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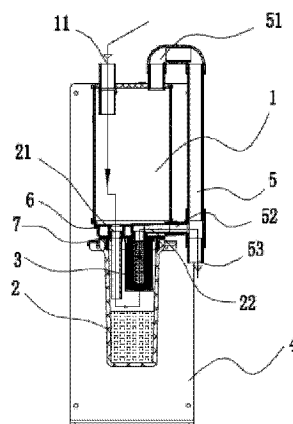
权利要求书 1 页 说明书 3 页 附图 3 页

(54) 发明名称

重金属分离装置

(57) 摘要

本发明揭示了一种重金属分离装置,其包括积污桶、重金属收集瓶和固体过滤器,所述积污桶上设有与口腔治疗机相连接的污水进水口,所述重金属收集瓶上设有与所述积污桶的底部相连通的污水入口和与负压抽吸机相连通的污水排水口;所述固体过滤器设于重金属收集瓶内,由过滤网层和沙层组成,用于将污水中的重金属过滤在所述重金属收集瓶内,并将过滤后的污水由负压抽吸机抽吸排放。本发明具有产品体积小、安装方便;适用于口腔医院和个体私人口腔诊所,使得口腔治疗时产生的污水中的重金属含量得到有效的减少,起到环保的作用。



1. 一种重金属分离装置,其特征在于:包括积污桶、重金属收集瓶和固体过滤器,所述积污桶上设有与口腔治疗机相连接的污水进水口,所述重金属收集瓶上设有与所述积污桶的底部相连通的污水入口和与负压抽吸机相连通的污水排水口;所述固体过滤器设于重金属收集瓶内,用于将污水中的重金属过滤在所述重金属收集瓶内,并将过滤后的污水由负压抽吸机抽吸排放。

2. 根据权利要求1所述的重金属分离装置,其特征在于:所述固体过滤器由过滤网层和夹设于过滤网层间的沙层组成。

3. 根据权利要求2所述的重金属分离装置,其特征在于:所述沙层包括海沙,锰沙或海沙和锰沙的混合层。

4. 根据权利要求3所述的重金属分离装置,其特征在于:所述沙层由海沙和锰沙以重量比为80%的海沙和20%的锰沙混合而成。

5. 根据权利要求1所述的重金属分离装置,其特征在于:所述污水排水口通过抽吸管道与所述负压抽吸机相连接,所述抽吸管道还与所述积污桶的上端相连通。

6. 根据权利要求1所述的重金属分离装置,其特征在于:所述固体过滤器粘接于所述重金属收集瓶上。

7. 根据权利要求1所述的重金属分离装置,其特征在于:所述装置还包括一安装支架,所述积污桶固定于所述安装支架上。

8. 根据权利要求1所述的重金属分离装置,其特征在于:所述重金属收集瓶和所述积污桶间通过密封连接件相密封连接。

重金属分离装置

技术领域

[0001] 本发明涉及重金属过滤沉淀分离技术,尤其涉及用于口腔治疗中分离重金属的重金属分离装置。

背景技术

[0002] 目前,环境保护问题已经引起了全世界的普遍重视,污水对环境的污染已经成为一个全球性的问题,最近几年来人类的目光逐渐从工厂废料,废水对环境的污染转移到包括一些医疗机构和家庭废弃物的污染上来。近年来由于口腔医学的发展,口腔治疗中产生的各种污染引起人们的关注及危害,尤其是口腔治疗中使用的银汞合金粉,以及包括其它重金属材料,这些重金属在治疗过程中会有一些随污水一起被排放掉,在常年的积累下随污水排放的重金属会引起对环境的污染。而对于这些重金属造成的污染,目前尚未有很好的方式来解决这一问题。

