element 9 onto the inner proximal end wall 18 which because of its spacing from the proximal end 32 of the tongue, is free to vibrate like a drum and hence pressurise liquid in the discharge region 20 to drive the liquid through the aperture 23 to form the aerosol.

Furthermore, the progressively tapering of the capillary passageway 25 assists in transporting liquid from the interior of the cassette to the discharge region, producing a progressively increasing capillary force along the cartridge towards the proximal end 15 for

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driving the liquid 28 into the discharge region 20. Also, when the generator is held in a vertical configuration, gravity assists with driving the liquid 28 from the space between the outer chamber wall 17 and the capillary driver wall 24, into the capillary passageway 25, to assist in delivery of the liquid to the discharge region 20.

It will be understood that because the cartridge is replaced periodically, quality of the successively used cartridges 7 should have generally similar spray characteristics. The cartridge 7 can be checked *in situ* in terms of its spray characteristics, which has been found to be highly dependent on the frictional force between the tongue 30 of the horn 8 and the inner chamber wall 13, which in turn results in a different electrical load on the piezo device 9. Referring to Figure 7, the driver 48 or the voltage converter 50 may be configured to adaptively adjust its voltage to compensate the load variations of the piezo device from cartridge to cartridge so as to maintain a uniformity of the aerosol spray 39 produced when cartridges are changed in the device.

It will be understood that many modifications and variations may be made to the described example of aerosol generator and cartridge, within the scope of the claims hereinafter. For example the nozzle(s) 23 my be formed directly in the cartridge outer wall rather than in a separate nozzle plate. Also, breath detection may be performed by other means than the piezo device to allow simultaneous aerosol generation and breath detection.

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Claims

1. A cartridge for an aerosol generator, comprising a chamber to receive an aerosolizable liquid, the chamber having proximal and distal ends, a generally tubular inner chamber wall extending longitudinally between the proximal and distal ends, a longitudinally extending outer chamber wall surrounding the inner wall, a proximal inner end wall bridging the inner wall at the proximal end, a proximal outer end wall longitudinally spaced from the inner wall to define a discharge region between the proximal end walls, a nozzle to discharge liquid from the discharge region through the outer end wall as an aerosol, and a capillary driver wall between the inner and outer chamber walls, the capillary driver wall being spaced from the inner chamber wall to provide a longitudinally extending capillary passageway sufficiently narrow to drive liquid within the chamber by capillary action along the capillary passageway to the discharge region.

2. A cartridge according to claim 1 wherein the capillary passageway narrows from the distal end towards the proximal end so that the force due to capillary action on the liquid increases towards the proximal end.

3. A cartridge according to claim 1 or 2 wherein the nozzle comprises at least one hole in a nozzle plate received in an aperture in the proximal outer end wall.

4. A cartridge according to any preceding claim including an air inlet aperture in the proximal outer end wall to allow ingress of air into the chamber.

5. A cartridge according to any preceding claim wherein the chamber comprises a first cartridge element including the inner and outer chamber walls the inner proximal end wall and a distal end wall extending between the inner and outer chamber walls at the distal end, and a second cartridge element comprising the capillary driver wall and the outer proximal end wall.

6. An aerosol generator configured to receive a cartridge according to any preceding claim, comprising a generally tubular housing, an elongate horn member configured longitudinally within the housing to extend into the distal end of the cartridge chamber to

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engage the interior surface the inner chamber wall, and a vibratory actuator on the horn member to create vibrations therein to be transmitted to the proximal inner end wall of chamber to act on liquid in the discharge region to cause discharge thereof through the nozzle.

7. A generator according to claim 6 including a mouthpiece at one end of the housing and a detector to detect air turbulence in the mouthpiece to actuate the vibratory actuator and generate the aerosol.

8. A generator according to claim 7 wherein the mouthpiece is removable from the housing to allow insertion and removal of the cartridge.

9. A generator as claimed in claim 7 or 8 wherein the vibratory actuator comprises a piezoelectric element and the detector includes said piezoelectric element to detect the air turbulence.

10. A generator according to claim 9 including electrical circuitry in the housing to drive the piezoelectric element to produce ultrasonic vibrations and also to be responsive to electrical signals from the actuator to detect pressure changes detected by the piezoelectric element.

11. A generator according to claim 10 wherein the housing includes a battery compartment to receive a battery to power the circuitry.

12. A generator according to any one of claims 8 to 11 wherein the horn comprises an elongate tongue having a proximal end to be inserted into the tubular inner chamber wall from the distal end thereof, and a base member at the distal end of the tongue, resiliently mounted in the housing, the piezoelectric element being mounted on the base member.

13. A generator according to claim 12 wherein the base member is generally cylindrical and mounted in a resilient O-ring in the housing.

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14. A generator according to any one of claims 6 to 13 and including said cartridge within the housing, with the horn received within and in engagement with the tubular inner chamber wall.

15. A generator according to claim 14 wherein the outer chamber wall includes a longitudinal groove to provide a passageway for air to enter the mouthpiece to be mixed with liquid discharged from the nozzle.

16. A generator according to claim 14 or wherein the inner chamber wall of the cartridge is frustoconical and the horn is tapered to engage the interior surface of the inner chamber wall.

17. A generator according to claim 14, 15 or 16 wherein horn and the interior surface of the inner chamber wall are formed with cooperating rings and grooves to releasably engage them together.

18. A generator according to any one of claims 14 to 17 wherein the proximal end of the horn when fitted in the inner wall of the chamber is spaced from the inner proximal end wall permitting vibration thereof to discharge liquid from the discharge region through the nozzle.

19. An aerosol generator comprising:

an elongate horn member;

a vibratory actuator on the horn member

a chamber to receive an aerosolizable liquid, the chamber having proximal and distal ends, an inner chamber wall extending longitudinally between the proximal and distal ends and defining a receptacle to receive the horn member from the distal end, a longitudinally extending outer chamber wall surrounding the inner wall, a proximal inner end wall bridging the inner wall at the proximal end, a proximal outer end wall longitudinally spaced from the inner wall to define a discharge region, a nozzle to discharge liquid from the discharge region through the outer end wall as an aerosol, and a capillary driver wall between the inner and outer walls, the capillary driver wall being spaced from

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the inner wall by a longitudinally extending capillary passageway sufficiently narrow to drive liquid within the chamber by capillary action along the gap to the discharge region.

20. An electronic device comprising

(a) a cartridge having a space for containing humectants and having nozzle outlet for ejecting liquid,

(b) a vibrating membrane arranged proximate the nozzle outlet,

(c) a housing comprising a support for holding said cartridge,

(d) a vibrating element arranged to actuate said vibrating membrane and said vibrating membrane being arranged to transmit the vibration to the humectants to said space, and

(e) battery powered electronics for transmitting electrical energy to said vibrating element.

21. An electronic device according to claim 20, wherein said vibrating membrane is shaped to allow an efficient ultrasonic energy transmission from said vibrating element to the liquid.

22. An electronic device according to claim 20 or and 2, wherein said cartridge is prefilled with humectants to be expelled through said nozzle outlets and an air chamber arranged to have a pressure drop between lOmbar to 20mbar for a air flow rate between 1 and 1.6 1/min.

23. An electronic device according to claim 20, 21 or 22, wherein said vibrating element arranged to vibrate and to detected air turbulence in said air chamber without contact with the piezo.

24. An electronic device according to any of claims 20 to 23 wherein said battery powered electronics comprise a bridge driver and a puff sensing circuit.

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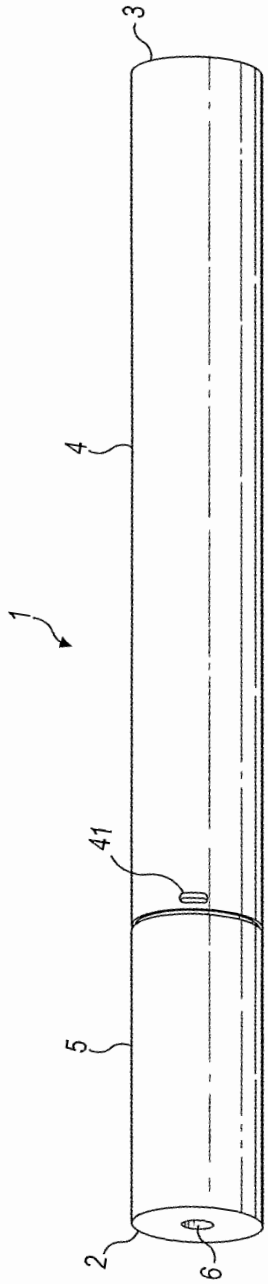


FIG. 1

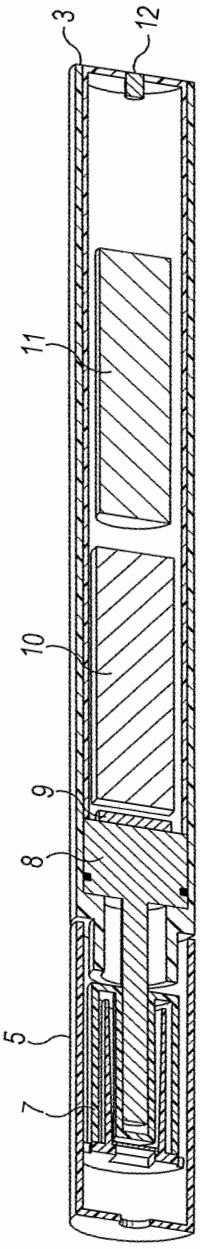


FIG. 2

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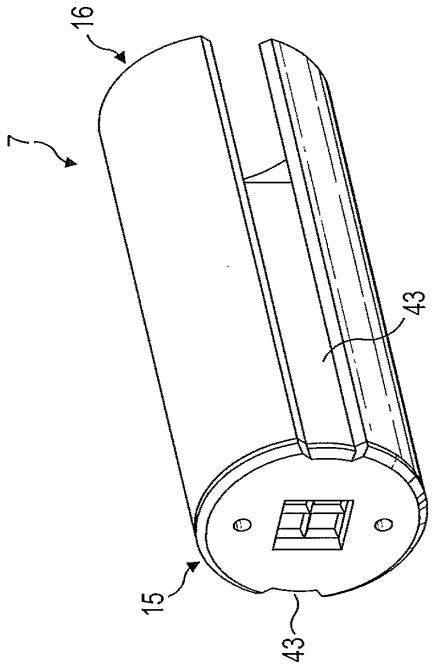


FIG. 3

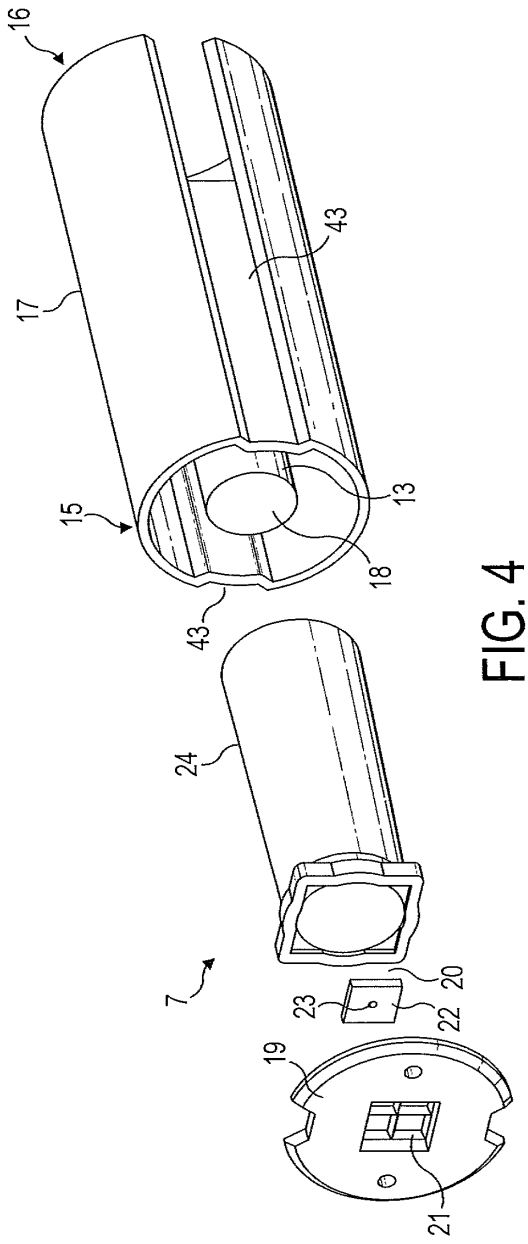


FIG. 4

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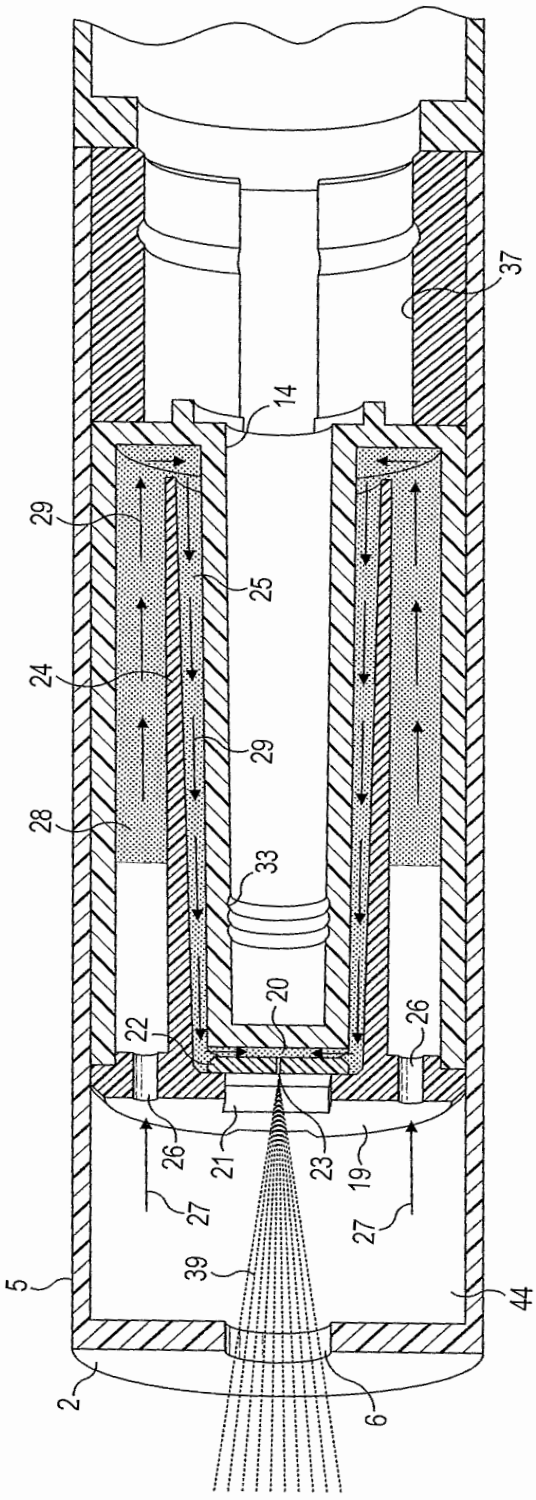


FIG. 5

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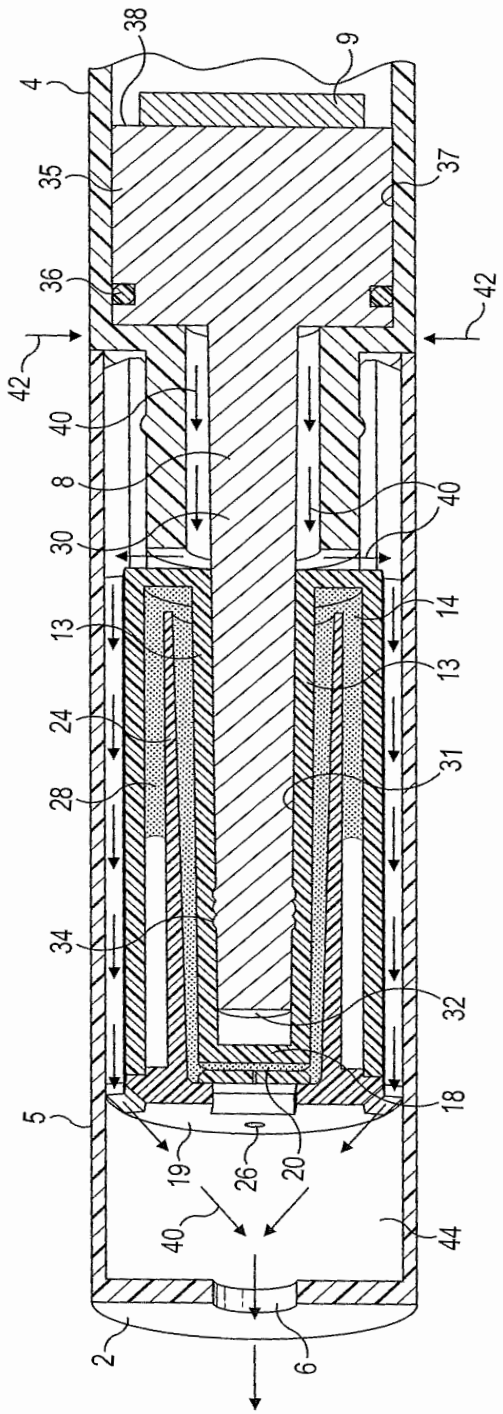