发明内容

[0003] 本发明的目的在于克服现有技术的缺陷,提供一种重金属分离装置,其用于收集口腔治疗过程中产生的重金属,以减少重金属对环境污染。

[0004] 为实现上述目的,本发明提出如下技术方案:一种重金属分离装置,包括积污桶、重金属收集瓶和固体过滤器,所述积污桶上设有与口腔治疗机相连接的污水进水口,所述重金属收集瓶上设有与所述积污桶的底部相连通的污水入口和与负压抽吸机相连通的污水排水口;所述固体过滤器设于重金属收集瓶内,用于将污水中的重金属过滤在所述重金属收集瓶内,并将过滤后的污水由负压抽吸机抽吸排放。

[0005] 其中,所述固体过滤器由过滤网层和夹设于过滤网层间的沙层组成。

[0006] 所述沙层包括海沙,锰沙或海沙和锰沙混合层。

[0007] 所述沙层由海沙和锰沙以重量比为 80% 的海沙和 20% 的锰沙混合而成。

[0008] 所述污水排水口通过抽吸管道与所述负压抽吸机相连接,所述抽吸管道还与所述积污桶的上端相连通。

[0009] 所述固体过滤器粘接于所述重金属收集瓶上。

[0010] 所述装置还包括一安装支架,所述积污桶固定于所述安装支架上。

[0011] 所述重金属收集瓶和所述积污桶间通过密封连接件相密封连接。

[0012] 与现有技术相比,本发明所揭示重金属分离装置,其具有产品体积小、安装方便;银汞分离率达到 99%;方便重金属回收和处理,使得重金属得到了有效收集;适用于口腔医院和个体私人口腔诊所,能拖一至 20 台牙科治疗机同时使用;使得口腔治疗时产生的废水重金属含量减少,对环境保护产生很大效果,保护了环境。

附图说明

[0013] 图 1 是本发明重金属分离装置的立体示意图;

[0014] 图 2 是本发明重金属分离装置的剖视示意图；

[0015] 图 3 是本发明固体过滤器安装于重金属收集瓶上的示意图（包括了第一密封连接件）。

具体实施方式

[0016] 下面将结合本发明的附图，对本发明实施例的技术方案进行清楚、完整的描述。

[0017] 结合图 1、图 2 所示，本发明所揭示的重金属分离装置，其包括积污桶 1、重金属收集瓶 2，固体过滤器 3 及安装支架 4，所述积污桶 1 固定于安装支架 4 上，积污桶 1 上设有与口腔治疗机（图未示）相连接的污水进水口 11，积污桶 1 用于将口腔治疗过程中产生的污水和负压气体进行有效的水气分离。

[0018] 所述重金属收集瓶 2 置于所述积污桶 1 的下部，其与积污桶 1 间通过第一密封连接件 6，第二密封连接件 7 以接口的方式相密封连接，并通过卡扣件相卡紧。具体来说，重金属收集瓶 2 上端具有与积污桶 1 底部相连通的污水入口 21 和与负压抽吸机连接的污水排水口 22，重金属收集瓶 2 用于将口腔治疗过程中产生的重金属如银、汞、铜、锡、锌进行有效收集。

[0019] 结合图 3 示，所述固体过滤器 3 设于所述重金属收集瓶 2 的内部，且固体过滤器 3 和重金属收集瓶 3 胶粘于一起，用于将口腔治疗过程中产生的污水中含有的重金属如银、汞、铜、锡、锌等进行有效的过滤、沉淀。固体过滤器 3 整体上中空呈圆柱状，由过滤网层 31 和沙层 32 组成，更具体来说，固体过滤器 3 包括两层过滤网层 31、33 和设于两层过滤网层 31、33 中间沙层 32，所述沙层 32 由海沙，锰沙或者海沙和锰沙以一定比例相混合而成，且以海沙占 80%，锰沙占 20% 的比例混合而成的沙层为优选。海沙和锰沙的沙粒大小为 1.5～2 毫米，过滤网的间隙为 0.5～1 毫米为优选。这样的固体过滤器能够有效地过滤污水中的重金属。

[0020] 此外，所述重金属收集瓶 2 的污水排水口 22 通过抽吸管道 5 与负压抽吸机（图未示）相连接，所述抽吸管道 5 具有与积污桶 1 上部相连通的第一接口 51，与重金属收集瓶 2 的污水排水口 22 相连接的第二接口 52，以及与负压抽吸机相连接的第三接口 53，积污桶 1 中的污水通过负压抽吸机的抽取后沿图 2 中 H 线的箭头方向排放至外界的污水道中。

[0021] 工作时，积污桶 1 的污水进水口 11 连接牙科治疗机的痰盂下水、强吸唾器和弱吸唾器等的接口。所述抽吸管道 5 的第三接口 53 与负压抽吸机连接好，当医师为患者治疗时，使用痰盂、强吸唾器或弱吸唾器，此时牙科治疗机会给负压抽吸机一个信号，负压抽吸机开始工作，负压抽吸机将患者治疗时产生的污水抽吸到积污桶 1 中，此时积污桶 1 将水和水分离，水通过负压抽吸和水自身的重量流入重金属收集瓶 2。重金属收集瓶 2 中的污水通过固体过滤器 3 后抽吸到负压抽吸机，其中重金属被固体过滤器 3 所过滤，并经过沉淀后保存到重金属收集瓶中，过滤后的污水通过负压抽吸机排放到国家规定的污水道中。

[0022] 使用一段时间后，当重金属收集瓶 2 中收集的重金属达到一定的高度后，则将重金属收集瓶从积污桶的下端拿开，更换上新的重金属收集瓶（连通粘接好的新的固体过滤器）后继续使用。

[0023] 本发明实施例所述的重金属分离装置，产品体积小、重金属收集瓶的安装更换方

便 ;银汞分离率达到 99%,分离具体数据为 :1%铜,20%银,25%锡,53%汞 ;重金属得到了有效收集,方便重金属回收和处理 ;适用于口腔医院和个体私人口腔诊所,能拖一至 20 台牙科治疗机同时使用 ;使得口腔治疗时产生的废水重金属含量减少,对环境保护产生很大效果,保护了环境。

[0024] 本发明的技术内容及技术特征已揭示如上,然而熟悉本领域的技术人员仍可能基于本发明的教示及揭示而作种种不背离本发明精神的替换及修饰,因此,本发明保护范围应不限于实施例所揭示的内容,而应包括各种不背离本发明的替换及修饰,并为本专利申请权利要求所涵盖。