FIG. 6

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NJOY Exhibit 1002.911

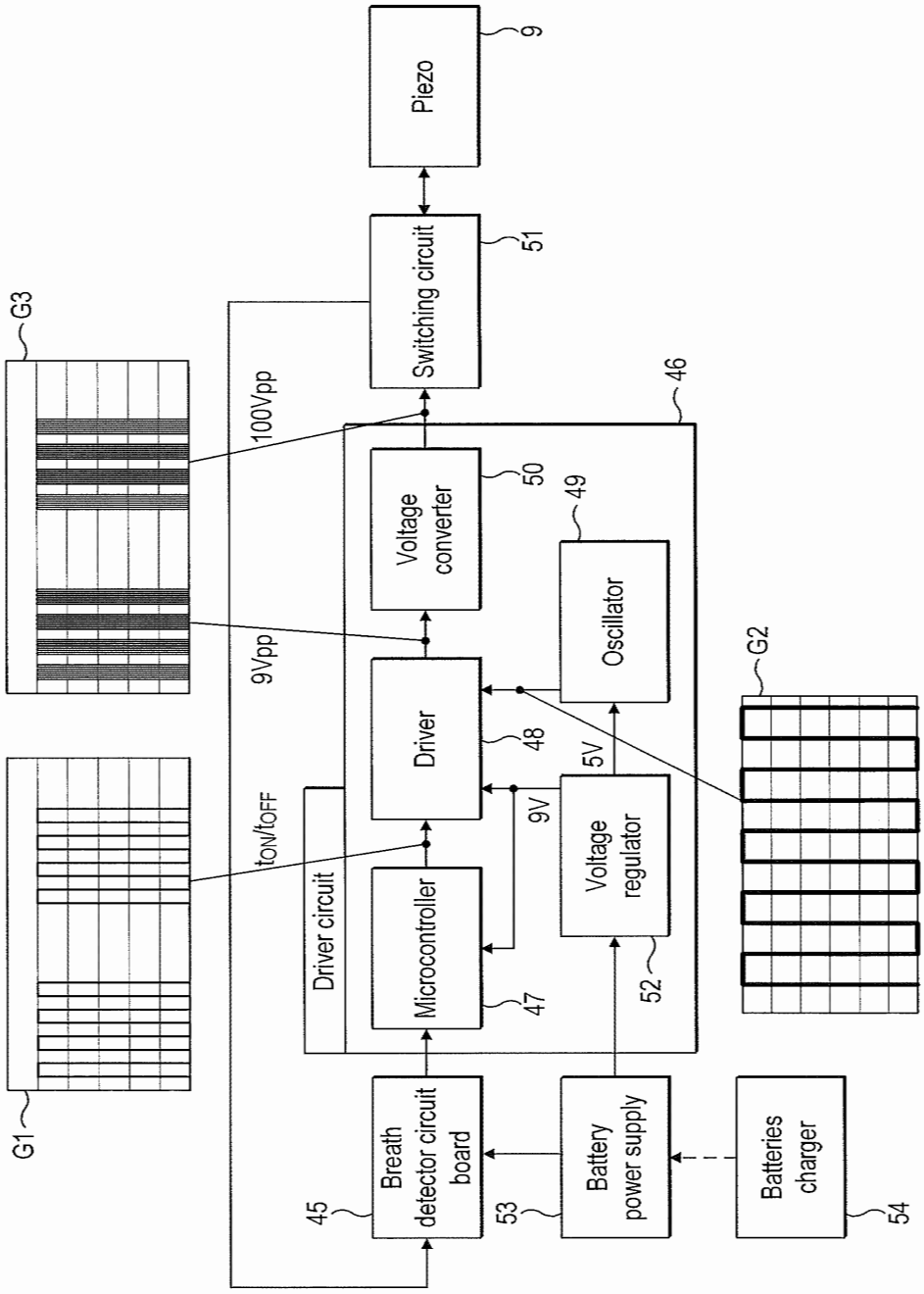


FIG. 7

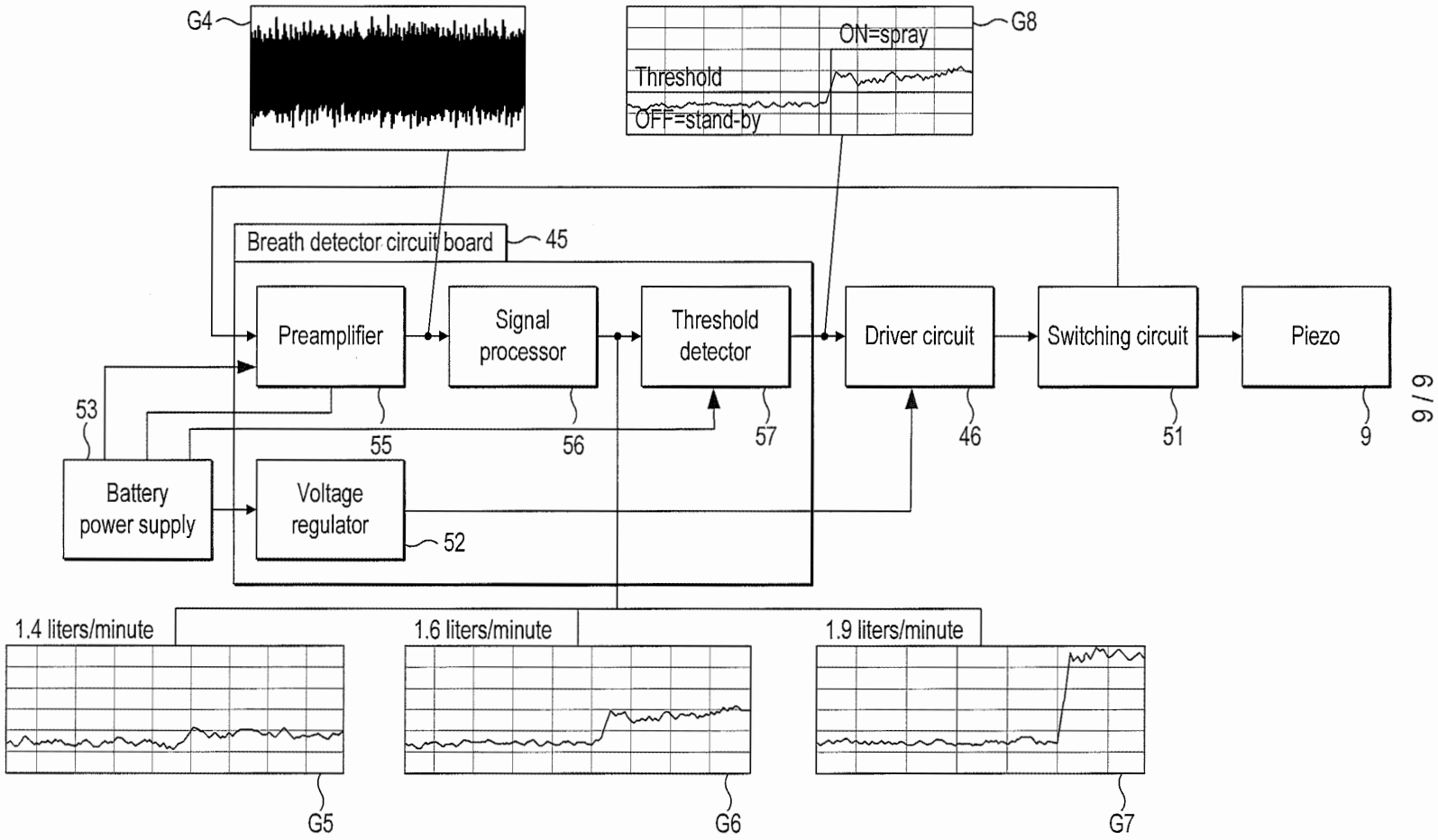


FIG. 8

NJOY Exhibit 1002.912

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/068908

A. CLASSIFICATION OF SUBJECT MATTER
INV. B05B17/06 A24F47/00 A61M15/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B05B A24F A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/221212 A1 (HUANG YI-HSIN [TW]) 27 September 2007 (2007-09-27)	1,3-6, 19
A	paragraphs [0037] - [0040] ; figure 2	2
X	US 2002/074426 A1 (TANAKA SHINYA [JP] ET AL) 20 June 2002 (2002-06-20)	1,3-6, 19
A	paragraph [0019] figure 1	2
X	US 2008/230052 A1 (MONTASER AKBAR [US]) 25 September 2008 (2008-09-25)	6-8
A	paragraph [0069] - paragraph [0070]	9-18
X	CN 100 443 036 C (MATSUSHITA ELECTRIC WORKS LTD [JP]) 17 December 2008 (2008-12-17) abstract; figures	6

-/- ·

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" documentwhich may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 February 2012	14/02/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Roldan Abalos, Jaime

7

Form PCT/ISA/210 (second sheet) (April 2005)

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/068908

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 932 102 A1 (OREAL [FR]) 11 December 2009 (2009-12-11) page 10, lines 7-8 figures 1,2 -----	1-5

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

NJOY Exhibit 1002.914

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2011/068908

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

1-19

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the '—' payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest '—' fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5

   Cartridge for an aerosol generator.

   ---

2. claims: 6-19

   Aerosol generator with vibrating horn.

   ---

3. claims: 20-24

   Aerosol generator with vibrating element.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2011/068908

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007221212 A1	27-09-2007	TW M297751 U	21-09-2006
		US 2007221212 A1	27-09-2007
US 2002074426 A1	20-06-2002	JP 4198850 B2	17-12-2008
		JP 2001149834 A	05-06-2001
		US 2002074426 A1	20-06-2002
US 2008230052 A1	25-09-2008	US 2008230052 A1	25-09-2008
		US 2011041858 A1	24-02-2011
CN 100443036 C	17-12-2008	NONE	
FR 2932102 A1	11-12-2009	FR 2932102 A1	11-12-2009
		WO 2009150619 A1	17-12-2009

NJOY Exhibit 1002.917

(12) 특허협력조약에 의하여 공개된 국제출원

(19) 세계지식재산권기구
국제사무국

(43) 국제공개일
2012 년 12 월 20 일 (20.12.2012)

WIPO | PCT

(10) 국제공개번호
WO 2012/173322 A1

(51) 국제특허분류:
A24B 15/16 (2006.01) *A24F 47/00* (2006.01)

(21) 국제출원번호: PCT/KR2012/000298

(22) 국제출원일: 2012 년 1 월 12 일 (12.01.2012)

(25) 출원언어: 한국어

(26) 공개언어: 한국어

(30) 우선권정보:
10-2011-0056905 2011 년 6 월 13 일 (13.06.2011) KR

(72) 발명자; 겸
(71) 출원인 : **김형윤 (KIM, Hyoung Yun)** [KR/KR]; 경기도 의정부시 용현동 547-3 송산주공 1 단지 114-1403, 480-901 Gyeonggi-do (KR).

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(81) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 국내 권리의 보호를 위하여): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

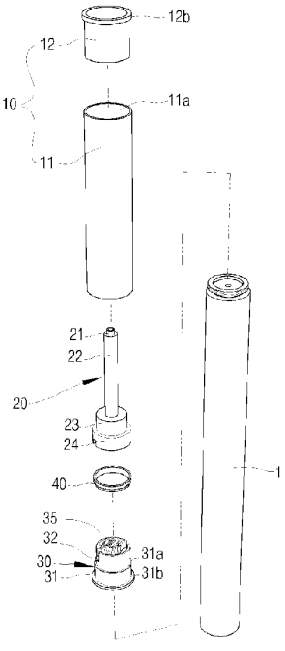
(84) 지정국 (별도의 표시가 없는 한, 가능한 모든 종류의 역내 권리의 보호를 위하여): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), 유라시아 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 유럽 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

공개:
— 국제조사보고서와 함께 (조약 제 21 조(3))

(54) Title: CARTRIDGE INTEGRATED WITH ATOMIZER FOR ELECTRONIC CIGARETTE

(54) 발명의 명칭 : 전자담배용 무화기 일체형 카트리지

[Fig. 1]



(57) **Abstract**: The present invention relates to a cartridge integrated with an atomizer for an electronic cigarette, and the object of the present invention is to provide a cartridge integrated with an atomizer for an electronic cigarette, wherein the atomizer can be interchanged with the cartridge without semipermanently and continuously using the atomizer. Thus, the present invention comprises: a liquid tank which has an essence accommodation space for accommodating essence, and has a lower end that is opened and in which a smoke-releasing hole is formed; a smoke-flow pipe which is positioned in the essence accommodation space of said liquid tank, and has a smoke-flow hole that is communicated with said smoke-releasing hole; and an atomizer unit which is coupled with the lower end of said liquid tank, is communicated with said smoke-flow hole by allowing an upper end thereof to be opened, and includes a body that has an essence inlet hole communicated with said essence accommodation space, a wick that is positioned on the inner side of said body, and a heating element that is positioned on the inner side of said body and heats said essence. Therefore, according to the present invention, the cartridge integrated with the atomizer can be replaced before the smoke generation quantity decreases due to the various foreign substances which are precipitated in the heating element of the atomizer, thereby maintaining an optimum level of smoke generation quantity.

(57) 요약서:

[다음 쪽 계속]

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본 발명은 전자담배용 무화기 일체형 카트리지에 관한 것으로서, 해결하고자 하는 기술적 과제는 무화기를 반영구적으로 계속 사용하지 않고 카트리지와 함께 교체하여 사용할 수 있는 전자담배용 무화기 일체형 카트리지를 제공하는데 있다. 그에 따른 본 발명은 에센스를 수용하는 에센스 수용공간이 형성되고, 하단부가 개구되며, 연기배출홀이 형성되는 액상탱크; 상기 액상탱크의 에센스 수용공간에 배치되고, 상기 연기배출홀과 연통되는 연기유동공이 형성되는 연기유동관체; 및 상기 액상탱크의 하단부에 결합되며, 상단이 개구되어 상기 연기유동공과 연통되고, 상기 에센스수용공간과 연통되는 에센스유입홀이 형성되는 몸체와, 상기 몸체의 내측에 구비되는 심지와, 상기 몸체의 내측에 구비되며 상기 에센스를 가열하는 가열 요소를 구비하는 무화기부; 를 포함한다. 따라서, 본 발명에 의하면, 무화기의 가열 요소에 각종 이물질이 침착되어 연기 발생량이 저하되기 전에 무화기가 일체화된 카드리지를 교체할 수 있어, 연기 발생량을 적정하게 유지시킬 수 있는 효과가 있다.

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NJOY Exhibit 1002.920

명세서

발명의 명칭: 전자담배용 무화기 일체형 카트리지

기술분야

[1] 본 발명은 전자담배용 무화기 일체형 카트리지에 관한 것으로서, 보다 상세하게는 에센스를 기화시켜 전사담배의 연기를 생성하는 전자담배용 무화기 일체형 카트리지에 관한 것이다.

배경기술

[2] 일반적으로, 담배는 기호 식품으로 많은 사람이 애용하고 있다. 통상의 연초 담배는 말린 담뱃잎이나 그 가루를 얇은 종이로 말아 기다랗게 만든 것으로 일단에는 니코틴을 비롯한 각종 유해 물질을 감소시켜 주는 필터가 마련되어 있다. 연초 담배의 단부에 불을 붙이면 담뱃잎 또는 그 가루가 타면서 특유의 연기가 발생하며 사용자는 담배 연기를 필터 쪽에서 흡입하여 담배를 즐기게 된다.

[3] 그러나, 연초 담배는 발암 유발 물질인 니코틴, 타르 등 인체에 유해한 성분들이 많이 포함되어 있어 각종 질병 및 사망의 원인이 될 뿐만 아니라, 주변 사람들에게 간접 흡연의 피해를 준다.

[4] 따라서, 전사회적으로 금연을 추구함에 따라 흡연자들의 입지가 점차 좁아지고 있는 것이 현실이지만, 애연가들은 담배가 백해무익한 기호품이기에 끊거나 줄여야 한다는 점을 잘 알고 있으면서도 오랜 습관과 중독성 및 관행 때문에 그것을 쉽게 실행하지 못하고 있다.

[5] 이에, 근래에는 담배를 보다 쉽게 끊을 수 있도록 도움을 줄 수 있는 다양한 보조기구들이 많이 개발되었으며, 그 중 하나가 최신 기술의 발전에 따라 개발된 전자담배이다.

[6] 전자담배는 연초 담배와 외양 및 사용 방법이 거의 유사하며, 즉 사용자가 후단 쪽을 입에 물고 흡입하면, 선단 끝 부분에서 담배가 타는 모양이 형상화된 불빛이 나타나고 내부에서는 연기가 생성되어 흡입되며, 따라서 사용자에게 마치 실제 담배를 피우는 것과 유사한 느낌을 제공할 수 있다.

[7] 이때, 발생되는 연기는 니코틴, 타르와 같은 물질을 포함하거나 또는 전혀 포함하지 않을 수 있는데, 현재 향 성분이 첨가되는 액상 에센스를 채택하여 인체에 전혀 유해를 주지 않도록 하는 것이 많이 출시되고 있으며, 대부분이 가열하거나 초음파 진동 등의 방식을 통해 액상 에센스를 기화시켜 연기를 발생시키고 있다.

[8] 보통, 이러한 전자담배는 에센스를 수용하는 카트리지와, 카트리지로부터 공급되는 에센스를 기화시켜 연기를 생성하는 무화기로 구성된다.

[9] 여기서, 카트리지는 무화기로 에센스를 공급하며, 그 에센스가 소진되는 경우에는 새로운 것으로 교체되기 위해 무화기로부터 분리된 후 교체된다.

[10] 이와 같이, 카트리지는 교체식으로 사용되고, 무화기는 반영구적으로 이용된다.

[11] 그러나, 이와 같이 무화기를 반영구적으로 사용하는 방식은, 무화기를 너무 오랜 기간 사용하다 보면, 무화기의 가열 요소(주로, 열선)에 각종 이물질이 침착되어 연기 발생량이 저하되고, 침착된 이물질에 기인하여 건강에 해로운 물질이 함유된 연기가 발생되게 되는 문제점이 있다.

발명의 상세한 설명

기술적 과제

[12] 본 발명은 상기와 같은 제반 문제점을 해결하기 위하여 창안된 것으로서, 본 발명의 기술적 과제는 무화기를 반영구적으로 계속 사용하지 않고 카트리지와 함께 교체하여 사용할 수 있는 전자담배용 무화기 일체형 카트리지를 제공하는데 있다.

[13] 본 발명의 상기 목적과 여러 가지 장점은 이 기술분야에 숙련된 사람들에 의해 본 발명의 바람직한 실시예로부터 더욱 명확하게 될 것이다.

과제 해결 수단

[14] 상기한 기술적 과제를 달성하기 위한 전자담배용 무화기 일체형 카트리지는, 에센스를 수용하는 에센스 수용공간이 형성되고, 하단부가 개구되며, 연기배출홀이 형성되는 액상탱크; 상기 액상탱크의 에센스 수용공간에 배치되고, 상기 연기배출홀과 연통되는 연기유동공이 형성되는 연기유동관체; 및 상기 액상탱크의 하단부에 결합되며, 상단이 개구되어 상기 연기유동공과 연통되고, 상기 에센스수용공간과 연통되는 에센스유입홀이 형성되는 몸체와, 상기 몸체의 내측에 구비되는 심지와, 상기 몸체의 내측에 구비되며 상기 에센스를 가열하는 가열 요소를 구비하는 무화기부; 를 포함한다.

[15] 이 경우, 상기 액상탱크는, 양단이 개구되는 통체 형상으로 형성되고, 상기 에센스 수용공간이 형성되는 에센스통체; 및 상기 에센스통체의 상단 개구부에 결합되어 상기 에센스통체의 상단 개구부를 밀폐하며, 상기 연기배출홀이 형성되는 흡입마개부; 를 포함할 수 있다.

[16] 또한, 상기 전자담배용 무화기 일체형 카트리지는, 상기 무화기부의 상기 몸체와 상기 액상탱크 사이에 밀착되어 상기 에센스의 유출을 방지하는 패킹; 을 더 포함할 수 있다.

[17] 다른 한편, 상기 전자담배용 무화기 일체형 카트리지는, 상기 무화기의 내측에 배치되며, 에센스를 흡수하여 상기 가열 요소로 공급하는 솜뭉치; 를 더 포함할 수 있다.

발명의 효과

[18] 본 발명에 따르면, 무화기의 가열 요소에 각종 이물질이 침착되어 연기 발생량이 저하되기 전에 무화기가 일체화된 카트리지를 교체할 수 있어, 연기 발생량을 적정하게 유지시킬 수 있는 효과가 있다.

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[19] 또한, 본 발명은 무화기의 가열 요소에 각종 이물질이 침착되어 건강에 해로운 물질이 함유된 연기가 발생되기 전에 무화기가 일체화된 카트리지를 교체할 수 있어, 해로운 물질이 함유된 연기가 발생되지 않도록 할 수 있는 효과가 있다.

도면의 간단한 설명

[20] 도 1은 본 발명의 일 실시예에 따른 전자담배용 무화기 일체형 카트리지와 배터리 수용체의 분해 사시도.

[21] 도 2는 도 1에 도시된 무화기 일체형 카트리지와 배터리 수용체가 결합된 상태의 사시도.

[22] 도 3은 도 1 및 도 2에 도시된 무화기 일체형 카트리지의 단면을 절개한 상태의 분해 사시도.

[23] 도 4는 도 3에 도시된 무화기 일체형 카트리지가 결합된 상태의 사시도.

발명의 실시를 위한 최선의 형태

[24] 이하, 본 발명을 첨부된 예시 도면에 의거하여 상세히 설명한다.

[25] 도 1은 본 발명의 일 실시예에 따른 전자담배용 무화기 일체형 카트리지와 배터리 수용체의 분해 사시도이다. 도 2는 도 1에 도시된 무화기 일체형 카트리지와 배터리 수용체가 결합된 상태의 사시도이다. 도 3은 도 1 및 도 2에 도시된 무화기 일체형 카트리지의 단면을 절개한 상태의 분해 사시도이다. 도 4는 도 3에 도시된 무화기 일체형 카트리지가 결합된 상태의 사시도이다.

[26] 도 1 내지 도 4에 도시된 바와 같이, 본 발명에 따른 전자담배용 무화기 일체형 카트리지는 액상탱크(10), 연기유동관체(20) 및 무화기부(30)를 포함하며, 패킹(40)을 더 포함할 수 있다.

[27] 본 실시예에서 예시하는 배터리 수용체(1)는 무화기부(30) 측과 연결되어 무화기부(30)에 전력을 공급하거나 열을 전도시킴으로써, 무화기부(30)의 가열 요소(33)가 발열될 수 있도록 하기 위한 것이다. 여기서, 배터리 수용체(1)는 일단부의 외주연에 나사산이 형성됨으로써, 무화기부(30)의 하단 내주연과 나사결합될 수 있다.

[28] 상기 액상탱크(10)는 에센스통체(11) 및 흡입마개부(12)를 포함할 수 있다.

[29] 상기 에센스통체(11)는 양단이 개구된 통체 형상으로 이루어진다. 이러한 에센스통체(11)는 에센스를 수용할 수 있는 에센스 수용공간(11a)이 형성된다. 또한, 에센스통체(11)는 통체의 내측면으로 돌출되는 단턱(11b)을 선택적으로 구비할 수 있으며, 이 경우, 단턱(11b)은 흡입마개부(12)가 안착될 수 있는 영역을 마련하게 된다.