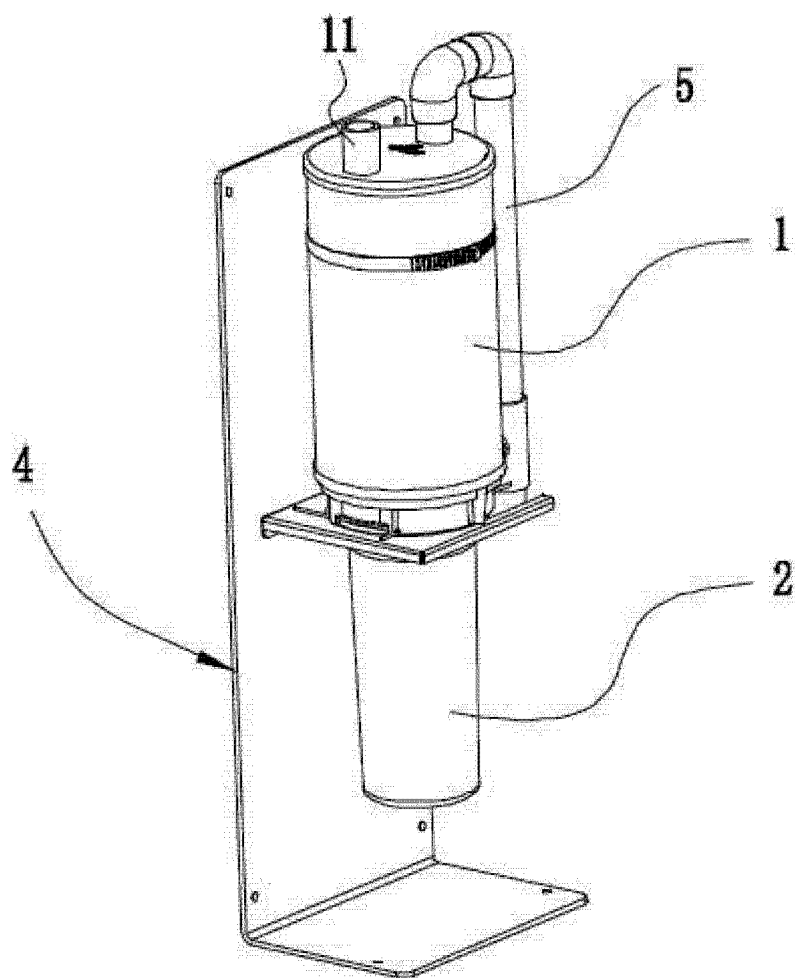


图 1

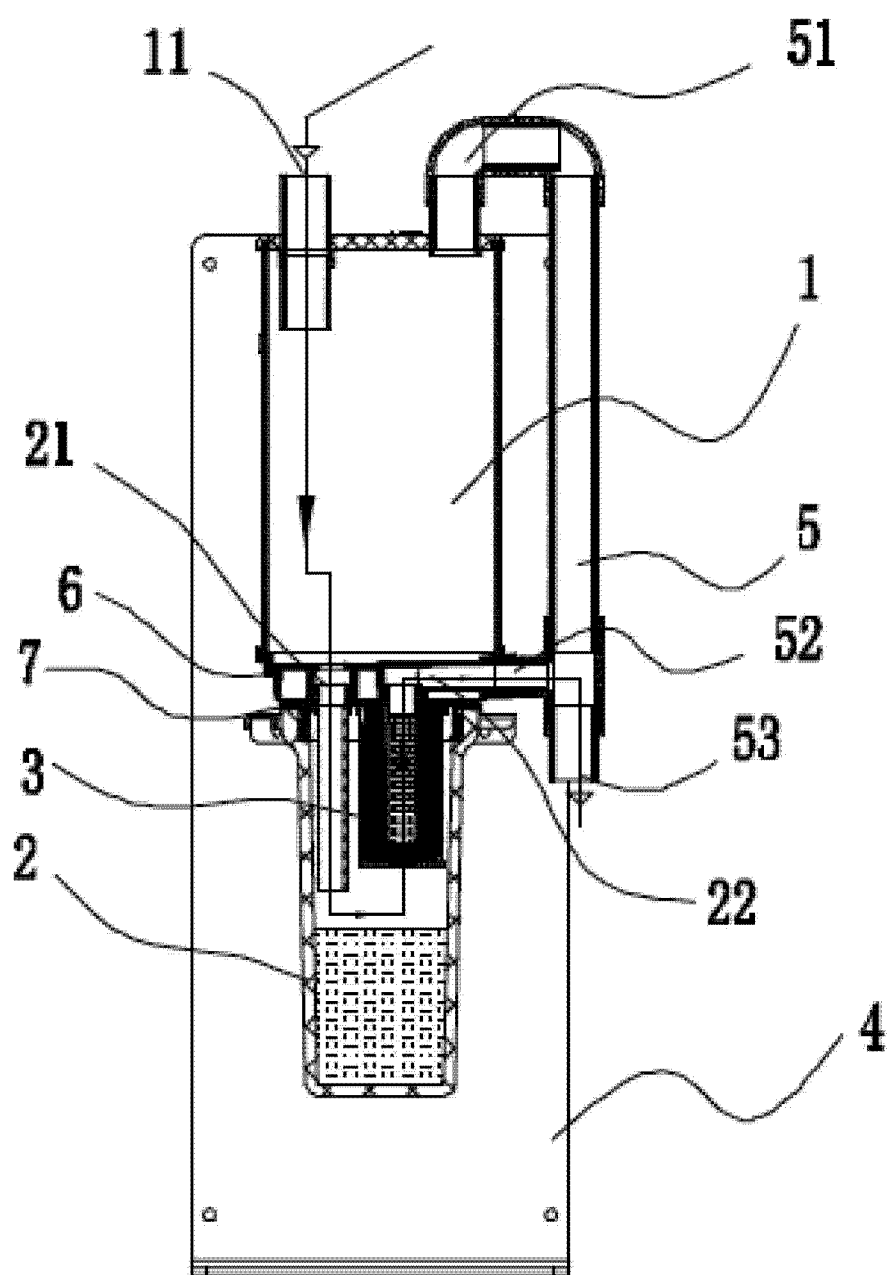


图 2

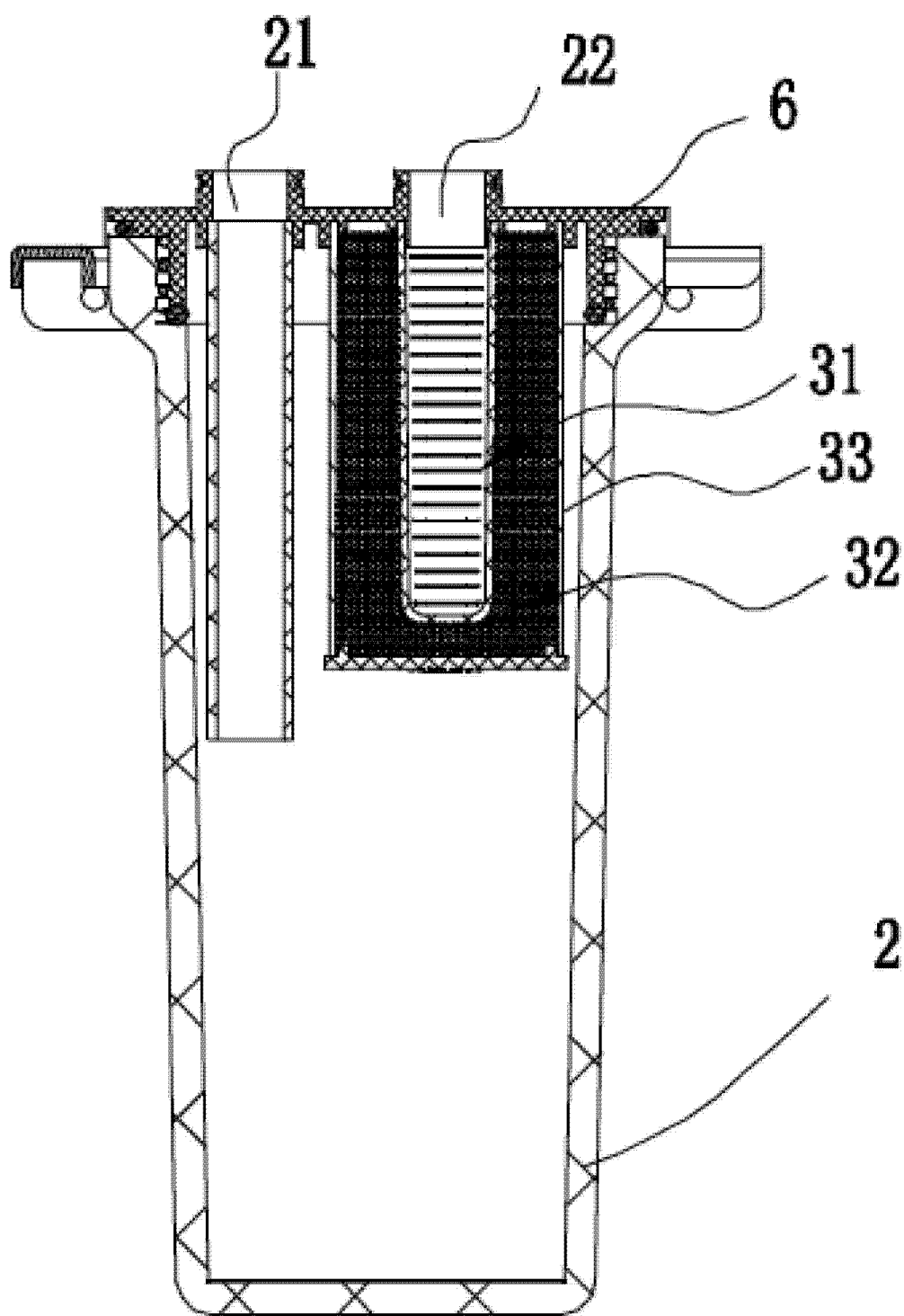


图 3



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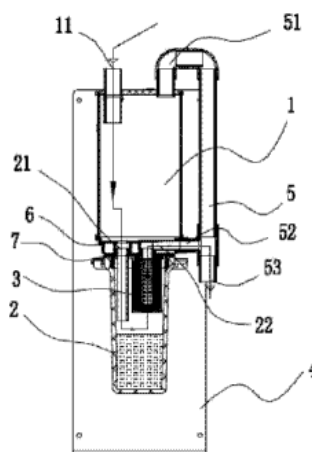
1 page of Claims, 3 pages of Specifications,
3 pages of Drawings

(54) Title of invention

Heavy metal separation device

(57) Abstract

The invention discloses a heavy metal separation device, which comprises a waste collecting tank, a heavy metal receiving bottle, and a solid filter. The waste collecting tank is provided with a sewage water inlet connected to an oral treatment machine, and the heavy metal receiving bottle is provided with a sewage inlet connected to the bottom of the waste collecting tank and a sewage discharge port connected with a negative pressure suction machine: the solid filter is arranged in the heavy metal receiving bottle and is composed of a filter mesh layer and a sand layer, and is used for filtering heavy metals in the sewage into the heavy metal receiving bottle, and the filtered sewage is sucked and discharged by a negative pressure suction machine. The invention has the advantages of small product size and convenient installation: it is suitable for stomatological