[30] 상기 흡입마개부(12)는 바람직하게, 컵 형상으로 형성되어 에센스통체(11)의 상부 개구부를 밀폐하게 되고, 연기유동공(20a)과 연통되는 연기배출홀(12a)이 형성된다. 이러한 흡입마개부(12)는 에센스통체(11)의 에센스 수용공간(11a)의 상부 공간을 밀폐하여 에센스가 액상탱크(10)의 상부 공간으로 유출되는 것을 방지하게 된다. 또한, 흡입마개부(12)는 외주연에 돌출되어 형성되는

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걸림턱부(12b)를 더 구비할 수 있다. 여기서, 걸림턱부(12b)는 액상탱크(10)의 상부면을 덮음으로써, 흡입마개부(12)와 액상탱크(10)의 결합 시에 흡입마개부(12)가 액상탱크(10)의 내부에 완전히 삽입되지 않도록 스톱퍼 역할을 하게 된다.

[31] 한편, 액상탱크(10)는 에센스통체(11)와 흡입마개부(12)로 구성되는 것과 같이 분리형으로 구성될 수 있으며, 이와 다르게 일체형으로도 형성될 수 있다. 여기서, 일체형으로 이루어지는 경우의 액상탱크(10)는 에센스통체(11)의 상단 개구부가 밀폐된 형태로 구성될 수 있으며, 이 경우, 밀폐된 상면 상에는 상기한 연기배출홀(12a)이 형성될 수 있다.

[32] 상기 연기유동관체(20)는 액상탱크(10)의 에센스 수용공간(11a)에 배치되고, 연기배출홀(12a)과 연통되는 연기유동공(20a)이 형성된다. 이러한 연기유동관체(20)는 무화기부(30)에서 발생되는 연기를 전자담배 이용자에게 전달하여 공급하는 통로 역할을 한다.

[33] 이러한 연기유동관체(20)는 관의 직경 크기에 따라 삽입부(21), 연결부(22), 제1확장부(23) 및 제2확장부(24)로 구성될 수 있다.

[34] 상기 삽입부(21)는 흡입마개부(12)의 연기배출홀(12a)과 끼워맞춤 결합되어 흡입마개부(12)와 연기유동관체(20)를 연결시키고, 연기유동공(20a)과 연기배출홀(12a)이 연통되도록 한다.

[35] 상기 연결부(22)는 삽입부(21)에서 하방으로 길게 이어지며, 삽입부(21)보다 큰 직경으로 형성된다. 이러한 연결부(22)는 연기배출홀(12a)의 직경보다 큰 직경으로 형성되어 흡입마개부(12)의 하부면을 지지하게 된다.

[36] 상기 제1확장부(23)는 연결부(22)에서 이어지며, 연결부(22)보다 큰 직경으로 형성된다. 이러한 제1확장부(23)는 무화기부(30)의 상단 개구부를 폐쇄하면서 무화기부(30)에서 배출되는 연기가 원활히 배출될 수 있도록 확장된 영역을 마련하게 된다.

[37] 상기 제2확장부(24)는 제1확장부(23)에서 이어지며, 제1확장부(23)보다 큰 직경으로 형성된다. 이러한 제2확장부(24)는 내주연이 무화기부(30)의 외주연에 밀착되어 무화기부(30)에서 배출되는 연기가 연기유동공(20a) 이외의 공간으로 새어나가지 않도록 하게 된다.

[38] 여기서, 액상탱크(10)와 연기유동관체(20) 및 흡입마개부(12)는 인체에 무해한 사출성형용 수지 재질로 이루어질 수 있다.

[39] 상기 무화기부(30)는 몸체(31), 심지(32), 가열 요소(33) 및 전원단자부(34)를 구비하며, 솜뭉치(35)를 선택적으로 더 구비할 수 있다.

[40] 상기 몸체(31)는 하단부가 폐쇄된 통체 형상으로 형성되며, 액상탱크(10)로부터 에센스를 공급받기 위하여 그 몸체(31)의 외면에는 적어도 하나 이상의 에센스유입홀(31a)이 형성된다. 이 경우, 에센스유입홀(31a)이 형성되는 위치에서 몸체(31)는 외주연이 액상탱크(10)의 내주연과 완전히 밀착되지 않고 틈새를 형성하게 된다. 이 경우, 몸체(31)와 액상탱크(10)

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틈새에는 에센스가 유입되며, 상기 틈새로 유입된 에센스는 에센스유입홀(31a)로 유입된다. 여기서, 에센스유입홀(31a)을 통해 유입되는 에센스는 가열 요소(33)에 의해 기화되어 연기가 생성되고 생성되는 연기는 상술한 연기유동관체(20)의 연기유동공(20a)으로 배출된다. 여기서, 몸체(31)는 외측부에서 하방으로 직경이 넓어지는 제1단차부(31a)가 형성될 수 있다. 이 경우, 제1단차부(31a)는 패킹(40)의 내주연이 밀착되는 경우, 패킹(40)이 안착될 수 있도록 하는 역할을 하게 된다. 또한, 몸체(31)는 외주연에서 돌출되어 형성되는 확장플랜지부(31b)를 더 구비할 수 있으며, 이 경우, 확장플랜지부(31b)는 액상탱크(10)의 하부면을 넓음으로써, 무화기부(30)와 액상탱크(10)의 결합시에 무화기부(30)가 액상탱크(10)의 내부에 완전히 삽입되지 않도록 하는 스톱퍼 역할을 하게 된다.

[41] 상기 심지(32)는 일단이 에센스유입홀(31a)에 삽입된 상태로 몸체(31)의 내측에 배치됨으로써, 에센스유입홀(31a)을 통해 유입되는 에센스를 가열 요소(33)측으로 전달한다. 이러한 심지(32)는 바람직하게 수평방향으로 길게 구비되어 그 단부가 에센스유입홀(31a)에 삽입되고 그 중앙부에는 코일형태의 가열 요소(33)에 의해 감기는 형태로 구비될 수 있다. 따라서, 심지(32)를 통해 전달되는 에센스는 가열 요소(33)에 의해 기화되어 연기가 생성된다.

[42] 상기 가열 요소(33)는 전기를 공급받는 경우에 발열되는 열선 또는 열전도에 의해 발열되는 발열체로 구성되며, 그것에 대해 공급되는 에센스를 가열하여 기화시킨다.

[43] 상기 전원단자부(34)는 몸체(31)의 하단부에 구비된다. 이 경우, 전원단자부(34)는 가열 요소(33)와 베터리 수용체(1) 사이를 전기적으로나 열적으로 접속시킴으로써, 가열 요소(33)에 전력이나 열을 공급하게 된다.

[44] 상기 솜뭉치(35)는 몸체(31)의 내측에 배치되며, 심지(32)를 통해 에센스가 과다하게 유입되는 경우 과다하게 유입된 에센스를 흡수하는 역할을 한다.

[45] 상기 패킹(40)은 링 형상으로 형성되며, 내주연이 무화기부(30)의 외주연과 밀착되고 외주연이 에센스통체(11)의 내주연과 밀착된다. 이 경우, 패킹(40)은 무화기부(30)의 제1단차부(31a)에 의해 하방으로 이탈되지 않도록 구속된다. 이러한 패킹(40)은 실리콘과 같은 고무재질로 형성되어 액상탱크(10)와 무화기부(30) 사이를 밀폐시킨다.

[46] 이하에서는 본 발명의 일 실시예에 따른 전자담배용 무화기 일체형 카트리지의 작용에 대해 설명한다.

[47] 먼저, 무화기부(30)가 일체로 결합된 액상탱크(10)를 베터리 수용체(1)에 결합시키게 되면, 액상탱크(10) 내부의 에센스는 액상탱크(10)와 무화기부(30) 사이의 틈새로 유입된다. 이 경우, 액상탱크(10)와 무화기부(30)의 틈새로 유입된 에센스는 무화기부(30)의 에센스유입홀(31a)을 통해 무화기부(30) 내부로 유입된다.

[48] 이때, 무화기부(30)의 에센스유입홀(31a)에 삽입된 심지(32)는 무화기부(30)

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내부로 유입되는 에센스를 흡수하여 가열 요소(33)로 전달하며, 에센스가 심지(32)로 너무 과다하게 유입된 경우에는 과다하게 유입된 에센스가 솜뭉치(35)에 의해 흡수된다.

[49] 다음으로, 가열 요소(33)는 배터리 수용체(1)로부터 전력을 공급받거나 열을 공급받아 발열되고, 발열되는 가열 요소(33)는 심지(32)를 통해 전달되는 에센스를 가열하여 기화시킨다.

[50] 그에 따라, 생성되는 연기는 전자담배의 이용자가 흡입함에 따라 연기유동관체(20)의 연기유동공(20a)을 통해 유동된 다음 연기배출홀(12a)로 배출되어 이용자가 흡입할 수 있게 된다.

[51] 이와 같이 이용하다 보면, 내부의 에센스가 소진된다.

[52] 그러면, 전자담배 이용자는 무화기 일체형 카트리지를 배터리 수용체(1)로부터 분리한 후 새로운 것으로 교체한다.

[53] 이상, 상기 내용은 본 발명의 바람직한 일 실시예를 단지 예시한 것으로 본 발명의 당업자는 본 발명의 요지를 변경시킴이 없이 본 발명에 대한 수정과 변경을 가할 수 있음을 인지해야 한다.

[54]

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청구범위

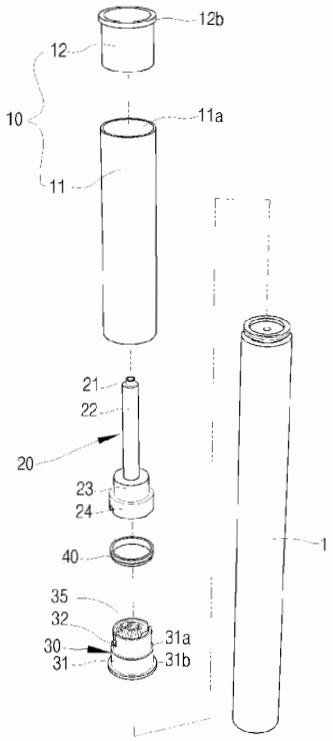
[청구항 1] 에센스를 수용하는 에센스 수용공간이 형성되고, 하단부가 개구되며, 연기배출홀이 형성되는 액상탱크;
상기 액상탱크의 에센스 수용공간에 배치되고, 상기 연기배출홀과 연통되는 연기유동공이 형성되는 연기유동관체;
상기 액상탱크의 하단부에 결합되며, 상단이 개구되어 상기 연기유동공과 연통되고, 상기 에센스수용공간과 연통되는 에센스유입홀이 형성되는 몸체와, 상기 몸체의 내측에 구비되는 심지와, 상기 몸체의 내측에 구비되며 상기 에센스를 가열하는 가열 요소를 구비하는 무화기부; 및
상기 무화기부의 상기 몸체와 상기 액상탱크 사이에 밀착되어 상기 에센스의 유출을 방지하는 패킹; 을 포함하는 전자담배용 무화기 일체형 카트리지.

[청구항 2] 제1항에 있어서,
상기 액상탱크는,
양단이 개구되는 통체 형상으로 형성되고, 상기 에센스 수용공간이 형성되는 에센스통체; 및
상기 에센스통체의 상단 개구부에 결합되어 상기 에센스통체의 상단 개구부를 밀폐하며, 상기 연기배출홀이 형성되는 흡입마개부; 를 포함하는 전자담배용 무화기 일체형 카트리지.

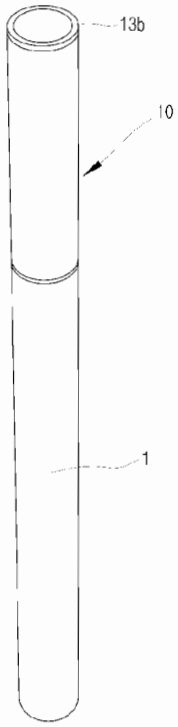
[청구항 3] 제1항에 있어서,
상기 무화기의 내측에 배치되며, 에센스를 흡수하여 상기 가열 요소로 공급하는 솜뭉치; 를 더 포함하는 전자담배용 무화기 일체형 카트리지.

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[Fig. 1]

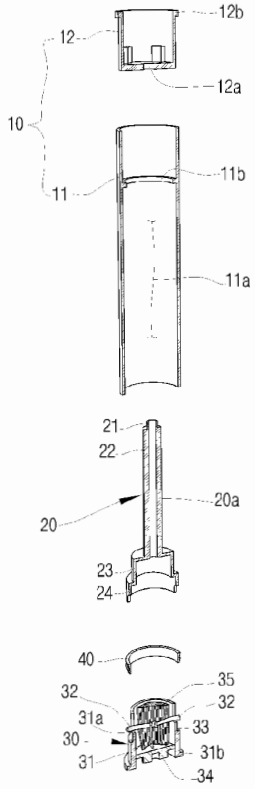


[Fig. 2]

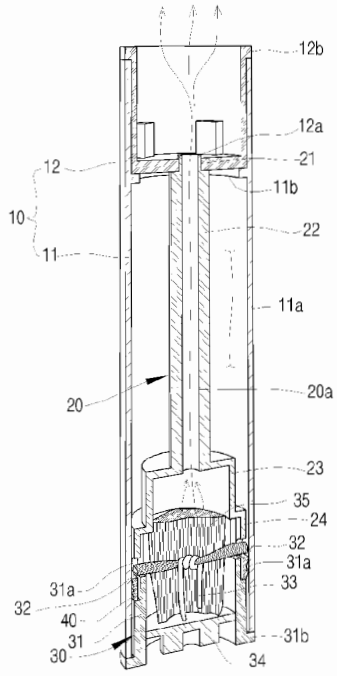


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[Fig. 3]



[Fig. 4]



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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2012/000298

A. CLASSIFICATION OF SUBJECT MATTER

A24B 15/16(2006.01)i, A24F 47/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24B 15/16; A24F 47/00; A61M 15/06; A24B 15/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: cigarette, cigar, non-smoking, smoking, essence, liquid phase, cartridge, nicotine, nicotine, smoke, atomization, evaporation, heating, heater, electronic cigarette

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 20-0453400 Y1 (OVALE INC.) 28 April 2011 See paragraph [0023], figures 1 and 4	1-3
A	KR 20-0453424 Y1 (OVALE INC.) 02 May 2011 See pages 5 and 6, figures 2 and 3	1-3
A	KR 10-2009-0121957 A (CHO, YEO CHAN) 26 November 2009 See claims 1 to 4, figures 3 and 5	1-3

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 SEPTEMBER 2012 (19.09.2012)	**25 SEPTEMBER 2012 (25.09.2012)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

NJOY Exhibit 1002.929

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2012/000298

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 20-0453400 Y1	28.04.2011	KR 20-2011-0002227 U	07.03.2011
KR 20-0453424 Y1	02.05.2011	NONE	
KR 10-2009-0121957 A	26.11.2009	KR 10-0939512 B1	28.01.2010

NJOY Exhibit 1002.930

국 제 조 사 보 고 서

국제출원번호
PCT/KR2012/000298

A. 발명이 속하는 기술분류(국제특허분류(IPC))

A24B 15/16(2006.01)i, A24F 47/00(2006.01)i

B. 조사된 분야

조사된 최소문헌(국제특허분류를 기재)
A24B 15/16; A24F 47/00; A61M 15/06; A24B 15/00

조사된 기술분야에 속하는 최소문헌 이외의 문헌
한국등록실용신안공보 및 한국공개실용신안공보: 조사된 최소문헌란에 기재된 IPC
일본등록실용신안공보 및 일본공개실용신안공보: 조사된 최소문헌란에 기재된 IPC

국제조사에 이용된 전산 데이터베이스(데이터베이스의 명칭 및 검색어(해당하는 경우))
eKOMPASS(특허청 내부 검색시스템) & 키워드: 담배,시가,금연,흡연, 에센스,액상,카트리지,니코틴,니코진, 연기,무화, 기화, 가열, 히터, 전자 담배

C. 관련 문헌

카테고리*	인용문헌명 및 관련 구절(해당하는 경우)의 기재	관련 청구항
A	KR 20-0453400 Y1 ((주)잔티코리아) 2011.04.28 식별번호 [0023], 도면 1 및 4 참조	1-3
A	KR 20-0453424 Y1 ((주)잔티코리아) 2011.05.02 페이지 5 및 6, 도면 2 및 3	1-3
A	KR 10-2009-0121957 A (조여찬) 2009.11.26 청구항 1 내지 4, 도면3 및 5	1-3

☐ 추가 문헌이 C(계속)에 기재되어 있습니다.

☒ 대응특허에 관한 별지를 참조하십시오.

* 인용된 문헌의 특별 카테고리:

"A" 특별히 관련이 없는 것으로 보이는 일반적인 기술수준을 정의한 문헌

"E" 국제출원일보다 빠른 출원일 또는 우선일을 가지나 국제출원일 이후에 공개된 선출원 또는 특허 문헌

"L" 우선권 주장에 의문을 제기하는 문헌 또는 다른 인용문헌의 공개일 또는 다른 특별한 이유(이유를 명시)를 밝히기 위하여 인용된 문헌

"O" 구두 개시, 사용, 전시 또는 기타 수단을 언급하고 있는 문헌

"P" 우선일 이후에 공개되었으나 국제출원일 이전에 공개된 문헌

"T" 국제출원일 또는 우선일 후에 공개된 문헌으로, 출원과 상충하지 않으며 발명의 기초가 되는 원리나 이론을 이해하기 위해 인용된 문헌

"X" 특별한 관련이 있는 문헌. 해당 문헌 하나만으로 청구된 발명의 신규성 또는 진보성이 없는 것으로 본다.

"Y" 특별한 관련이 있는 문헌. 해당 문헌이 하나 이상의 다른 문헌과 조합하는 경우로 그 조합이 당업자에게 자명한 경우 청구된 발명은 진보성이 없는 것으로 본다.

"&" 동일한 대응특허문헌에 속하는 문헌

국제조사의 실제 완료일	국제조사보고서 발송일
2012년 09월 19일 (19.09.2012)	**2012년 09월 25일 (25.09.2012)**

ISA/KR의 명칭 및 우편주소
대한민국 특허청
(302-701) 대전광역시 서구 청사로 189,
4동 (둔산동, 정부대전청사)
팩스 번호 82-42-472-7140

심사관
김홍래
전화번호 0424813363

서식 PCT/ISA/210 (두 번째 용지) (2009년 7월)

NJOY Exhibit 1002.931

국 제 조 사 보 고 서
대응특허에 관한 정보

국제출원번호
PCT/KR2012/000298

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of:
Kyle D. Newton

Application No.: 16/359,938	Confirmation No.: 6916
Filed: March 20, 2019	Art Unit: 3991
For: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR	Examiner: N. L. Torres Velazquez

INFORMATION DISCLOSURE STATEMENT (IDS)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

Pursuant to 37 C.F.R. §§ 1.56, 1.97, and 1.98, the attention of the United States Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08 submission. It is respectfully requested that the information be expressly considered during the prosecution of the above-identified application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed after the mailing date of a first Office Action on the merits, but before the mailing date of any of a Final Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311 or an action that otherwise closes prosecution in this application (37 C.F.R. § 1.97(c)).

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), copies of U.S. patents and U.S. patent application publications are not submitted. Submitted herewith are copies of foreign patents in accordance with 37 C.F.R. § 1.98(a)(2).

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed as a representation that a search has been made. In accordance with 37 C.F.R. § 1.97(h), the filing of this Information Disclosure Statement shall not be construed to be an

admission that the information cited in this Information Disclosure Statement is, or is considered to be, material to patentability as defined in 37 C.F.R. § 1.56(b).

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98, and the Examiner is respectfully requested to consider the listed references.

Any fees believed to be due have been paid herewith. However, the Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed, or which should have been filed herewith to our Deposit Account No. 50-0311, under Application No.: 16/359,938.

Dated: July 14, 2021

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of:
Kyle D. Newton

Application No.: 16/359,938	Confirmation No.: 6916
Filed: March 20, 2019	Art Unit: 3991
For: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR	Examiner: N. L. Torres Velazquez

SUPPLEMENTAL RESPONSE TO CORRECT CLAIM AMENDMENTS

VIA EFS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is a supplemental response to the non-final Office Action dated January 14, 2021.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 19 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Twice Amended) An electronic cigarette cartridge apparatus, comprising:

a housing having a mouthpiece with an aerosol outlet;

an atomizer disposed within an atomizing chamber, and operable to selectively generate an aerosol of [the]a liquid in response to electric current flowing therethrough;

said atomizing chamber having an air inlet, an atomizer outlet coupled to said aerosol outlet, [and]a first wick aperture, and a second wick aperture;

a liquid reservoir disposed within said housing and sealably separated from said atomizing chamber[,]; and

a wick in contact with the liquid in the liquid reservoir [disposed]through said first wick aperture[between said liquid reservoir and said atomizing chamber] and said second wick aperture, the wick disposed between the liquid reservoir and the atomizer and configured to transfer the liquid by capillarity from said liquid reservoir to said atomizer;

wherein said atomizer outlet and said aerosol outlet are coupled by a chimney.