hospitals and individual private dental clinics, so that the content of heavy metals in sewage generated during oral treatment can be effectively reduced, thereby playing an environmental protection role.



1. The invention discloses a heavy metal separation device, which comprises a waste collecting tank, a heavy metal receiving bottle, and a solid filter. The waste collecting tank is provided with a sewage water inlet connected to an oral treatment machine, and the heavy metal receiving bottle is provided with a sewage inlet connected to the bottom of the waste collecting tank and a sewage discharge port connected with a negative pressure suction machine: the solid filter is arranged in the heavy metal receiving bottle and is used for filtering heavy metals in the sewage into the heavy metal receiving bottle, and the filtered sewage is sucked and discharged by a negative pressure suction machine.
2. The heavy metal separation device according to Claim 1 is characterized by: the solid filter is composed of a filter layer and a sand layer sandwiched between the filter layers.
3. The heavy metal separation device according to Claim 2 is characterized by: the sand layer comprises sea sand, manganese sand or a mixed layer of sea sand and manganese sand.
4. The heavy metal separation device according to Claim 3 is characterized by: the sand layer is formed by mixing sea sand and manganese sand with a weight ratio of 80% sea sand and 20% manganese sand.
5. The heavy metal separation device according to Claim 1 is characterized by: the sewage outlet is connected to the negative pressure suction machine through a suction pipe, and the suction pipe is also connected to the upper end of the waste collecting tank.
6. The heavy metal separation device according to Claim 1 is characterized by: the solid filter is bonded to the heavy metal receiving bottle.
7. The heavy metal separation device according to Claim 1 is characterized by: the device further comprises a mounting bracket, and the waste collecting tank is fixed on the mounting bracket.
8. The heavy metal separation device according to Claim 1 is characterized by: the heavy metal receiving bottle and the waste collecting tank are sealed and connected by a sealed connector.

Heavy Metal Separation Device

Technical areas

[0001] The invention relates to heavy metal filtration and deposition separation technology, in particular to a heavy metal separation device used for separating heavy metals in dental treatment.