2. The apparatus of claim 1, further comprising:

an inlet vent formed on the exterior of said housing and coupled to deliver air to said atomizing chamber air inlet.

3. (Amended) The apparatus of claim 2, [and]wherein said inlet vent is coupled to said atomizing chamber air inlet by a conduit.

4. (Amended) The apparatus of claim 3, [and]wherein said conduit sealably passes through said liquid reservoir.

5. (Amended) The apparatus of claim 1, [and]wherein said chimney sealably passes through said liquid reservoir.

6. (Amended) The apparatus of claim 1, [and]wherein said atomizer is a resistive heating element.

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7. (Amended) The apparatus of claim 6, [and]wherein said wick [is]partially engages said resistive heating element.

8. (Amended) The apparatus of claim 1, [and]wherein said atomizer has a tubular form defining an open central passage.

9. (Amended) The apparatus of claim 8, [and]wherein said wick passes through said open central passage.

10. (Twice Amended) The apparatus of claim 1, [and]wherein [said atomizing chamber further comprises a second wick aperture, and wherein]a first end of said wick passes through said first wick aperture and a second end of said wick passes through said second wick aperture.

Cancel claim 11.

12. (Amended) The apparatus of claim [11]1, [and]wherein said bundle of heat resistant fibers is fiberglass.

13. (Amended) The apparatus of claim [11]1, [and]wherein said bundle of heat resistant fibers is fabricated from a material selected from; aramid, fluorocarbon, sulfide, melamine, polyimide, carbon, and glass.

14. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir is formed as an annular cavity between [the]an interior of said housing and said atomizing chamber.

15. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir includes an external access opening[,] for enabling addition of liquid into said liquid reservoir.

16. (Amended) The apparatus of claim 15, [and]wherein said external access opening is a removable mouthpiece.

17. (New, amended) A method, comprising:

transferring liquid from a liquid reservoir of an electronic cigarette cartridge to an atomizing chamber of the cartridge with a wick extending between the liquid reservoir and the

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atomizing chamber, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber;

generating an aerosol of the liquid in the atomizing chamber; and

channeling the aerosol from an outlet of the atomizing chamber to an aerosol outlet of the electronic cigarette cartridge with a chimney coupled to the outlet of the atomizing chamber and to the aerosol outlet.

18. (New) The method of claim 17, where the liquid reservoir is without a porous material for storing the liquid.

19. (New) The method of claim 17, wherein transferring liquid from a liquid reservoir to an atomizing chamber with a wick comprises transferring the liquid by capillarity with the wick.

20. (New) The method of claim 17, wherein generating an aerosol of the liquid comprises generating aerosol with an electrically powered atomizer in the atomizing chamber.

21. (New) The method of claim 17, wherein channeling the aerosol with a chimney comprises channeling the aerosol with the chimney through the liquid reservoir, the chimney being sealed from the liquid reservoir.

22. (New) The apparatus of claim 1, wherein the wick extends between the liquid reservoir and an interior of the atomizing chamber.

23. (New) The apparatus of claim 1, wherein the liquid reservoir adjacent the wick is free from porous material.

24. (New) The apparatus of claim 1, wherein the first wick aperture is circular.

25. (New, amended) The apparatus of claim 1, further comprising an atomizing assembly comprising a body and the atomizer, the atomizing assembly comprising a first recess formed therein that aligns with the first wick aperture in the atomizing chamber and provides a compressive fit around the wick.

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26. (New, amended) The apparatus of claim 25, wherein the first wick aperture and the first recess cooperate to define a circular aperture.

27. (New) The apparatus of claim 10, wherein the first wick aperture and the second wick aperture each comprise a fixed width slot terminating in a curved end, the fixed width configured to receive the wick.

28. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber.

29. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet.

30. (New) The apparatus of claim 1, wherein the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

31. (New, amended) The apparatus of claim 1, wherein the chimney and atomizing chamber are cylindrical and the maximum exterior diameter of the chimney is less than the maximum interior diameter of the atomizing chamber.

32. (New) The apparatus of claim 1, wherein the apparatus is elongate, and the maximum transverse exterior dimension of the chimney is less than the maximum transverse interior diameter of the atomizing chamber.

33. (New) The apparatus of claim 1, wherein the atomizing chamber and the chimney are formed as a single unit.

34. (New, amended) The apparatus of claim 1, wherein the housing comprises a transparent material through which the liquid in the liquid reservoir can be viewed from the exterior of the apparatus.

35. (New, amended) The apparatus of claim 1, further comprising an insert in the housing, the insert comprising the aerosol outlet.

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36. (New, amended) The apparatus of claim 1, coupled to a power supply portion, wherein the power supply portion comprises a pressure sensor configured to detect negative pressure within the power supply portion and energize the atomizer.

37. (New) The apparatus of claim 36, wherein the power supply portion comprises an LED positioned at a tip end of the power supply portion, the LED configured to illuminate in response to the pressure sensor detecting negative pressure in the power supply portion.

38. (New) The apparatus of claim 37, wherein the LED comprises an amber LED configured to emulate burning ash when illuminated.

39. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet, the chimney and atomizing chamber are cylindrical, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

40. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber, the atomizing chamber and the chimney are formed as a single unit, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

41. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

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a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

42. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

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43. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

44. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

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a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

45. (New, amended) A cartridge comprising:

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber comprising a first wick aperture and a second wick aperture each forming an opening between the atomizing chamber and a liquid reservoir configured to contain an atomization liquid; the atomizing chamber further comprising an atomizer outlet;

a wick partially disposed within the atomizing chamber, the wick having a first wick end extending out of the atomizing chamber through the first wick aperture into the liquid reservoir and a second wick end extending out of the atomizing chamber through the second wick aperture into the liquid reservoir, the wick configured to draw the atomization liquid into the atomizing chamber by capillarity; and

an atomizer disposed within the atomizing chamber, the atomizer configured to receive electric current from a battery to facilitate generation of an aerosol by vaporizing the atomization liquid drawn into the atomizing chamber by the wick;

wherein the atomizer outlet and the aerosol outlet are coupled by a chimney.

46. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

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a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

47. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

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48. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

49. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

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a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

50. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

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a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

51. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

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a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

52. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

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a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

53. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

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a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

54. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer

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outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

55. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

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an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

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REMARKS

This supplemental response is being submitted to correct the inadvertent error in the use of strike through markings in the amendments made to claims 1 and 10 in the Response to Non-Final Office Action filed on July 14, 2021. As shown above, the strike through markings have been removed and the subject matter to be omitted from claims 1 and 10 is now correctly enclosed in single brackets. No new matter has been added. Reconsideration is respectfully requested.

The Examiner is encouraged to telephone the undersigned attorney for Applicant if such communication is deemed to expedite prosecution of this application.

All fees due are believed to be paid. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 50-0311, Reference No.: 16/359,938, from which the undersigned is authorized to draw.

Dated: July 15, 2021

Respectfully submitted,

Electronic signature: /Elissa M. Kingsland/
Elissa M. Kingsland
Registration No.: 63,259
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114361061v.1

NJOY Exhibit 1002.953

Electronic Acknowledgement Receipt	
EFS ID:	43261069
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	15-JUL-2021
Filing Date:	20-MAR-2019
Time Stamp:	15:54:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		492RI1US_Supplemental_Response.pdf	168807 6f6bc0af62c297d37687052928a6be7da4e9a5d5	yes	19

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Supplemental Response or Supplemental Amendment	1	1
	Claims	2	18
	Applicant Arguments/Remarks Made in an Amendment	19	19
Warnings:			
Information:			
	Total Files Size (in bytes):	168807	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/359,938	Filing Date 03/20/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	07/15/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 54	Minus	** 54	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 17	Minus	*** 17	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RHONDA BELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	03/20/2019	Kyle D. Newton	62210-492RI1US	6916

148514 7590 09/08/2021

Mintz/JUUL
One Financial Center
Boston, MA 02111

EXAMINER
TORRES VELAZQUEZ, NORCA LIZ

ART UNIT	PAPER NUMBER
3991	

NOTIFICATION DATE	DELIVERY MODE
09/08/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPDocketingBOS@mintz.com
IPFileroombos@mintz.com
mintzdocketing@cpaglobal.com

NJOY Exhibit 1002.957

Office Action Summary	**Application No.** 16/359,938	**Applicant(s)** Newton, Kyle D.	
	Examiner NORCA L TORRES VELAZQUEZ	**Art Unit** 3991	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 14 July 2021 and 15 July 2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-10 and 12-55 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☑ Claim(s) 17-21 and 41-55 is/are allowed.

7) ☑ Claim(s) 1-10 and 12-16 is/are rejected.

8) ☑ Claim(s) 22-40 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

NJOY Exhibit 1002.958

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Reissue Applications

For reissue applications filed before September 16, 2012, all references to 35 U.S.C. 251 and 37 CFR 1.172, 1.175, and 3.73 are to the law and rules in effect on September 15, 2012. Where specifically designated, these are "pre-AIA" provisions.

For reissue applications filed on or after September 16, 2012, all references to 35 U.S.C. 251 and 37 CFR 1.172, 1.175, and 3.73 are to the current provisions.

The present reissue application is a **broadening reissue** of US 9,596,887 Patent (the '887 Patent herein), and it includes new claims 17-55. This Final action is in response to the amendment and remarks filed July 14 and July 15, 2021.

Invention of the '024 Patent

The '887 Patent issued with sixteen (16) claims. The amendment filed 7/15/2021 amends claims 1, 3-10 and 12-16, cancels claim 11 and includes amendments to some of new claims 17-55. Claims 1-10 and 12-55 are pending in the present reissue. Independent claims 1 and 17 are representative as follows:

1. (Twice, Amended) An electronic cigarette cartridge apparatus, comprising:

a housing having a mouthpiece with an aerosol outlet;

an atomizer disposed within an atomizing chamber, and operable to selectively generate an aerosol of [the] a liquid in response to electric current flowing therethrough;

said atomizing chamber having an air inlet, an atomizer outlet coupled to said aerosol outlet, [and]a first wick aperture, and a second wick aperture;

a liquid reservoir disposed within said housing and sealably separated from said atomizing chamber[,]; and

a wick in contact with the liquid in the liquid reservoir [disposed] through said first wick aperture[between said liquid reservoir and said atomizing chamber] and said second wick

aperture, the wick disposed between the liquid reservoir and the atomizer and configured to transfer the liquid by capillarity from said liquid reservoir to said atomizer;

wherein said atomizer outlet and said aerosol outlet are coupled by a chimney.

17. (New, *Amended*) A method, comprising:

transferring liquid from a liquid reservoir of an electronic cigarette cartridge to an atomizing chamber of the cartridge with a wick extending between the liquid reservoir and the atomizing chamber, the liquid reservoir *surrounds and is* sealed from an interior of the atomizing chamber;

generating an aerosol of the liquid in the atomizing chamber; and

channeling the aerosol from an outlet of the atomizing chamber to an aerosol outlet of the electronic cigarette cartridge with a chimney coupled to the outlet of the atomizing chamber and to the aerosol outlet.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-

processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-10 and 12-16 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 8,528,569 in view of HON (CA 2884987).

Claims 1, 5, 11 and 12 of the '569 Patent teach the limitations of claim 1 of the present reissue, except that they fail to claim that the atomizer generates an aerosol of the liquid "in response to electric current flowing therethrough." HON discloses an atomizing electronic cigarette and teaches that when the user inhales, as the sensor 2 communicates with the air vent 101, the through hole 51, the channel 31 and the air suction port "a" form an airflow loop with the auxiliary air inlet 4. When the gas flow is generated inside the electronic cigarette, the sensor 3 switches the circuit on, the electric heater 5 starts heating to make cigarette liquid in the liquid permeating component 6 be gasified after reaching the boiling point. (Abstract; Page 7, last paragraph bridging to Page 8, first paragraph). Thus, it would have been obvious to a person having ordinary skill in the art to use an electric current in the claims of the '569 patent with the motivation of producing aerosol as disclosed by HON. (Page 7, last paragraph bridging to Page 8, first paragraph) Claims 2-4 and 6-17 of the '569 Patent provide for the limitations in dependent claims 2-10 and 12-16 of the present reissue.

Rejections Overcome

The prior art rejections set forth on pp. 5-19 of the Office Action mailed 01/14/2021 are expressly withdrawn in view of Applicant's amendment and arguments.

In particular, claims 1-10, 12-16 and 22-55 as amended on July 15, 2021 are free of prior art because the prior art of record fails to teach that the atomizing chamber comprises a first wick aperture and a second wick aperture each forming an opening between the atomizing chamber

and the liquid reservoir and a wick having a first wick end extending out of the atomizing chamber through the first wick aperture into the liquid reservoir and a second wick end extending out of the atomizing chamber through the second wick aperture into the liquid reservoir.

Claims 17-21 are free of prior art because the prior art of record fails to provide a method of the present invention wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber as claimed in independent claim 17. It is noted that the prior art of FANG teaches the use of a liquid reservoir but it fails to surround the interior of the atomizing chamber. HON provides a liquid storage component 3 that surrounds an atomizing chamber (Fig. 6), however, there is no rationale to substitute the liquid tank of FANG with the liquid storage of component of HON that includes a porous material.

Response to Arguments

Applicant's arguments filed 07/15/2021 have been fully considered but they are not persuasive.

With respect to the obviousness-type double patenting rejection, Applicant defers filing a terminal disclaimer until the claims of the present application are allowed (Remarks, p. 22). It is noted that a terminal disclaimer has not yet been filed, and thus, the obviousness-type double patenting rejection is maintained.

Conclusion

Claims 1-10 and 12-16 are rejected.

Claims 22-40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 17-21 and 41-44 are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Applicant is reminded of the continuing obligation under 37 CFR 1.178(b), to timely apprise the Office of any prior or concurrent proceeding in which Patent No. 9,596,887 is or was involved. These proceedings would include interferences, reissues, reexaminations, and litigation.

Applicant is further reminded of the continuing obligation under 37 CFR 1.56, to timely apprise the Office of any information which is material to patentability of the claims under consideration in this reissue application.

These obligations rest with each individual associated with the filing and prosecution of this application for reissue. See also MPEP §§ 1404, 1442.01 and 1442.04.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NORCA LIZ TORRES VELAZQUEZ whose telephone number

is (571)272-1484. The examiner can normally be reached on M-Th 7:00 am - 4:30 pm and alternate Fridays-.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Speer can be reached on (313) 446-4825. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Norca L. Torres Velazquez/
Patent Reexamination Specialist
Central Reexamination Unit 3991

Conferees:

/Alan Diamond/
Patent Reexamination Specialist
Central Reexamination Unit 3991

/TIMOTHY M SPEER/
Supervisory Patent Examiner, Art Unit 3991

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	**Art Unit**
	NORCA L TORRES VELAZQUEZ	3991

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/27/2020	12/31/2020	08/31/2021						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	-	-						
	12	✓	✓	✓						
	13	✓	✓	✓						
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	39	✓	✓	O						
	40	✓	✓	O						
	41	=	=	=						
	42	=	=	=						

NJOY Exhibit 1002.965

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	**Art Unit**
	NORCA L TORRES VELAZQUEZ	3991

CLAIM		DATE								
Final	Original	05/27/2020	12/31/2020	08/31/2021						
	43	=	=	=						
	44	=	=	=						
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	54	=	=	=						
	55	=	=	=						

NJOY Exhibit 1002.966

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	Art Unit
	NORCA L TORRES VELAZQUEZ	3991

CPC - Searched*		
Symbol	**Date**	**Examiner**
A61M15/06 B01D19/0047 B05B7/1693 A24B15/167	05/27/2020	NT
A24C5/12 A61M15/06 A24F47/00 A24F47/002	05/27/2020	NT

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
Inventor's name search; assignee name search	05/27/2020	nt
reviewed prosecution of 14/219,426 and parent cases: 13/955,153 13/157,024	05/27/2020	nt
EAST textsearch	05/27/2020	nt
updated textsearch SEARCH (attached)	12/31/2020	nt
considered IDS 7/14/21	08/31/2021	nt
textsearch SEARCH	08/31/2021	nt

/NT/ Patent Reex Specialist, Art Unit 3991	

NJOY Exhibit 1002.967

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	Art Unit
	NORCA L TORRES VELAZQUEZ	3991

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/NT/ Patent Reex Specialist, Art Unit 3991	

NJOY Exhibit 1002.968

Used in Lieu of PTO/SB/08A/B
(Based on PTO 11-07 version)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	16/359,938
				Filing Date	March 20, 2019
				First Named Inventor	Kyle D. Newton
				Art Unit	3991
(Use as many sheets as necessary)				Examiner Name	N. L. Torres Velazquez
Sheet	1	of	5	Attorney Docket Number	

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A	US-20020043262-A1	04-18-2002	Langford et al.	
	B	US-20020078951-A1	06-27-2002	Nichols et al.	
	C	US-20020088469-A1	07-11-2002	Rennecamp	
	D	US-20030226837-A1	12-11-2003	Blake et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	16/359,938
				Filing Date	March 20, 2019
				First Named Inventor	Kyle D. Newton
				Art Unit	3991
(Use as many sheets as necessary)				Examiner Name	N. L. Torres Velazquez
Sheet	2	of	5	Attorney Docket Number	

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Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*				***Complete if Known***	
				Application Number	16/359,938
				Filing Date	March 20, 2019
				First Named Inventor	Kyle D. Newton
				Art Unit	3991
				Examiner Name	N. L. Torres Velazquez
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				First Named Inventor	Kyle D. Newton
				Art Unit	3991
(Use as many sheets as necessary)				Examiner Name	N. L. Torres Velazquez
Sheet	4	of	5	Attorney Docket Number	

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				Filing Date	March 20, 2019
				First Named Inventor	Kyle D. Newton
				Art Unit	3991
(Use as many sheets as necessary)				Examiner Name	N. L. Torres Velazquez
Sheet	5	of	5	Attorney Docket Number	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. * CITE NO.: Those application(s) which are marked with an single asterisk (*) next to the Cite No. are not supplied (under 37 CFR 1.98(a)(2)(iii)) because that application was filed after June 30, 2003 or is available in the IFW. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

Examiner Signature	/Norca L. Torres Velazquez/	Date Considered	08/31/2021

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[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

101858321v.1

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L209	1	("9596887").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:26 AM
L210	1	("9596887").pn. AND reservoir	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:28 AM
L211	1	("9596887").pn. AND reservoir AND porous	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:35 AM
L212	1	"20110011396"	(US-PGPUB)	OR	ON	ON	2021/08/31 09:39 AM
L213	1	("20110011396").pn.	(US-PGPUB)	OR	ON	ON	2021/08/31 09:39 AM
L214	0	("20110011396").pn. AND liquid AND reservoir	(US-PGPUB)	OR	ON	ON	2021/08/31 09:40 AM
L215	1	("20110011396").pn. AND liquid	(US-PGPUB)	OR	ON	ON	2021/08/31 09:52 AM
L216	110	("20020043262"|"20020078951"|"20020088469"|"20030226837"|"20040050382"|"20050134215"|"20070045288"|"20070074734"|"20070229025"|"20070277816"|"20070283972"|"20080023003"|"20080029095"|"20080257367"|"20080302374"|"20090095287"|"20090133691"|"20090272379"|"20090293892"|"20090302019"|"20100031968"|"20100194337"|"20100200008"|"20100207576"|"20100253279"|"20110036346"|"20110159705"|"20110192397"|"20110226266"|"20110265806"|"20110277761"|"20110278189"|"20110303231"|"20120018529"|"20120048266"|"20120174914"|"20120199146"|"20120199663"|"20120223673"|"20120255546"|"20120312313"|"20120318882"|"20120325227"|"20130056013"|"20130174842"|"20130220315"|"20130253433"|"20130306084"|"20130319435"|"20140158129"|"20140283859"|"20170197046"|"3085145	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:16 PM

NJOY Exhibit 1002.974

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L217	37	L216 AND (tank reservoir)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:17 PM
L218	110	L216	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:23 PM
L219	1	("20110303231").pn.	(US-PGPUB)	OR	ON	ON	2021/08/31 01:34 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

NJOY Exhibit 1002.975

To: mintzdocketing@cpaglobal.com,IPDocketingBOS@mintz.com,IPFileroombos@mintz.com
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Subject: Private PAIR Correspondence Notification for Customer Number 148514

Sep 08, 2021 03:58:48 AM

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Application	Document	Mailroom Date	Attorney Docket No.
16359938	CTFR	09/08/2021	62210-492RI1US
	1449	09/08/2021	62210-492RI1US

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One Financial Center
Boston, MA 02111

Courtesy Reminder for
Application Serial No: 16/359,938

Attorney Docket No: 62210-492RI1US
Customer Number: 148514
Date of Electronic Notification: 09/08/2021

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NJOY Exhibit 1002.977

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of: Kyle D. Newton	
Application No.: 16/359,938	Confirmation No.: 6916
Filed: March 20, 2019	Art Unit: 3991
For: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR	Examiner: N. L. Torres Velazquez

AMENDMENT AFTER FINAL ACTION UNDER 37 C.F.R. § 1.116

VIA EFS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is in response to the final Office Action dated September 8, 2021.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 32 of this paper.

A **Terminal Disclaimer** is submitted herewith.

AMENDMENTS TO THE CLAIMS

1. (Twice Amended) An electronic cigarette cartridge apparatus, comprising:

a housing having a mouthpiece with an aerosol outlet;

an atomizer disposed within an atomizing chamber, and operable to selectively generate an aerosol of [the]a liquid in response to electric current flowing therethrough;

said atomizing chamber having an air inlet, an atomizer outlet coupled to said aerosol outlet, [and]a first wick aperture, and a second wick aperture;

a liquid reservoir disposed within said housing and sealably separated from said atomizing chamber[,]; and

a wick in contact with the liquid in the liquid reservoir [disposed]through said first wick aperture[between said liquid reservoir and said atomizing chamber] and said second wick aperture, the wick disposed between the liquid reservoir and the atomizer and configured to transfer the liquid by capillarity from said liquid reservoir to said atomizer;

wherein said atomizer outlet and said aerosol outlet are coupled by a chimney.

2. The apparatus of claim 1, further comprising:

an inlet vent formed on the exterior of said housing and coupled to deliver air to said atomizing chamber air inlet.

3. (Amended) The apparatus of claim 2, [and]wherein said inlet vent is coupled to said atomizing chamber air inlet by a conduit.

4. (Amended) The apparatus of claim 3, [and]wherein said conduit sealably passes through said liquid reservoir.

5. (Amended) The apparatus of claim 1, [and]wherein said chimney sealably passes through said liquid reservoir.

6. (Amended) The apparatus of claim 1, [and]wherein said atomizer is a resistive heating element.

7. (Amended) The apparatus of claim 6, [and]wherein said wick [is]partially engages said resistive heating element.

NJOY Exhibit 1002.979

8. (Amended) The apparatus of claim 1, [and]wherein said atomizer has a tubular form defining an open central passage.

9. (Amended) The apparatus of claim 8, [and]wherein said wick passes through said open central passage.

10. (Twice Amended) The apparatus of claim 1, [and]wherein [said atomizing chamber further comprises a second wick aperture, and wherein]a first end of said wick passes through said first wick aperture and a second end of said wick passes through said second wick aperture.

Cancel claim 11.

12. (Amended) The apparatus of claim [11]1, [and]wherein said bundle of heat resistant fibers is fiberglass.

13. (Amended) The apparatus of claim [11]1, [and]wherein said bundle of heat resistant fibers is fabricated from a material selected from; aramid, fluorocarbon, sulfide, melamine, polyimide, carbon, and glass.

14. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir is formed as an annular cavity between [the]an interior of said housing and said atomizing chamber.

15. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir includes an external access opening[,] for enabling addition of liquid into said liquid reservoir.

16. (Amended) The apparatus of claim 15, [and]wherein said external access opening is a removable mouthpiece.

17. (New, amended) A method, comprising:

transferring liquid from a liquid reservoir of an electronic cigarette cartridge to an atomizing chamber of the cartridge with a wick extending between the liquid reservoir and the atomizing chamber, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber;

generating an aerosol of the liquid in the atomizing chamber; and

NJOY Exhibit 1002.980

channeling the aerosol from an outlet of the atomizing chamber to an aerosol outlet of the electronic cigarette cartridge with a chimney coupled to the outlet of the atomizing chamber and to the aerosol outlet.

18. (New) The method of claim 17, where the liquid reservoir is without a porous material for storing the liquid.

19. (New) The method of claim 17, wherein transferring liquid from a liquid reservoir to an atomizing chamber with a wick comprises transferring the liquid by capillarity with the wick.

20. (New) The method of claim 17, wherein generating an aerosol of the liquid comprises generating aerosol with an electrically powered atomizer in the atomizing chamber.

21. (New) The method of claim 17, wherein channeling the aerosol with a chimney comprises channeling the aerosol with the chimney through the liquid reservoir, the chimney being sealed from the liquid reservoir.

22. (New) The apparatus of claim 1, wherein the wick extends between the liquid reservoir and an interior of the atomizing chamber.

23. (New) The apparatus of claim 1, wherein the liquid reservoir adjacent the wick is free from porous material.

24. (New) The apparatus of claim 1, wherein the first wick aperture is circular.

25. (New, amended) The apparatus of claim 1, further comprising an atomizing assembly comprising a body and the atomizer, the atomizing assembly comprising a first recess formed therein that aligns with the first wick aperture in the atomizing chamber and provides a compressive fit around the wick.

26. (New, amended) The apparatus of claim 25, wherein the first wick aperture and the first recess cooperate to define a circular aperture.

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27. (New) The apparatus of claim 10, wherein the first wick aperture and the second wick aperture each comprise a fixed width slot terminating in a curved end, the fixed width configured to receive the wick.

28. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber.

29. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet.

30. (New) The apparatus of claim 1, wherein the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

31. (New, amended) The apparatus of claim 1, wherein the chimney and atomizing chamber are cylindrical and the maximum exterior diameter of the chimney is less than the maximum interior diameter of the atomizing chamber.

32. (New) The apparatus of claim 1, wherein the apparatus is elongate, and the maximum transverse exterior dimension of the chimney is less than the maximum transverse interior diameter of the atomizing chamber.

33. (New) The apparatus of claim 1, wherein the atomizing chamber and the chimney are formed as a single unit.

34. (New, amended) The apparatus of claim 1, wherein the housing comprises a transparent material through which the liquid in the liquid reservoir can be viewed from the exterior of the apparatus.

35. (New, amended) The apparatus of claim 1, further comprising an insert in the housing, the insert comprising the aerosol outlet.

36. (New, amended) The apparatus of claim 1, coupled to a power supply portion, wherein the power supply portion comprises a pressure sensor configured to detect negative pressure within the power supply portion and energize the atomizer.

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37. (New) The apparatus of claim 36, wherein the power supply portion comprises an LED positioned at a tip end of the power supply portion, the LED configured to illuminate in response to the pressure sensor detecting negative pressure in the power supply portion.

38. (New) The apparatus of claim 37, wherein the LED comprises an amber LED configured to emulate burning ash when illuminated.

39. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet, the chimney and atomizing chamber are cylindrical, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

40. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber, the atomizing chamber and the chimney are formed as a single unit, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

41. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

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a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

42. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

43. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer

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outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

44. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

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a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

45. (New, amended) A cartridge comprising:

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber comprising a first wick aperture and a second wick aperture each forming an opening between the atomizing chamber and a liquid reservoir configured to contain an atomization liquid; the atomizing chamber further comprising an atomizer outlet;

a wick partially disposed within the atomizing chamber, the wick having a first wick end extending out of the atomizing chamber through the first wick aperture into the liquid reservoir and a second wick end extending out of the atomizing chamber through the second wick aperture into the liquid reservoir, the wick configured to draw the atomization liquid into the atomizing chamber by capillarity; and

an atomizer disposed within the atomizing chamber, the atomizer configured to receive electric current from a battery to facilitate generation of an aerosol by vaporizing the atomization liquid drawn into the atomizing chamber by the wick;

wherein the atomizer outlet and the aerosol outlet are coupled by a chimney.

46. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

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a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

47. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

48. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

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a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

49. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

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a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

50. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the

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atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

51. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

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a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

52. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

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an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

53. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir

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between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

54. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

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a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

55. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

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56. (New) The cartridge of claim 41, wherein the liquid reservoir is sealably separated from the atomizing chamber.

57. (New) The cartridge of claim 41, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

58. (New) The cartridge of claim 41, wherein the chimney is formed as a single unit with the atomizing chamber.

59. (New) The cartridge of claim 41, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

60. (New) The cartridge of claim 41, wherein the liquid reservoir is not a porous reservoir.

61. (New) The cartridge of claim 41, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

62. (New) The cartridge of claim 41, wherein the wick comprises a bundle of heat resistant fibers.

63. (New) The cartridge of claim 41, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

64. (New) The cartridge of claim 63, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

65. (New) The cartridge of claim 63, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

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66. (New) The cartridge of claim 65, wherein the atomizing assembly comprises the atomizer.

67. (New) The cartridge of claim 41, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

68. (New) The cartridge of claim 41, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

69. (New) The cartridge of claim 41, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

70. (New) The cartridge of claim 41, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

71. (New) The cartridge of claim 41, further comprising:

an inlet vent formed on the exterior of the housing and coupled to deliver air to the atomizing chamber air inlet.

72. (New) The cartridge of claim 71, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

73. (New) The cartridge of claim 72, wherein the conduit sealably passes through the liquid reservoir.

74. (New) The cartridge of claim 41, further comprising the atomization liquid.

75. (New) The cartridge of claim 43, wherein the chimney is formed as a single unit with the atomizing chamber.

76. (New) The cartridge of claim 43, wherein the liquid reservoir is sealably separated from the atomizing chamber.

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77. (New) The cartridge of claim 43, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

78. (New) The cartridge of claim 43, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

79. (New) The cartridge of claim 43, wherein the liquid reservoir is not a porous reservoir.

80. (New) The cartridge of claim 43, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

81. (New) The cartridge of claim 43, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

82. (New) The cartridge of claim 43, wherein the wick comprises a bundle of heat resistant fibers.

83. (New) The cartridge of claim 43, wherein the first wick aperture and the second wick aperture are at opposite sides of the atomizing chamber.

84. (New) The cartridge of claim 43, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

85. (New) The cartridge of claim 84, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

86. (New) The cartridge of claim 43, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

87. (New) The cartridge of claim 43, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

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88. (New) The cartridge of claim 43, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

89. (New) The cartridge of claim 43, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

90. (New) The cartridge of claim 43, further comprising:

an inlet vent formed on the exterior of the housing and coupled to deliver air to the atomizing chamber air inlet.

91. (New) The cartridge of claim 90, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

92. (New) The cartridge of claim 91, wherein the conduit sealably passes through the liquid reservoir.

93. (New) The cartridge of claim 43, further comprising the atomization liquid.

94. (New) The cartridge of claim 45, further comprising:

a cartridge housing having a lower end and the mouthpiece end, the mouthpiece end being opposite the lower end;

wherein the atomizing chamber is disposed within the cartridge housing proximate the lower end of the cartridge housing.

95. (New) The cartridge of claim 94, wherein the liquid reservoir is within the cartridge housing.

96. (New) The cartridge of claim 95, wherein the liquid reservoir is sealably separated from the atomizing chamber.

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97. (New) The cartridge of claim 94, wherein the atomizing chamber further comprises an atomizing chamber air inlet, and wherein the atomizing chamber air inlet is closer to the lower end of the cartridge housing and the atomizer outlet is closer to the mouthpiece end.

98. (New) The cartridge of claim 97, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

99. (New) The cartridge of claim 94, further comprising a resilient seal disposed between an exterior of the chimney and an interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

100. (New) The cartridge of claim 45, wherein the chimney passes through the liquid reservoir between the atomizer outlet and the aerosol outlet.

101. (New) The cartridge of claim 45, wherein the chimney is formed as a single unit with the atomizing chamber.

102. (New) The cartridge of claim 45, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the first wick aperture and the second wick aperture.

103. (New) The cartridge of claim 102, wherein the first wick aperture and the second wick aperture are disposed on opposite sides of the atomizing chamber.

104. (New) The cartridge of claim 103, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

105. (New) The cartridge of claim 104, wherein the atomizing assembly comprises the atomizer.

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106. (New) The cartridge of claim 104, wherein the atomizing assembly comprises an electrical coupler via which the electric current passes from the battery to the atomizer.

107. (New) The cartridge of claim 45, wherein the atomizer comprises a resistive heating element.

108. (New) The cartridge of claim 107, wherein the resistive heating element comprises a coiled heater through which the wick passes.

109. (New) The cartridge of claim 107, wherein the resistive heating element comprises nickel-chromium.

110. (New) The cartridge of claim 46, wherein the chimney is formed as a single unit with the atomizing chamber.

111. (New) The cartridge of claim 46, wherein the liquid reservoir is sealably separated from the atomizing chamber.

112. (New) The cartridge of claim 46, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

113. (New) The cartridge of claim 46, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

114. (New) The cartridge of claim 46, wherein the liquid reservoir is not a porous reservoir.

115. (New) The cartridge of claim 46, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

116. (New) The cartridge of claim 46, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

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117. (New) The cartridge of claim 46, wherein the wick comprises a bundle of heat resistant fibers.

118. (New) The cartridge of claim 46, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

119. (New) The cartridge of claim 118, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

120. (New) The cartridge of claim 118, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

121. (New) The cartridge of claim 120, wherein the atomizing assembly comprises the atomizer.

122. (New) The cartridge of claim 46, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

123. (New) The cartridge of claim 46, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

124. (New) The cartridge of claim 46, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

125. (New) The cartridge of claim 46, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

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126. (New) The cartridge of claim 46, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

127. (New) The cartridge of claim 126, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

128. (New) The cartridge of claim 127, wherein the conduit sealably passes through the liquid reservoir.

129. (New) The cartridge of claim 46, further comprising the atomization liquid.

130. (New) The cartridge of claim 48, wherein the liquid reservoir is sealably separated from the atomizing chamber.

131. (New) The cartridge of claim 48, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

132. (New) The cartridge of claim 48, wherein the chimney is formed as a single unit with the atomizing chamber.

133. (New) The cartridge of claim 48, wherein the liquid reservoir is not a porous reservoir.

134. (New) The cartridge of claim 48, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

135. (New) The cartridge of claim 48, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

136. (New) The cartridge of claim 48, wherein the wick comprises a bundle of heat resistant fibers.

137. (New) The cartridge of claim 48, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

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138. (New) The cartridge of claim 137, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

139. (New) The cartridge of claim 137, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

140. (New) The cartridge of claim 139, wherein the atomizing assembly comprises the atomizer.

141. (New) The cartridge of claim 48, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

142. (New) The cartridge of claim 48, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

143. (New) The cartridge of claim 48, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

144. (New) The cartridge of claim 48, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

145. (New) The cartridge of claim 48, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

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146. (New) The cartridge of claim 145, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

147. (New) The cartridge of claim 146, wherein the conduit sealably passes through the liquid reservoir.

148. (New) The cartridge of claim 48, further comprising the atomization liquid.

149. (New) The cartridge of claim 50, wherein the liquid reservoir is sealably separated from the atomizing chamber.

150. (New) The cartridge of claim 50, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

151. (New) The cartridge of claim 50, wherein the liquid reservoir is not a porous reservoir.

152. (New) The cartridge of claim 50, wherein the atomizer assembly closes the lower end of the cartridge housing.

153. (New) The cartridge of claim 50, wherein the wick comprises a bundle of heat resistant fibers.

154. (New) The cartridge of claim 50, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element.

155. (New) The cartridge of claim 50, wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

156. (New) The cartridge of claim 50, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

157. (New) The cartridge of claim 50, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

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158. (New) The cartridge of claim 50, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

159. (New) The cartridge of claim 50, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

160. (New) The cartridge of claim 50, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

161. (New) The cartridge of claim 160, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

162. (New) The cartridge of claim 161, wherein the conduit sealably passes through the liquid reservoir.

163. (New) The cartridge of claim 50, wherein the atomizing assembly comprises the atomizer.

164. (New) The cartridge of claim 50, further comprising the atomization liquid.

165. (New) The cartridge of claim 52, wherein the liquid reservoir is sealably separated from the atomizing chamber.

166. (New) The cartridge of claim 52, wherein the atomizer assembly closes the lower end of the cartridge housing.

167. (New) The cartridge of claim 52, wherein the wick comprises a bundle of heat resistant fibers.

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168. (New) The cartridge of claim 52, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element.

169. (New) The cartridge of claim 52, wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

170. (New) The cartridge of claim 52, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

171. (New) The cartridge of claim 52, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

172. (New) The cartridge of claim 52, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

173. (New) The cartridge of claim 52, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

174. (New) The cartridge of claim 173, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

175. (New) The cartridge of claim 174, wherein the conduit sealably passes through the liquid reservoir.

176. (New) The cartridge of claim 52, further comprising the atomization liquid.

177. (New) The cartridge of claim 54, wherein the liquid reservoir is sealably separated from the atomizing chamber.

178. (New) The cartridge of claim 54, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

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179. (New) The cartridge of claim 54, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

180. (New) The cartridge of claim 54, wherein the liquid reservoir is not a porous reservoir.

181. (New) The cartridge of claim 54, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

182. (New) The cartridge of claim 54, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

183. (New) The cartridge of claim 54, wherein the wick comprises a bundle of heat resistant fibers.

184. (New) The cartridge of claim 54, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

185. (New) The cartridge of claim 184, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

186. (New) The cartridge of claim 184, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

187. (New) The cartridge of claim 186, wherein the atomizing assembly comprises the atomizer.

188. (New) The cartridge of claim 54, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

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189. (New) The cartridge of claim 54, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

190. (New) The cartridge of claim 54, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

191. (New) The cartridge of claim 54, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

192. (New) The cartridge of claim 54, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

193. (New) The cartridge of claim 192, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

194. (New) The cartridge of claim 193, wherein the conduit sealably passes through the liquid reservoir.

195. (New) The cartridge of claim 54, further comprising the atomization liquid.

196. (New) An electronic cigarette comprising:

a power supply portion comprising the battery; and

the cartridge of claim 45, the cartridge configured for separable attachment to the power supply portion.

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REMARKS

The Office Action addresses claims 1-10 and 12-55, with claims 1, 17, and 41-55 being independent. Claims 1-10 and 12-16 are rejected. Claims 17-21 and 41-55 are allowable, and claims 22-40 are objected to. Reconsideration is respectfully requested.

Amendments to the Claims

New dependent claims 56-196 are added. Support for each of these claims can be found throughout the specification and drawings of U.S. Patent No. 9,596,887, on which this reissue application is based. For example:

- Claims 56, 76, 111, 130, 149, 165, and 177: Abstract; col. 1, lines 58-60; col. 5, lines 16-19; FIGS. 4b and 5b.
- Claims 57, 77, 100, 112, 131, 150, and 178: Col. 5, lines 14-16; col. 6, lines 13-14; FIGS. 4b, 5b, and 7.
- Claims 58, 75, 101, 110, and 132: Col. 6, lines 41-45; col. 7, lines 47-49; FIGS. 8 and 12b.
- Claims 59, 78, 113, and 179: Col. 5, lines 12-17; col. 6, lines 11-14 and 43-44; col. 7, lines 2-5 and 50-52; FIGS. 4b, 5b, 7-10, and 12b.
- Claims 60, 74, 79, 93, 114, 129, 133, 148, 151, 164, 176, 180, and 195: Col. 6, lines 17-19; FIG. 7.
- Claims 61, 81, 116, 135, 152, 166, and 182: Col. 5, lines 17-21; FIGS. 4b and 5b.
- Claims 62, 82, 117, 136, 153, 167, and 183: Col. 2, lines 22-28; col. 7, lines 38-41; original claims 11-13; FIGS. 7, 9, 10, and 11d.
- Claims 63-66, 84, 85, 104, 105, 118-121, 137-140, 154, 155, 163, 168, 169, and 184-187: Abstract; col. 2, lines 9-11 and 16-20; col 5, lines 17-21; col. 6, lines 21-29 and

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45-56; col. 6, line 64 to col. 7, line 2; original claims 7 and 10; FIGS. 4b, 5b, and 7-10.