Background technique

[0002] At present, environmental protection problem has caused the general attention of the whole world, and the pollution of sewage to environment has become a global problem. In recent years, the attention has gradually shifted from the environmental pollution caused by factory waste and wastewater to the pollution, including some medical institutions and household waste. In recent years, due to the development of stomatology, various pollutions produced in oral treatment have attracted people's attention, especially the amalgam powder used in oral treatment, as well as other heavy metal materials. Some of these heavy metals will be discharged with sewage during the treatment process. The heavy metals discharged with sewage will cause environmental pollution after years of accumulation. As for the pollution caused by these heavy metals, there is no good way to solve this problem.

Contents of the invention

[0003] The purpose of the present invention is to overcome the defective of prior art, and provide a heavy metal separation device, which is used for collecting heavy metals generated during oral treatment, so as to reduce environmental pollution caused by heavy metals.

[0004] In order to achieve the above object, the present invention proposes the following technical solution: a heavy metal separation device, which comprises a waste collecting tank, a heavy metal receiving bottle, and a solid filter. The waste collecting tank is provided with a sewage water inlet connected to an oral treatment machine, and the heavy metal receiving bottle is provided with a sewage inlet connected to the bottom of the waste collecting tank and a sewage discharge port connected with a negative pressure suction machine: the solid filter is arranged in the heavy metal receiving bottle and is used for filtering heavy metals in the sewage into the heavy metal receiving bottle, and the filtered sewage is sucked and discharged by a negative pressure suction machine.

[0005] Wherein, the solid filter is composed of a mesh layer and a sand layer sandwiched between the filter mesh layers.

[0006] The sand layer includes sea sand, manganese sand or a mixed layer of sea sand and manganese sand.

[0007] The sand layer is formed by mixing sea sand and manganese sand with a weight ratio of 80% sea sand and 20% manganese sand.

[0008] The sewage outlet is connected to the negative pressure pump through a suction pipe, and the suction pipe is also connected to the upper end of the waste collecting tank.

[0009] The solid filter is bonded to the heavy metal receiving bottle.

[0010] The device also includes a mounting bracket on which the waste collecting tank is fixed.

[0011] The heavy metal receiving bottle and the waste collecting tank are sealed and connected by a sealed connector.

[0012] Compared with the prior art, the heavy metal separation device disclosed in the present invention has the advantages of small product size and convenient installation; the amalgam separation rate reaches 99%; it is convenient for the recovery and treatment of heavy metals, so that the heavy metals are effectively collected; it is suitable for stomatological hospitals and individual private dental clinics, and can be used at the same time with one to 20 dental treatment machines: the waste water produced during oral treatment has less heavy metal content, which has a great effect on environmental protection and protects the environment.

Description of drawings

[0013] Fig. 1 is the perspective view of heavy metal separation device of the present invention:

[0014] Fig. 2 is the schematic sectional view of heavy metal separation device of the present invention:

[0015] Fig. 3 is a schematic diagram of the solid filter of the present invention installed on the heavy metal receiving bottle (including the first sealed connector).

Specific implementation methods

[0016] The following will clearly and completely describe the technical solutions of the embodiments of the present invention in conjunction with the accompanying drawings of the present invention.

[0017] As shown in FIG. 1 and FIG. 2, the heavy metal separation device disclosed by the present invention includes a waste collecting tank 1, a heavy metal receiving bottle 2, a solid filter 3 and a mounting bracket 4. The waste collecting tank 1 is fixed on the mounting bracket 4. The waste collecting tank 1 is provided with a sewage water inlet 11 connected to a dental treatment machine (not shown in the figure). The waste collecting tank 1 is used to effectively separate water and gas from sewage and negative pressure gas generated during oral treatment.

[0018] The heavy metal receiving bottle 2 is placed at the lower part of the waste collecting tank 1 and is connected with the waste collecting tank 1 through the first sealed connector 6 and the second sealed connector 7 in the form of an interface and is fastened by a buckle. Specifically, the upper end of the heavy metal receiving bottle 2 has a sewage inlet 21 connected to the bottom of the waste collecting tank 1 and the sewage discharge port 22 connected to a negative pressure suction machine, and the heavy metal receiving bottle 2 is used to effectively collect heavy metals such as silver, mercury, copper, tin, and zinc produced during oral treatment.