- Claims 67, 86, 122, 141, 156, 170, and 188: Abstract; col. 1, lines 60-63; col. 6, lines 34-38; original claim 1.
- Claims 68, 87, 107, 108, 109, 123, 142, 157, 171, and 189: Col. 6, lines 21-22.
- Claims 69, 83, 88, 102, 103, 124, 143, 158, and 190: Col. 2, lines 12-15; original claims 8 and 9.
- Claims 70, 89, 125, 144, 159, 172, and 191: Col. 3, line 62 to col. 4, line 6; col. 5, lines 10-12; FIGS. 4b, 5b, 7 and 10.
- Claims 71-73, 90-92, 126-128, 145-147, 160-162, 173-175, and 192-194: Col. 1, line 64 to col. 2, line 3; col. 4, lines 17-20; col. 6, lines 6-9; col. 7, lines 32-36; original claims 2-4; FIGS. 1, 7, 11a, 11b, and 11d.
- Claims 80, 115, 134, and 181: Col. 4, lines 25-27.
- Claims 94-99: Abstract; col. 1, lines 56-60 and 64-67; col. 4, lines 11-15 and 17-20; col. 5, lines 10-19; col. 6, lines 6-9, 11-14, and 43-44; col. 7, lines 2-5 and 50-52; original claims 1 and 2; FIGS. 1, 4b, 5b, 7-10, and 12b.
- Claim 106: Col. 5, lines 21-27 and 62-63; col. 7, lines 13-18; FIGS. 5b, 6, 7, 9, 11b, and 11d.
- Claim 196: Abstract; col. 1, lines 51-63; col. 2, lines 1-4, 8-10, 16-20, and 28-30; col. 4, lines 1-4, 23-24, 40-42, and 48-60; col. 5, lines 1-5, 10-12, 20-43, and 53-55; col. 6, lines 4-37, 45-48, and 56-59; col. 6, line 64 to col. 7, line 12; col. 7, lines 52-55; FIGS. 1, 2b, 3a, 3b, 4b, 4c, 5b, 6-10, and 12b.

No new matter is added.

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Entry of the amendment after final is proper at least because it requires only a cursory review by the Examiner. *See MPEP § 714.13.* All of the new claims are fully supported in the original application as filed as explained above. Furthermore, each new claim is dependent on a claim that has already been identified as allowed and is therefore itself allowable at least for the reasons applicable to its respective base claim.

Allowable Subject Matter

Claims 17-21 and 41-55 are indicated as being allowed, and claims 22-40 are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of their respective base claims and any intervening claims.[1]

Claims 22-40 are not amended into independent form at this time because independent claim 1 as presented herein, which claims 22-40 depend therefrom, represents allowable subject matter as explained below.

Double Patenting Rejection

Claims 1-10 and 12-16 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 8,528,569 in view of CA Patent No. 2884987 of Hon.

Without conceding to the rejection, to expedite prosecution, a terminal disclaimer for the present application over U.S. Patent No. 8,528,569 is submitted on even date herewith, thereby obviating the basis for this rejection and as a result, the basis for the objection of claims 22-40. Withdrawal of this rejection and the objection of claims 22-40 is therefore respectfully requested.

New Claims

New claims 56-196 variously depend from claims 41-55, and thus represent allowable subject matter at least because they depend from an allowed base claim.

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[1] On page 6 of the Final Office Action, claims 17-21 and 41-44 are listed as allowed claims. However, this claim range is inconsistent with the claim range listed in the Office Action Summary, which lists claims 17-21 and 41-55 as allowed. As such, Applicant submits that claims 17-21 and 41-55 are allowed.

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Conclusion

In conclusion, Applicant submits that all pending claims are now in condition for allowance for at least the reasons discussed above, and allowance thereof is respectfully requested. Applicant's amendment of the claims does not constitute a concession that the claims are not allowable in their unamended form. The Examiner is encouraged to telephone the undersigned attorney for Applicant if such communication is deemed to expedite prosecution of this application.

No extension of time is believed to be due with this filing. In the event that a petition for an extension of time is required to be submitted at this time, Applicant hereby petitions under 37 C.F.R. § 1.136(a) for an extension of time for as many months as are required to ensure that the above-identified application does not become abandoned.

All fees due are believed to be paid. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 50-0311, Reference No.: 16/359,938, from which the undersigned is authorized to draw.

Dated: December 7, 2021

Respectfully submitted,

Electronic signature: /mdvl/
Michael D. Van Loy
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MINTZ LEVIN COHN FERRIS GLOVSKY
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NJOY Exhibit 1002.1012

Electronic Patent Application Fee Transmittal

Application Number:	16359938
Filing Date:	20-Mar-2019
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Filer:	Elissa Marie Kingsland/June Watson
Attorney Docket Number:	62210-492RI1US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1202	141	100	14100
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**14100**

Electronic Acknowledgement Receipt	
EFS ID:	44451878
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	07-DEC-2021
Filing Date:	20-MAR-2019
Time Stamp:	13:01:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$14100
RAM confirmation Number	E2021B7D01482434
Deposit Account	500311
Authorized User	Elissa Kingsland
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)					
File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1		62210-492RI1US_Response_FOA.pdf	301553 e5e33e27d10d6dc0a58d72c6fa9e65ab5f921fce	yes	35
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Response After Final Action		1	1	
	Claims		2	31	
	Applicant Arguments/Remarks Made in an Amendment		32	35	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38015 e3bba6b95dc80b51dd531ffb165fa0ad521bebc6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	339568		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16359938
Filing Date	20-Mar-2019
First Named Inventor	Kyle Newton
Attorney Docket Number	62210-492RI1US
Title of Invention	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
JUUL Labs, Inc.	100%

The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

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as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○	I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

○ Small Entity

○ Micro Entity

◉ Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 63259

○ A sole inventor

○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

○ A joint inventor; all of whom are signing this request

Signature	/Elissa M. Kingsland/
Name	Elissa M. Kingsland

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	16359938
Filing Date:	20-Mar-2019
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Filer:	Elissa Marie Kingsland
Attorney Docket Number:	62210-492RI1US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**170**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16359938

Filing Date: 20-Mar-2019

Applicant/Patent under Reexamination: Newton

Electronic Terminal Disclaimer filed on December 7, 2021

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	44451187
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	07-DEC-2021
Filing Date:	20-MAR-2019
Time Stamp:	13:16:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$170
RAM confirmation Number	E2021B7D16062698
Deposit Account	500311
Authorized User	Elissa Kingsland
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	41431 c6450729cc725122c2a83fc5d792d450d9cb977b	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37856 b64025ed72893592a0b4db4198631cf8abbcde5c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	79287		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/359,938	Filing Date 03/20/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/07/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 195	Minus	** 54	= 141		x $100 =	14100
	Independent (37 CFR 1.16(h))	* 17	Minus	*** 17	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	14100

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RHONDA BELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	03/20/2019	Kyle D. Newton	62210-492RI1US	6916

148514 7590 12/20/2021

Mintz/JUUL
One Financial Center
Boston, MA 02111

EXAMINER	
TORRES VELAZQUEZ, NORCA LIZ	

ART UNIT	PAPER NUMBER
3991	

NOTIFICATION DATE	DELIVERY MODE
12/20/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPDocketingBOS@mintz.com
IPFileroombos@mintz.com
mintzdocketing@cpaglobal.com

NJOY Exhibit 1002.1026

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 16/359,938	**Applicant(s)** Newton, Kyle D.	
	Examiner NORCA L TORRES VELAZQUEZ	**Art Unit** 3991	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 07 December 2021 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.

Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☑ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See Continuation Sheet (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☑ Applicants reply has overcome the following rejection(s): See Continuation Sheet
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Relies on an unentered amendment.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☐ Other: _____.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:1-10,12-21 and 41-55.
    Claim(s) objected to:22-40.
    Claim(s) rejected:_____.
    Claim(s) withdrawn from consideration:_____.

/Norca L. Torres Velazquez/ Patent Reex Specialist, Art Unit 3991	/Alan Diamond/ /Jean C Witz/ Supervisor Patent Reexam Spec., CRU 3991

NJOY Exhibit 1002.1027

Continuation of 3. NOTE: the new claims proposed include new limitations not previously considered during prosecution that require further consideration. Also, new claims (not previously considered) will further need to be considered under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph.

It is further noted that the proposed amendment includes additional new claims 54-196 (i.e. 142 additional new claims), without canceling any finally rejected claims. This is not considered as placing the application in better condition for appeal. (Refer to MPEP 714.13 III)

Continuation of AMENDMENTS 5. Applicant's reply has overcome the following rejection(s): Nonstatutory double patenting rejection of claims 1-10 and 12-16 has been withdrawn in view of the Terminal Disclaimer filed 12/7/21. The Terminal Disclaimer has been approved and entered.

DO NOT ENTER: /NT/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of:
Kyle D. Newton

Application No.: 16/359,938 Confirmation No.: 6916

Filed: March 20, 2019 Art Unit: 3991

For: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR Examiner: N. L. Torres Velazquez

AMENDMENT AFTER FINAL ACTION UNDER 37 C.F.R. § 1.116

VIA EFS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is in response to the final Office Action dated September 8, 2021.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 32 of this paper.

A **Terminal Disclaimer** is submitted herewith.

To: mintzdocketing@cpaglobal.com,IPDocketingBOS@mintz.com,IPFileroombos@mintz.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 148514

Dec 20, 2021 04:12:47 AM

Dear PAIR Customer:

Mintz/JUUL
One Financial Center
Boston, MA 02111
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 148514 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16359938	CTAV	12/20/2021	62210-492RI1US

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16359938	Filing Date	2019-03-20	Docket Number (if applicable)		Art Unit	3991
First Named Inventor	Kyle D. Newton			Examiner Name	N. L. Torres Velazquez		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☒ Other Petition for Extension of Time and Associated Fee

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 50-0311

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

NJOY Exhibit 1002.1031

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Elissa M. Kingsland/	Date (YYYY-MM-DD)	2021-12-29
Name	Elissa M. Kingsland	Registration Number	63259

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

NJOY Exhibit 1002.1032

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

NJOY Exhibit 1002.1033

PTO/AIA/22 (10-20)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional)

Application Number	16/359,938	Filed	March 20, 2019

For ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

Art Unit	3991	Examiner	N. L. Torres Velazquez

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
[X]	One month (37 CFR 1.17(a)(1))	$220	$110	$55	$ 220.00
[ ]	Two months (37 CFR 1.17(a)(2))	$640	$320	$160	$
[ ]	Three months (37 CFR 1.17(a)(3))	$1,480	$740	$370	$
[ ]	Four months (37 CFR 1.17(a)(4))	$2,320	$1,160	$580	$
[ ]	Five months (37 CFR 1.17(a)(5))	$3,160	$1,580	$790	$

[ ] Applicant asserts small entity status. See 37 CFR 1.27.

[ ] Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

[ ] A check in the amount of the fee is enclosed.

[ ] Payment by credit card. Form PTO-2038 is attached.

[X] The Director has already been authorized to charge fees in this application to a Deposit Account.

[X] The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 50-0311 .

[X] Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant.

[X] attorney or agent of record. Registration number 63,259 .

[ ] attorney or agent acting under 37 CFR 1.34. Registration number _____ .

/Elissa M. Kingsland/	December 29, 2021
Signature	Date
Elissa M. Kingsland	(617) 542-6000
Typed or printed name	Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

[X] * Total of 1 forms are submitted.

Electronic Patent Application Fee Transmittal

Application Number:	16359938
Filing Date:	20-Mar-2019
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Filer:	Elissa Marie Kingsland/June Watson
Attorney Docket Number:	62210-492RI1US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	220	220
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1360	1360
		Total in USD ($)		**1580**

Electronic Acknowledgement Receipt	
EFS ID:	44634061
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	29-DEC-2021
Filing Date:	20-MAR-2019
Time Stamp:	16:21:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1580
RAM confirmation Number	E2021BSG21341174
Deposit Account	500311
Authorized User	Elissa Kingsland
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	62210-492RI1US_RCE.pdf	1370702 aaa5c345651e442274ab4744b9a288f379d1cb05	no	3
Warnings:					
Information:					
2	Extension of Time	62210-492RI1US_EOT.pdf	96969 f58d2b1451f998827717279d2a456a7ac3086104	no	1
Warnings:					
Information:					
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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of:
Kyle D. Newton

Application No.: 16/359,938	Confirmation No.: 6916
Filed: March 20, 2019	Art Unit: 3991
For: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR	Examiner: N. L. Torres Velazquez

SUPPLEMENTAL RESPONSE

VIA EFS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is a supplemental response to the final Office Action dated September 8, 2021.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 32 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Twice Amended) An electronic cigarette cartridge apparatus, comprising:

a housing having a mouthpiece with an aerosol outlet;

an atomizer disposed within an atomizing chamber, and operable to selectively generate an aerosol of [the]a liquid in response to electric current flowing therethrough;

said atomizing chamber having an air inlet, an atomizer outlet coupled to said aerosol outlet, [and]a first wick aperture, and a second wick aperture;

a liquid reservoir disposed within said housing and sealably separated from said atomizing chamber[,]; and

a wick in contact with the liquid in the liquid reservoir [disposed]through said first wick aperture[between said liquid reservoir and said atomizing chamber] and said second wick aperture, the wick disposed between the liquid reservoir and the atomizer and configured to transfer the liquid by capillarity from said liquid reservoir to said atomizer;

wherein said atomizer outlet and said aerosol outlet are coupled by a chimney.

2. The apparatus of claim 1, further comprising:

an inlet vent formed on the exterior of said housing and coupled to deliver air to said atomizing chamber air inlet.

3. (Amended) The apparatus of claim 2, [and]wherein said inlet vent is coupled to said atomizing chamber air inlet by a conduit.

4. (Amended) The apparatus of claim 3, [and]wherein said conduit sealably passes through said liquid reservoir.

5. (Amended) The apparatus of claim 1, [and]wherein said chimney sealably passes through said liquid reservoir.

6. (Amended) The apparatus of claim 1, [and]wherein said atomizer is a resistive heating element.

7. (Amended) The apparatus of claim 6, [and]wherein said wick [is]partially engages said resistive heating element.

NJOY Exhibit 1002.1040

8. (Amended) The apparatus of claim 1, [and]wherein said atomizer has a tubular form defining an open central passage.

9. (Amended) The apparatus of claim 8, [and]wherein said wick passes through said open central passage.

10. (Twice Amended) The apparatus of claim 1, [and]wherein [said atomizing chamber further comprises a second wick aperture, and wherein]a first end of said wick passes through said first wick aperture and a second end of said wick passes through said second wick aperture.

Cancel claim 11.

12. (Twice Amended) The apparatus of claim [11]1, [and]wherein said wick comprises a bundle of heat resistant fibers, and wherein said bundle of heat resistant fibers is fiberglass.

13. (Twice Amended) The apparatus of claim [11]1, [and]wherein said wick comprises a bundle of heat resistant fibers, and wherein said bundle of heat resistant fibers is fabricated from a material selected from; aramid, fluorocarbon, sulfide, melamine, polyimide, carbon, and glass.

14. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir is formed as an annular cavity between [the]an interior of said housing and said atomizing chamber.

15. (Amended) The apparatus of claim 1, [and]wherein said liquid reservoir includes an external access opening[,] for enabling addition of liquid into said liquid reservoir.

16. (Amended) The apparatus of claim 15, [and]wherein said external access opening is a removable mouthpiece.

17. (New, amended) A method, comprising:

transferring liquid from a liquid reservoir of an electronic cigarette cartridge to an atomizing chamber of the cartridge with a wick extending between the liquid reservoir and the atomizing chamber, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber;

generating an aerosol of the liquid in the atomizing chamber; and

NJOY Exhibit 1002.1041

channeling the aerosol from an outlet of the atomizing chamber to an aerosol outlet of the electronic cigarette cartridge with a chimney coupled to the outlet of the atomizing chamber and to the aerosol outlet.

18. (New) The method of claim 17, where the liquid reservoir is without a porous material for storing the liquid.

19. (New) The method of claim 17, wherein transferring liquid from a liquid reservoir to an atomizing chamber with a wick comprises transferring the liquid by capillarity with the wick.

20. (New) The method of claim 17, wherein generating an aerosol of the liquid comprises generating aerosol with an electrically powered atomizer in the atomizing chamber.

21. (New) The method of claim 17, wherein channeling the aerosol with a chimney comprises channeling the aerosol with the chimney through the liquid reservoir, the chimney being sealed from the liquid reservoir.

22. (New) The apparatus of claim 1, wherein the wick extends between the liquid reservoir and an interior of the atomizing chamber.

23. (New) The apparatus of claim 1, wherein the liquid reservoir adjacent the wick is free from porous material.

24. (New) The apparatus of claim 1, wherein the first wick aperture is circular.

25. (New, amended) The apparatus of claim 1, further comprising an atomizing assembly comprising a body and the atomizer, the atomizing assembly comprising a first recess formed therein that aligns with the first wick aperture in the atomizing chamber and provides a compressive fit around the wick.

26. (New, amended) The apparatus of claim 25, wherein the first wick aperture and the first recess cooperate to define a circular aperture.

NJOY Exhibit 1002.1042

27. (New) The apparatus of claim 10, wherein the first wick aperture and the second wick aperture each comprise a fixed width slot terminating in a curved end, the fixed width configured to receive the wick.

28. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber.

29. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet.

30. (New) The apparatus of claim 1, wherein the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

31. (New, amended) The apparatus of claim 1, wherein the chimney and atomizing chamber are cylindrical and the maximum exterior diameter of the chimney is less than the maximum interior diameter of the atomizing chamber.

32. (New) The apparatus of claim 1, wherein the apparatus is elongate, and the maximum transverse exterior dimension of the chimney is less than the maximum transverse interior diameter of the atomizing chamber.

33. (New) The apparatus of claim 1, wherein the atomizing chamber and the chimney are formed as a single unit.

34. (New, amended) The apparatus of claim 1, wherein the housing comprises a transparent material through which the liquid in the liquid reservoir can be viewed from the exterior of the apparatus.

35. (New, amended) The apparatus of claim 1, further comprising an insert in the housing, the insert comprising the aerosol outlet.

36. (New, amended) The apparatus of claim 1, coupled to a power supply portion, wherein the power supply portion comprises a pressure sensor configured to detect negative pressure within the power supply portion and energize the atomizer.

NJOY Exhibit 1002.1043

37. (New) The apparatus of claim 36, wherein the power supply portion comprises an LED positioned at a tip end of the power supply portion, the LED configured to illuminate in response to the pressure sensor detecting negative pressure in the power supply portion.

38. (New) The apparatus of claim 37, wherein the LED comprises an amber LED configured to emulate burning ash when illuminated.

39. (New) The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet, the chimney and atomizing chamber are cylindrical, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

40. (New) The apparatus of claim 1, wherein the liquid reservoir surrounds and is sealed from an interior of the atomizing chamber, the atomizing chamber and the chimney are formed as a single unit, and the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

41. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

NJOY Exhibit 1002.1044

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

42. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

43. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer

NJOY Exhibit 1002.1045

outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

44. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

NJOY Exhibit 1002.1046

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

45. (New, amended) A cartridge comprising:

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber comprising a first wick aperture and a second wick aperture each forming an opening between the atomizing chamber and a liquid reservoir configured to contain an atomization liquid; the atomizing chamber further comprising an atomizer outlet;

a wick partially disposed within the atomizing chamber, the wick having a first wick end extending out of the atomizing chamber through the first wick aperture into the liquid reservoir and a second wick end extending out of the atomizing chamber through the second wick aperture into the liquid reservoir, the wick configured to draw the atomization liquid into the atomizing chamber by capillarity; and

an atomizer disposed within the atomizing chamber, the atomizer configured to receive electric current from a battery to facilitate generation of an aerosol by vaporizing the atomization liquid drawn into the atomizing chamber by the wick;

wherein the atomizer outlet and the aerosol outlet are coupled by a chimney.

46. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

NJOY Exhibit 1002.1047

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

47. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

48. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

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a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

49. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

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a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

50. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the

NJOY Exhibit 1002.1050

atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

51. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

NJOY Exhibit 1002.1051

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit.

52. (New, amended) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

NJOY Exhibit 1002.1052

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

53. (New, amended) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber, the atomizing chamber defining an open central passage;

a non-porous liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid, the liquid reservoir comprising a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the liquid reservoir

NJOY Exhibit 1002.1053

between the atomizer outlet and the aerosol outlet, wherein liquid reservoir is also partially defined between the interior of the cartridge housing and the chimney;

a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element;

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick passing through the open central passage between the wick apertures at opposite sides of the atomizing chamber, the wick comprising a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture; and

an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in a pair of circular apertures through which the first wick end and the second wick end pass with a compressive fit, the atomizing assembly comprising the atomizer.

54. (New) A cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

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a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

55. (New) An electronic cigarette comprising:

a power supply portion comprising a rechargeable battery; and

a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:

a cartridge housing;

a mouthpiece end comprising an aerosol outlet;

an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end, the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet; the atomizing chamber further comprising a first wick aperture and a second wick aperture at opposite sides of the atomizing chamber;

a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber, the liquid reservoir configured to contain an atomization liquid;

a chimney formed as a single unit with the atomizing chamber, the chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;

an atomizer disposed within the atomizing chamber, the atomizer comprising a resistive heating element; and

a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture, the wick disposed between the liquid reservoir and the atomizer.

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56. (New) The cartridge of claim 41, wherein the liquid reservoir is sealably separated from the atomizing chamber.

57. (New) The cartridge of claim 41, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

58. (New) The cartridge of claim 41, wherein the chimney is formed as a single unit with the atomizing chamber.

59. (New) The cartridge of claim 41, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

60. (New) The cartridge of claim 41, wherein the liquid reservoir is not a porous reservoir.

61. (New) The cartridge of claim 41, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

62. (New) The cartridge of claim 41, wherein the wick comprises a bundle of heat resistant fibers.

63. (New) The cartridge of claim 41, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

64. (New) The cartridge of claim 63, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

65. (New) The cartridge of claim 63, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

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66. (New) The cartridge of claim 65, wherein the atomizing assembly comprises the atomizer.

67. (New) The cartridge of claim 41, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

68. (New) The cartridge of claim 41, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

69. (New) The cartridge of claim 41, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

70. (New) The cartridge of claim 41, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

71. (New) The cartridge of claim 41, further comprising:

an inlet vent formed on the exterior of the housing and coupled to deliver air to the atomizing chamber air inlet.

72. (New) The cartridge of claim 71, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

73. (New) The cartridge of claim 72, wherein the conduit sealably passes through the liquid reservoir.

74. (New) The cartridge of claim 41, further comprising the atomization liquid.

75. (New) The cartridge of claim 43, wherein the chimney is formed as a single unit with the atomizing chamber.

76. (New) The cartridge of claim 43, wherein the liquid reservoir is sealably separated from the atomizing chamber.

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77. (New) The cartridge of claim 43, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

78. (New) The cartridge of claim 43, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

79. (New) The cartridge of claim 43, wherein the liquid reservoir is not a porous reservoir.

80. (New) The cartridge of claim 43, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

81. (New) The cartridge of claim 43, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

82. (New) The cartridge of claim 43, wherein the wick comprises a bundle of heat resistant fibers.

83. (New) The cartridge of claim 43, wherein the first wick aperture and the second wick aperture are at opposite sides of the atomizing chamber.

84. (New) The cartridge of claim 43, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

85. (New) The cartridge of claim 84, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

86. (New) The cartridge of claim 43, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

87. (New) The cartridge of claim 43, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

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88. (New) The cartridge of claim 43, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

89. (New) The cartridge of claim 43, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

90. (New) The cartridge of claim 43, further comprising:

an inlet vent formed on the exterior of the housing and coupled to deliver air to the atomizing chamber air inlet.

91. (New) The cartridge of claim 90, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

92. (New) The cartridge of claim 91, wherein the conduit sealably passes through the liquid reservoir.

93. (New) The cartridge of claim 43, further comprising the atomization liquid.

94. (New) The cartridge of claim 45, further comprising:

a cartridge housing having a lower end and the mouthpiece end, the mouthpiece end being opposite the lower end;

wherein the atomizing chamber is disposed within the cartridge housing proximate the lower end of the cartridge housing.

95. (New) The cartridge of claim 94, wherein the liquid reservoir is within the cartridge housing.

96. (New) The cartridge of claim 95, wherein the liquid reservoir is sealably separated from the atomizing chamber.

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97. (New) The cartridge of claim 94, wherein the atomizing chamber further comprises an atomizing chamber air inlet, and wherein the atomizing chamber air inlet is closer to the lower end of the cartridge housing and the atomizer outlet is closer to the mouthpiece end.

98. (New) The cartridge of claim 97, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

99. (New) The cartridge of claim 94, further comprising a resilient seal disposed between an exterior of the chimney and an interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

100. (New) The cartridge of claim 45, wherein the chimney passes through the liquid reservoir between the atomizer outlet and the aerosol outlet.

101. (New) The cartridge of claim 45, wherein the chimney is formed as a single unit with the atomizing chamber.

102. (New) The cartridge of claim 45, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the first wick aperture and the second wick aperture.

103. (New) The cartridge of claim 102, wherein the first wick aperture and the second wick aperture are disposed on opposite sides of the atomizing chamber.

104. (New) The cartridge of claim 103, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

105. (New) The cartridge of claim 104, wherein the atomizing assembly comprises the atomizer.

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106. (New) The cartridge of claim 104, wherein the atomizing assembly comprises an electrical coupler via which the electric current passes from the battery to the atomizer.

107. (New) The cartridge of claim 45, wherein the atomizer comprises a resistive heating element.

108. (New) The cartridge of claim 107, wherein the resistive heating element comprises a coiled heater through which the wick passes.

109. (New) The cartridge of claim 107, wherein the resistive heating element comprises nickel-chromium.

110. (New) The cartridge of claim 46, wherein the chimney is formed as a single unit with the atomizing chamber.

111. (New) The cartridge of claim 46, wherein the liquid reservoir is sealably separated from the atomizing chamber.

112. (New) The cartridge of claim 46, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

113. (New) The cartridge of claim 46, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the cartridge housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

114. (New) The cartridge of claim 46, wherein the liquid reservoir is not a porous reservoir.

115. (New) The cartridge of claim 46, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

116. (New) The cartridge of claim 46, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

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117. (New) The cartridge of claim 46, wherein the wick comprises a bundle of heat resistant fibers.

118. (New) The cartridge of claim 46, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

119. (New) The cartridge of claim 118, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

120. (New) The cartridge of claim 118, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

121. (New) The cartridge of claim 120, wherein the atomizing assembly comprises the atomizer.

122. (New) The cartridge of claim 46, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

123. (New) The cartridge of claim 46, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

124. (New) The cartridge of claim 46, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

125. (New) The cartridge of claim 46, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

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126. (New) The cartridge of claim 46, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

127. (New) The cartridge of claim 126, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

128. (New) The cartridge of claim 127, wherein the conduit sealably passes through the liquid reservoir.

129. (New) The cartridge of claim 46, further comprising the atomization liquid.

130. (New) The cartridge of claim 48, wherein the liquid reservoir is sealably separated from the atomizing chamber.

131. (New) The cartridge of claim 48, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

132. (New) The cartridge of claim 48, wherein the chimney is formed as a single unit with the atomizing chamber.

133. (New) The cartridge of claim 48, wherein the liquid reservoir is not a porous reservoir.

134. (New) The cartridge of claim 48, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

135. (New) The cartridge of claim 48, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

136. (New) The cartridge of claim 48, wherein the wick comprises a bundle of heat resistant fibers.

137. (New) The cartridge of claim 48, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

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138. (New) The cartridge of claim 137, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

139. (New) The cartridge of claim 137, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

140. (New) The cartridge of claim 139, wherein the atomizing assembly comprises the atomizer.

141. (New) The cartridge of claim 48, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

142. (New) The cartridge of claim 48, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

143. (New) The cartridge of claim 48, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

144. (New) The cartridge of claim 48, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

145. (New) The cartridge of claim 48, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

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146. (New) The cartridge of claim 145, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

147. (New) The cartridge of claim 146, wherein the conduit sealably passes through the liquid reservoir.

148. (New) The cartridge of claim 48, further comprising the atomization liquid.

149. (New) The cartridge of claim 50, wherein the liquid reservoir is sealably separated from the atomizing chamber.

150. (New) The cartridge of claim 50, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

151. (New) The cartridge of claim 50, wherein the liquid reservoir is not a porous reservoir.

152. (New) The cartridge of claim 50, wherein the atomizer assembly closes the lower end of the cartridge housing.

153. (New) The cartridge of claim 50, wherein the wick comprises a bundle of heat resistant fibers.

154. (New) The cartridge of claim 50, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element.

155. (New) The cartridge of claim 50, wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

156. (New) The cartridge of claim 50, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

157. (New) The cartridge of claim 50, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

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158. (New) The cartridge of claim 50, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

159. (New) The cartridge of claim 50, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

160. (New) The cartridge of claim 50, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

161. (New) The cartridge of claim 160, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

162. (New) The cartridge of claim 161, wherein the conduit sealably passes through the liquid reservoir.

163. (New) The cartridge of claim 50, wherein the atomizing assembly comprises the atomizer.

164. (New) The cartridge of claim 50, further comprising the atomization liquid.

165. (New) The cartridge of claim 52, wherein the liquid reservoir is sealably separated from the atomizing chamber.

166. (New) The cartridge of claim 52, wherein the atomizer assembly closes the lower end of the cartridge housing.

167. (New) The cartridge of claim 52, wherein the wick comprises a bundle of heat resistant fibers.

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168. (New) The cartridge of claim 52, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element.

169. (New) The cartridge of claim 52, wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

170. (New) The cartridge of claim 52, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

171. (New) The cartridge of claim 52, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

172. (New) The cartridge of claim 52, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

173. (New) The cartridge of claim 52, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

174. (New) The cartridge of claim 173, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

175. (New) The cartridge of claim 174, wherein the conduit sealably passes through the liquid reservoir.

176. (New) The cartridge of claim 52, further comprising the atomization liquid.

177. (New) The cartridge of claim 54, wherein the liquid reservoir is sealably separated from the atomizing chamber.

178. (New) The cartridge of claim 54, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

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179. (New) The cartridge of claim 54, further comprising a resilient seal disposed between an exterior of the chimney and the interior of the housing, the resilient seal sealing an upper end of the liquid reservoir and locating the chimney within the cartridge housing.

180. (New) The cartridge of claim 54, wherein the liquid reservoir is not a porous reservoir.

181. (New) The cartridge of claim 54, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.

182. (New) The cartridge of claim 54, further comprising an atomizer assembly comprising the atomizer, the atomizer assembly closing the lower end of the cartridge housing.

183. (New) The cartridge of claim 54, wherein the wick comprises a bundle of heat resistant fibers.

184. (New) The cartridge of claim 54, wherein the wick comprises a first wick end passing through the first wick aperture and a second wick end passing through the second wick aperture.

185. (New) The cartridge of claim 184, wherein a middle part of the wick is positioned to be heated by the resistive heating element when current passes through the resistive heating element, and wherein the first wick end and the second wick end are outside the atomizing chamber and in contact with the atomization liquid in the liquid reservoir.

186. (New) The cartridge of claim 184, further comprising an atomizing assembly engaged with the atomizing chamber, the atomizing assembly having a pair of semicircular recesses formed therein, the pair of semicircular recesses aligning cooperatively with the first wick aperture and the second wick aperture of the atomizing chamber to result in opposed circular apertures through which the first wick end and the second wick end pass with a compressive fit.

187. (New) The cartridge of claim 186, wherein the atomizing assembly comprises the atomizer.

188. (New) The cartridge of claim 54, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

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189. (New) The cartridge of claim 54, wherein the resistive heating element comprises a coiled nickel-chromium heater through which the wick passes.

190. (New) The cartridge of claim 54, wherein the atomizing chamber defines an open central passage, and wherein the wick passes through the open central passage between the wick apertures at opposite sides of the atomizing chamber.

191. (New) The cartridge of claim 54, wherein the atomizing chamber comprises an open atomization chamber, and wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

192. (New) The cartridge of claim 54, further comprising:

an inlet vent formed on the exterior of the cartridge housing and coupled to deliver air to the atomizing chamber air inlet.

193. (New) The cartridge of claim 192, wherein the inlet vent is coupled to the atomizing chamber air inlet by a conduit.

194. (New) The cartridge of claim 193, wherein the conduit sealably passes through the liquid reservoir.

195. (New) The cartridge of claim 54, further comprising the atomization liquid.

196. (New) An electronic cigarette comprising:

a power supply portion comprising the battery; and

the cartridge of claim 45, the cartridge configured for separable attachment to the power supply portion.

NJOY Exhibit 1002.1069

REMARKS

This supplemental response is being submitted to correct the lack of antecedent basis for "the bundle of heat resistant fibers," as recited in claims 12 and 13. As discussed with Examiner Torres Velazquez on January 26, 2022, claims 12 and 13 are each further amended as indicated above to recite "wherein said wick comprises a bundle of heat resistant fibers, and" starting at line 9 and 12, respectively. Support for these amendments can be found throughout the specification and drawings, for example, in original claim 11 of U.S. Patent No. 9,596,887 for which this reissue application is based on. No new matter has been added. Reconsideration is respectfully requested.

The Examiner is encouraged to telephone the undersigned attorney for Applicant if such communication is deemed to expedite prosecution of this application.

All fees due are believed to be paid. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 50-0311, Reference No.: 16/359,938, from which the undersigned is authorized to draw.

Dated: January 27, 2022

Respectfully submitted,

Electronic signature: /Elissa M. Kingsland/
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NJOY Exhibit 1002.1070

Electronic Acknowledgement Receipt	
EFS ID:	44850362
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	27-JAN-2022
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Time Stamp:	13:15:31
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		62210-492RI1US_Supplemental_Response.pdf	196300 d879a72ffe375c45abb14725979a07e776d599ca	yes	32

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Supplemental Response or Supplemental Amendment	1	1
	Claims	2	31
	Applicant Arguments/Remarks Made in an Amendment	32	32
Warnings:			
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/359,938	Filing Date 03/20/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/27/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 195	Minus	** 195	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 17	Minus	*** 17	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/RHONDA BELL/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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NOTICE OF ALLOWANCE AND FEE(S) DUE

148514 7590 02/09/2022

Mintz/JUUL
One Financial Center
Boston, MA 02111

EXAMINER
TORRES VELAZQUEZ, NORCA LIZ

ART UNIT	PAPER NUMBER
3991	

DATE MAILED: 02/09/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	03/20/2019	Kyle D. Newton	62210-492RI1US	6916

TITLE OF INVENTION: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/09/2022

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

NJOY Exhibit 1002.1074

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

148514 7590 02/09/2022
Mintz/JUUL
One Financial Center
Boston, MA 02111

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	03/20/2019	Kyle D. Newton	62210-492RI1US	6916

TITLE OF INVENTION: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/09/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
TORRES VELAZQUEZ, NORCA LIZ	3991	131-273000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

NJOY Exhibit 1002.1075

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	03/20/2019	Kyle D. Newton	62210-492RI1US	6916

148514 7590 02/09/2022

Mintz/JUUL
One Financial Center
Boston, MA 02111

EXAMINER	
TORRES VELAZQUEZ, NORCA LIZ	
ART UNIT	PAPER NUMBER
3991	

DATE MAILED: 02/09/2022

Determination of Patent Term Extension or Adjustment under 35 U.S.C. 154 (b)

A reissue patent is for "the unexpired part of the term of the original patent." See 35 U.S.C. 251. Accordingly, the above-identified reissue application is not eligible for Patent Term Extension or Adjustment under 35 U.S.C. 154(b).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

NJOY Exhibit 1002.1076

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/359,938	Applicant(s) Newton, Kyle D.	
	Examiner NORCA L TORRES VELAZQUEZ	Art Unit 3991	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 12/29/2021 and 01/27/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-10 and 12-196 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Norca L. Torres Velazquez/ /Jean C. Witz/ Supervisor Patent Reex Specialist, Art Unit 3991	/Alan Diamond/ Patent Reexam Spec., CRU 3991

NJOY Exhibit 1002.1078

Examiner-Initiated Interview Summary	**Application No.** 16/359,938	**Applicant(s)** Newton, Kyle D.		
	Examiner NORCA L TORRES VELAZQUEZ	**Art Unit** 3991	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
NORCA L TORRES VELAZQUEZ	Primary Examiner	Telephonic
Elissa M. Kingsland	Attorney	

Date of Interview: 26 January 2022

Issues Discussed:

35 U.S.C. 112

Called the attomey regarding lack of antecedent basis for "the bundle of heat resistant fibers" on claims 12 and 13 in the amendment filed 12/29/2021.

/Norca L. Torres Velazquez/ Patent Reex Specialist, Art Unit 3991	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

NJOY Exhibit 1002.1079

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	Art Unit
	NORCA L TORRES VELAZQUEZ	3991

CPC - Searched*		
Symbol	**Date**	**Examiner**
A61M15/06 B01D19/0047 B05B7/1693 A24B15/167	05/27/2020	NT
A24C5/12 A24F47/00 A24F47/002	05/27/2020	NT

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
Inventor's name search; assignee name search	05/27/2020	nt
reviewed prosecution of 14/219,426 and parent cases: 13/955,153 13/157,024	05/27/2020	nt
EAST textsearch	05/27/2020	nt
updated textsearch SEARCH (attached)	12/31/2020	nt
considered IDS 7/14/21	08/31/2021	nt
textsearch SEARCH	08/31/2021	nt
updated SEARCH & checked support for new claims and proper ant. basis	01/28/2022	NT

/NT/ Patent Reex Specialist, Art Unit 3991	

NJOY Exhibit 1002.1080

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	Art Unit
	NORCA L TORRES VELAZQUEZ	3991

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
A61M	15/06	01/28/2022	NT
B01D	19/0047	01/28/2022	NT
B05B	7/1693	01/28/2022	NT
A24B	15/167	01/28/2022	NT
A24C	5/12	01/28/2022	NT
A24F	47/00 47/002	01/28/2022	NT

/NT/ Patent Reex Specialist, Art Unit 3991	

NJOY Exhibit 1002.1081

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	**Art Unit**
	NORCA L TORRES VELAZQUEZ	3991

CPC							
Symbol						**Type**	**Version**
A24F	/	40	/	44		F	2020-01-01
A24F	/	40	/	485		I	2020-01-01
A24F	/	40	/	42		I	2020-01-01
A61M	/	15	/	06		I	2013-01-01
A24F	/	40	/	10		A	2020-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	195	
/Norca L. Torres Velazquez/ Patent Reex Specialist, Art Unit 3991	28 January 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

U.S. Patent and Trademark Office — Part of Paper No.: 20220128

NJOY Exhibit 1002.1082

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	**Art Unit**
	NORCA L TORRES VELAZQUEZ	3991

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A24F40/44	/	40	/	44
A24F40/485	/	40	/	485
A24F40/42	/	40	/	42
A61M15/06	/	15	/	06
A24F40/10	/	40	/	10

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	195	
/Norca L. Torres Velazquez/ Patent Reex Specialist, Art Unit 3991	28 January 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

NJOY Exhibit 1002.1083

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/359,938	Newton, Kyle D.
	Examiner	**Art Unit**
	NORCA L TORRES VELAZQUEZ	3991

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	195	
/Norca L. Torres Velazquez/ Patent Reex Specialist, Art Unit 3991	28 January 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	7

U.S. Patent and Trademark Office Part of Paper No.: 20220128

NJOY Exhibit 1002.1084

United States Patent And Trademark Office	**Application No.**	**Art Unit**
	16/359,938	3991
Reissue Terminal Disclaimer Review Form	**Examiner**	**AIA Status**
	NORCA L TORRES VELAZQUEZ	Yes

Original Patent Number of Patent to be Reissued is: 9596887	**The Maintenance fee status is:** ◉ up to date ○ not up to date (Consult with SPRS)

Is there a terminal disclaimer filed and accepted during the prosecution of (i) the current reissue application, (ii) the underlying patent, and/or (iii) reexamination proceeding(s) of the underlying patent?

○ NO
◉ YES (Complete the rest of the form)

The reissue patent is subject to Terminal Disclaimer(s) that was/were:

☑ filed and accepted (DISQ or DISQ.E.FILE) during the prosecution of the current reissue application. (Enter terminal disclaimer(s) filing date(s) below).

1. 07 December 2021 2. _____ 3. _____

The underlying patent of the current reissue application is subject to Terminal DIsclaimer(s) that was/were:

☑ accepted (DISQ or DISQ.E.FILE) and of record in the prosecution of the underlying patent and/or reexamination procceeding(s) of the underlying patent. (Enter application/control no(s) and terminal disclaimer(s) filing date(s) below).

1. 14/219,426 07 October 2016 2. _____ _____ 3. _____ _____

NJOY Exhibit 1002.1085

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/12 10:10 AM
L2	1	L1 and aerosol	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 10:36 AM
L3	1	L1 and porous	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 10:41 AM
L4	1	L1 and reservoir	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 10:42 AM
L5	2247	(A61M15/06).cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:35 AM
L6	367	b01d19/0047.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:36 AM
L7	108	b05b7/1693.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:36 AM
L8	0	a24b15-167.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:43 AM
L9	471	a24b15/167.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:43 AM
L10	15	a24c5/12.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:44 AM
L11	2247	a61m15/06.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:45 AM
L12	3975	(electronic adj cigarette)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:46 AM
L13	1266	L12 and atomizing	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:46 AM
L14	586	a24f47/00.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:55 AM
L15	903	a24f47/002.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:55 AM
L16	586	a24f47/00.cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 11:56 AM
L18	32	juul.as.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 12:13 PM
L20	30	juul.as. same labs.as.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 12:14 PM
L21	18	kyle.in. same newton.in.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/12 12:18 PM
L22	1	("20140334804").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/12 12:25 PM
L23	1	("20130292620").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/12 12:27 PM
L24	1	("20130319407").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/12 12:27 PM
L25	2	(("20110011396") or ("20110277756")).PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/12 12:30 PM

NJOY Exhibit 1002.1086

L26	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/18 10:41 AM
L27	1	L26 and wick	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 10:41 AM
L28	1	("20110011396").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/18 10:44 AM
L29	1	L28 and capillary	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 10:44 AM
L30	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/18 11:50 AM
L31	1	L30 and AEROSOL	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 11:50 AM
L32	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/18 02:18 PM
L33	1	L32 and air	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 02:18 PM
L34	1	("20110011396").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/18 02:18 PM
L35	0	L34 and air	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 02:18 PM
L36	0	L34 and inlet	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 02:18 PM
L37	1	L32 and heating	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 02:51 PM
L38	1	L34 and heating	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 02:58 PM
L39	0	L34 and (refill removable)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 03:52 PM
L40	0	L34 and fill	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 03:53 PM
L41	0	L34 and add	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 03:53 PM
L42	1	L34 and liquid	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/18 03:54 PM
L43	1	("20110011396").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/19 08:29 AM
L44	0	L43 and seal	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 08:29 AM
L45	0	L43 and sealed	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 08:29 AM
L46	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/19 10:37 AM
L47	1	L46 and sealed	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 10:37 AM
L48	1	L46 and seal	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 10:38 AM
L49	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/19 03:07 PM
L50	1	L49 and circular	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:07 PM

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L51	0	L49 and slot	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:10 PM
L52	0	L49 and curved	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:10 PM
L53	1	L49 and end	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:10 PM
L54	0	L49 and width	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:11 PM
L55	1	L49 and (seal sealed)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:15 PM
L56	1	L49 and (cylindrical cylinder)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/19 03:20 PM
L57	1	("20110303231").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/20 09:25 AM
L58	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/20 10:49 AM
L59	1	L58 and cartridge	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/20 10:49 AM
L60	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/20 12:14 PM
L61	1	L60 and mouthpiece	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/20 12:14 PM
L62	1	("9596887").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/20 02:10 PM
L63	0	L62 and (fixed width slot)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/20 02:10 PM
L64	1	L62 and porous	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/20 02:30 PM
L65	1	("20110011396").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/21 08:51 AM
L66	0	L65 and air	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 08:52 AM
L67	1	L65 and airflow	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 08:53 AM
L68	1	("20110011396").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/21 11:03 AM
L69	0	L68 and vent	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 11:03 AM
L70	4006	(electronic adj cigarette)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:03 PM
L71	1172	L70 and wick	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:03 PM
L72	899	L71 and mouthpiece	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:03 PM
L73	485	L72 and (air adj inlet)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:04 PM
L74	256	L73 and (liquid adj reservoir)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:04 PM
L75	651	L70 and (liquid adj reservoir)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:07 PM

L76	440	L75 and wick	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/21 01:07 PM
L77	1	("20140209105").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/21 01:58 PM
L78	1	("20130228191").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/21 02:49 PM
L79	1	("20120111347").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/21 02:51 PM
L80	1	("20120111347").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/22 08:44 AM
L81	0	L80 and refill	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 09:33 AM
L82	1	L80 and liquid	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 09:34 AM
L83	0	L82 and cap	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 09:34 AM
L84	18	newton.in. same kyle.in.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 10:53 AM
L85	16	newton.in. same kyle.in. same d.in.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 10:54 AM
L86	1	("8528569").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/22 10:56 AM
L87	1	("20130228191").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/22 11:03 AM
L88	1	("8707965").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/22 11:24 AM
L89	4	(("20120111347") or ("20140209105") or ("20130081642") or ("20110011396")).PN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/05/22 12:30 PM
L90	4	L89 and (suction atomizer heater heating)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 12:30 PM
L91	1	L89 and (suction) and (atomizer heater heating)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 12:32 PM
L92	1	L89 and (suction) same (atomizer heater heating)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 12:32 PM
L93	4	"200910108807.6"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2020/05/22 01:58 PM
L94	3	robert.in. same safari.in.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2020/05/22 02:09 PM
L95	924	(electronic same cigarette) and window	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 02:22 PM
L96	203	L95 and wick	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 02:22 PM
L97	187	L96 and (mouthpiece cap)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 02:22 PM

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L98	182	L96 and mouthpiece	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 02:22 PM
L99	5	(("2009009534") or ("6155268") or ("2057353") or ("3431393")).PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/22 02:32 PM
L100	1	L99 and window	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/22 02:39 PM
L101	1	("6155268").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/26 10:42 AM
L102	1	L101 and (bundled fibers)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 10:43 AM
L103	0	L101 and (fiber)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 10:43 AM
L104	0	L101 and fiberglass	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 10:43 AM
L105	1	L101 and pore	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 10:44 AM
L106	0	L101 and indidentally	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 11:45 AM
L107	1	L101 and incidentally	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 11:46 AM
L108	0	L101 and CIGARETTE	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 11:49 AM
L109	1	("6155268").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/26 02:33 PM
L110	1	L109 and (capillarity capillary)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 02:33 PM
L111	1	L109 and liquid	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 03:48 PM
L112	1	L109 and (negative pressure)	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/05/26 04:30 PM
L114	1	("20120111347").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/05/28 09:52 AM
L115	784	(electronic near4 cigarette) AND ((wick wicking) SAME fibers)	(US-PGPUB; USPAT; DERWENT)	OR	ON	ON	2020/12/28 11:14 AM
L116	765	(electronic near4 cigarette) AND ((wick wicking) SAME fibers)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:14 AM
L117	0	L116 AND (bundle SAME fiber SAME heat-resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:15 AM
L118	0	L116 AND (bundle WITH fiber WITH heat-resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:15 AM
L119	14	L116 AND (fiber WITH heat-resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:15 AM
L120	14	L119	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:15 AM

L121	14	L120	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:16 AM
L122	0	L116 SAME (fiber WITH heat-resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:20 AM
L123	38	(electronic near4 cigarette) AND (heat$resistant SAME fibers)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:20 AM
L124	38	(electronic near4 cigarette) AND (heat$resistant SAME fibers)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:27 AM
L125	38	L123	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:27 AM
L126	1	"20110011396".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:29 AM
L127	1	"6155268".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:29 AM
L128	0	(L127 OR L126) AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:31 AM
L129	0	L126 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:31 AM
L130	0	L127 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:32 AM
L131	39339	wick AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:32 AM
L132	7234	L131 AND (cigarette OR cartridge)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:32 AM
L133	1272	L132 AND (electronic near3 cigarette)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:33 AM
L134	377	L133 AND (heat NEAR 4 resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:33 AM
L135	173	L134 AND atomizer	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 11:33 AM
L137	1	"7726320".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:03 PM
L139	1	"8528569".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:09 PM
L140	1	"20050016550".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:09 PM
L141	1	"20050172976".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:09 PM
L142	1	"20060196518".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:09 PM

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L143	1	"20070267031".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:10 PM
L144	1	"20090095311".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:10 PM
L145	1	"20100031967".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:10 PM
L146	1	"20110011396".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:10 PM
L147	1	"20110303231".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:10 PM
L148	1	"20120111347".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:11 PM
L156	11	L137 L139 L140 L141 L142 L143 L144 L145 L146 L147 L148	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:15 PM
L158	2	L156 AND (heat NEAR4 resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:16 PM
L159	2	L131 AND L156	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 12:16 PM
L160	1	"20140060554".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 01:04 PM
L161	1	L160 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 01:05 PM
L162	43	william.in. SAME robert.in. SAME collett.in.	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/28 01:07 PM
L163	37	L162 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/28 01:08 PM
L164	22	L156	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/28 01:11 PM
L165	1	"8528569".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 01:12 PM
L166	1	"8707965".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/28 01:12 PM
L167	1	(L166or L165) AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/28 01:13 PM
L168	11	L156 AND fibers	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/28 01:14 PM
L169	4	WO-2010091593-a1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/12/28 01:19 PM

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L170	3	cn-201379072-y	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/12/28 01:20 PM
L171	1	"20140060554".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 10:51 AM
L172	1	L171 AND wick	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 10:52 AM
L173	0	L171 AND bundle	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 10:53 AM
L174	1	L171 AND bundled	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 10:53 AM
L175	1	L172	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 10:53 AM
L176	2	L171 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/29 10:59 AM
L177	1	L171 AND air ADJ intake	(US-PGPUB; USPAT; EPO; DERWENT)	OR	ON	ON	2020/12/29 12:55 PM
L178	0	"6155268".pn. AND bundles	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:24 PM
L179	0	"6155268".pn. AND bundle	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:24 PM
L180	1	"6155268".pn. AND bundled	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:24 PM
L181	0	L180 AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:25 PM
L182	0	"6155268".pn. AND (aramid fluorocarbon sulfide melamine polyimide carbon glass)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:25 PM
L184	1	"20120111347".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:40 PM
L185	1	L184 AND (liquid ADJ storage)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:41 PM
L186	1	L184 AND (heat resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:53 PM
L187	28	(heat near2 resistant near2 fibers) AND (cigarette near3 electronic)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:56 PM
L188	96	(heat near2 resistant near2 fibers) AND (cigarette)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29 02:57 PM
L189	68	L188 NOT L187	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/29

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							02:57 PM
L190	1	"8528569".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/30 09:31 AM
L192	1	L191 AND housing	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/30 11:45 AM
L193	1	"9596887".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/31 08:35 AM
L194	1	L193 AND (heat temperature resistant)	(US-PGPUB; USPAT)	OR	ON	ON	2020/12/31 08:35 AM
L195	1	L191	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/12/31 09:11 AM
L196	1	L190	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/12/31 09:11 AM
L197	1	"9596887".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 11:05 AM
L198	0	"9596887".pn. AND (air ADJ vent)	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 11:06 AM
L199	1	"9596887".pn. AND (air OR vent)	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 11:06 AM
L200	1	"9596887".pn. AND conduit	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 11:12 AM
L201	1	"6155268".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:36 PM
L202	1	"6155268".pn. AND fibers	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:36 PM
L203	0	"6155268".pn. AND fibers AND wick	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:36 PM
L204	1	L202 AND (heat aramid fluorocarbon sulfide melamine polyimide carbon glass fiberglass)	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:38 PM
L205	1	L202 AND capillary	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:38 PM
L206	0	L205 AND cigarette	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:45 PM
L207	0	L205 AND cigarrete	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:45 PM
L208	0	L205 AND electronic	(US-PGPUB; USPAT)	OR	ON	ON	2021/01/07 03:45 PM
L209	1	("9596887").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:26 AM
L210	1	("9596887").pn. AND reservoir	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:28 AM
L211	1	("9596887").pn. AND reservoir AND porous	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 09:35 AM
L212	1	"20110011396"	(US-PGPUB)	OR	ON	ON	2021/08/31 09:39 AM
L213	1	("20110011396").pn.	(US-PGPUB)	OR	ON	ON	2021/08/31 09:39 AM
L214	0	("20110011396").pn.	(US-PGPUB)	OR	ON	ON	2021/08/31

NJOY Exhibit 1002.1094

L215	1	AND liquid AND reservoir ("20110011396").pn. AND liquid	(US-PGPUB)	OR	ON	ON	09:40 AM 2021/08/31 09:52 AM
L216	110	("20020043262"|"20020078951"|"20020088469"|"20030226837"|"20040050382"|"20050134215"|"20070045288"|"20070074734"|"20070229025"|"20070277816"|"20070283972"|"20080023003"|"20080029095"|"20080257367"|"20080302374"|"20090095287"|"20090133691"|"20090272379"|"20090293892"|"20090302019"|"20100031968"|"20100194337"|"20100200008"|"20100207576"|"20100253279"|"20110036346"|"20110159705"|"20110192397"|"20110226266"|"20110265806"|"20110277761"|"20110278189"|"20110303231"|"20120018529"|"20120048266"|"20120174914"|"20120199146"|"20120199663"|"20120223673"|"20120255546"|"20120312313"|"20120318882"|"20120325227"|"20130056013"|"20130174842"|"20130220315"|"20130253433"|"20130306084"|"20130319435"|"20140158129"|"20140283859"|"20170197046"|"3085145"|"3918451"|"3934117"|"4171000"|"4745705"|"4793365"|"4811731"|"4941236"|"4947874"|"4947875"|"4993436"|"5042509"|"5117482"|"5144962"|"5261424"|"5269327"|"5479948"|"5666977"|"5682050"|"5865185"|"6090082"|"6155268"|"6443146"|"6516796"|"6532965"|"6708846"|"6772756"|"7173222"|"7318435"|"7802569"|"7913688"|"8205622"|"8251060"|"8365742"|"8371310"|"8499766"|"8522776"|	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:16 PM

NJOY Exhibit 1002.1095

		8752545"|"8869792"|"8893726"|"8899240"|"8978663"|"8991402"|"9072321"|"9095175"|"9277768"|"9315890"|"9345541"|"9420829"|"9504279"|"9555203"|"9743691"|"9801413"|"9814263"|"9844234"|"9974743"|"9999250"|"D590990").PN.					
L217	37	L216 AND (tank reservoir)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:17 PM
L218	110	L216	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:23 PM
L219	1	("20110303231").pn.	(US-PGPUB)	OR	ON	ON	2021/08/31 01:34 PM
L220	1	("9926464").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:53 PM
L221	1	("9926464").pn. AND (inorganic amine)	(US-PGPUB; USPAT)	OR	ON	ON	2021/08/31 01:54 PM
L222	1	L1 AND nickel	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 01:56 PM
L223	1	L1 AND chamber	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 01:58 PM
L224	1	L1 AND coupler	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 02:17 PM
L225	1	L1 AND resistive	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 02:30 PM
L226	1	L1 AND power	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 02:55 PM
L227	1	L1 AND power AND battery	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 02:56 PM
L228	7415	electronic near3 cigarette	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 03:59 PM
L229	2923	L228 AND (wick aperture)	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 04:00 PM
L230	2807	L229 AND (liquid reservoir)	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 04:00 PM
L231	1184	L229 AND (liquid near2 reservoir)	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 04:00 PM
L232	35	(L228 AND (wick near2 aperture))	(US-PGPUB; USPAT)	OR	ON	ON	2022/01/26 04:00 PM
L233	7614	(A24F40/44 OR A24F40/42 OR A24F40/485 OR A61M15/06 OR A24F40/10).cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/01/28 10:55 AM
L234	55	((((A24F40/44 OR A24F40/42 OR A24F40/485 OR A61M15/06 OR	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR,	OR	ON	ON	2022/01/28 11:18 AM

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		A24F40/10).cpc.) AND (wick ADJ aperture)))	GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	7614	(A24F40/44 OR A24F40/42 OR A24F40/485 OR A61M15/06 OR A24F40/10).cpc.	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/01/28 10:56 AM
N2	5920	N1 AND cigarette	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/01/28 11:06 AM
N3	2727	N1 AND cigarette AND wick	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/01/28 11:07 AM
N4	17	N3 AND (wick ADJ aperture)	(US-PGPUB; USPAT)	OR	OFF	OFF	2022/01/28 11:07 AM

Bibliographic Data

Application No: 16/359,938

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /Norca L. Torres Velazquez/ Examiner's Signature | Initials

Title: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
03/20/2019	131	3991	62210-492RI1US
RULE			

APPLICANTS

Juul Labs, Inc., San Francisco, CA,

INVENTORS

Kyle D. Newton, Southlake, TX, UNITED STATES

CONTINUING DATA

This application is a REI of 14219426 03/19/2014 PAT 9596887

14219426 is a CON of 13955153 07/31/2013 PAT 8707965

13955153 is a CON of 13157024 06/28/2011 PAT 8528569

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

03/21/2019

STATE OR COUNTRY

UNITED STATES

ADDRESS

Mintz/JUUL
One Financial Center
Boston, MA 02111
UNITED STATES

FILING FEE RECEIVED

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Application	Document	Mailroom Date	Attorney Docket No.
16359938	NOA	02/09/2022	62210-492RI1US
	EXIN	02/09/2022	62210-492RI1US

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

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Complete and send this form, together with the applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
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Alexandria, VA 22313-1450

By fax, send to: (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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3580 Carmel Mountain Road
Suite 300
San Diego, California 92130-6768

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)

(Signature)

(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
16/359,938	03/20/2019	Kyle D. Newton		6916

TITLE OF INVENTION: ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR

APPLN: TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1,200.00	$0.00	$0.00	$1,200.00	05/09/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
N. L. Torres Velazquez	3991	131-273000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363)

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. Mintz Levin Cohn Ferris Glovsky and Popeo, P.C.
2.
3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **JUUL Labs, Inc.**

(B) RESIDENCE: (CITY and STATE or COUNTRY): **San Francisco, California**

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

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5. Change of Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29. NOTE: Absent a valid Certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27. NOTE: If the application was previously under micro entity status, checking this box will be taken as a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status. NOTE: Checking this box will be taken as a notification of loss of entitlement to small or micro entity status, as applicable.

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Authorized Signature /Elissa M. Kingsland/ Date May 9, 2022

Typed or printed name Elissa M. Kingsland Registration No. 63,259

NJOY Exhibit 1002.1100

Electronic Patent Application Fee Transmittal

Application Number:	16359938
Filing Date:	20-Mar-2019
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Filer:	Elissa Marie Kingsland/Desire' Wells
Attorney Docket Number:	62210-492RI1US

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
REISSUE ISSUE FEE	1511	1	1200	1200

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt	
EFS ID:	45659927
Application Number:	16359938
International Application Number:	
Confirmation Number:	6916
Title of Invention:	ELECTRONIC CIGARETTE WITH LIQUID RESERVOIR
First Named Inventor/Applicant Name:	Kyle D. Newton
Customer Number:	148514
Filer:	Elissa Marie Kingsland
Filer Authorized By:	
Attorney Docket Number:	62210-492RI1US
Receipt Date:	09-MAY-2022
Filing Date:	20-MAR-2019
Time Stamp:	09:36:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1200
RAM confirmation Number	E202259036360286
Deposit Account	500311
Authorized User	Elissa Kingsland
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	62210_492RI1US_Issue_Fee_05092022.pdf	153952 1607ab2119f271d0139c8c91aed3e4747b84d63e	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37863 29f539416ed22eae16a583cd3bb57d219b22b1a4	no	2
Warnings:					
Information:					
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National Stage of an International Application under 35 U.S.C. 371

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/359,938	06/28/2022	RE49114	62210-492RI1US	6916

148514 7590 06/08/2022

Mintz/JUUL
One Financial Center
Boston, MA 02111

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Extension or Adjustment under 35 U.S.C. 154 (b)

A reissue patent is for "the unexpired part of the term of the original patent." See 35 U.S.C. 251. Accordingly, the above-identified reissue application is not eligible for Patent Term Extension or Adjustment under 35 U.S.C. 154(b).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Kyle D. Newton, Southlake, TX;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Juul Labs, Inc., San Francisco, CA, Assignee (with 37 CFR 1.172 Interest);

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NJOY Exhibit 1002.1105

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Application	Document	Mailroom Date	Attorney Docket No.
16359938	ISSUE.NTF	06/08/2022	62210-492RI1US

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