[0019] As shown in FIG. 3, the solid filter 3 is arranged inside the heavy metal receiving bottle 2, and the solid filter 3 and the heavy metal receiving bottle 3 are glued together for effective filtration and deposition of heavy metals, such as silver, mercury, copper, tin, zinc, etc. contained in the sewage generated during oral treatment. The solid filter 3 is hollow and cylindrical as a whole and is composed of a filter layer 31 and a sand layer 32. More specifically, the solid filter 3 includes two filter layers 31, 33 and a sand layer 32 located between the two filter layers 31 and 33. The sand layer 32 is formed by mixing sea sand, manganese sand or a certain proportion of sea sand and manganese sand, and the sand layer is preferably mixed with 80% of sea sand and 20% of manganese sand. The sand grain size of sea sand and manganese sand is preferably 1.5-2 mm, and the gap of the filter screen is 0.5-1 mm. Such a solid filter can effectively filter heavy metals in sewage.

[0020] In addition, the sewage discharge port 22 of the heavy metal receiving bottle 2 is connected to a negative pressure suction machine (not shown) through a suction pipe 5. The suction pipe 5 has a first connection port 51 connected to the upper part of the waste collecting tank 1, a second connection port 52 connected to the sewage discharge port 22 of the heavy metal receiving bottle 2, and a third connection port 53 connected to the negative pressure suction machine. After being sucked by the negative pressure suction machine, the sewage in the waste collecting tank 1 is discharged into the external sewage channel along the arrow direction of the H line in FIG. 2.

[0021] During operation, the sewage water inlet 11 of the waste collecting tank 1 is connected to the interface of the spittoon drain of the dental treatment machine, the strong saliva suction device and the weak saliva suction device. The third connection port 53 of the suction pipeline 5 is connected to the negative pressure suction machine. When the doctor treats the patient, he or she uses a spittoon, a strong saliva suction device or a weak saliva suction device. At this time, the dental treatment machine would send a signal to the negative pressure suction machine, and the negative pressure suction machine starts to work. The negative pressure suction machine sucks the sewage generated during the treatment of the patient into the waste collecting tank 1. At this time, the waste collecting tank 1 separates water and gas, and the water flows into the heavy metal storage bottle 2 through the negative pressure suction and the weight of the water itself. The sewage passes through the solid filter 3 and then is sucked into the negative pressure suction machine, in which the heavy metals are filtered by the solid filter 3, and are stored in the heavy metal storage bottle after precipitation, and the filtered sewage is discharged into the national sewage channel through the negative pressure suction machine.

[0022] After using for a period of time, when the heavy metals collected in the heavy metal receiving bottle 2 reach a certain height, the heavy metal receiving bottle is removed from the lower end of the waste collecting tank, and a new heavy metal receiving bottle (connected with a bonded new solid filter) is replaced before continued use.

[0023] The heavy metal separation device described in the embodiment of the present invention is small in size, and the heavy metal receiving bottle is easy to install and replace:

The amalgam separation rate reaches 99%, and the specific separation data are: 1% of copper, 20% of silver, 25% of tin, 53% of mercury; heavy metals have been effectively collected, which is convenient for heavy metal recycling and processing: it is suitable for dental hospitals and individual private dental clinics, and can be used at the same time with one to 20 dental treatment machines: it reduces the heavy metal content of wastewater generated during dental treatment, which has a great effect on environmental protection and protect the environment.

[0024] The technical content and technical features of the present invention are disclosed above. However, those skilled in the art may still make various replacements and modifications based on the teachings and disclosures of the present invention without departing from the spirit of the present invention. Therefore, the scope of protection of the present invention should not be limited to the content disclosed in the embodiments but should include various replacements and modifications that do not deviate from the present invention and are covered by the claims of this patent application.

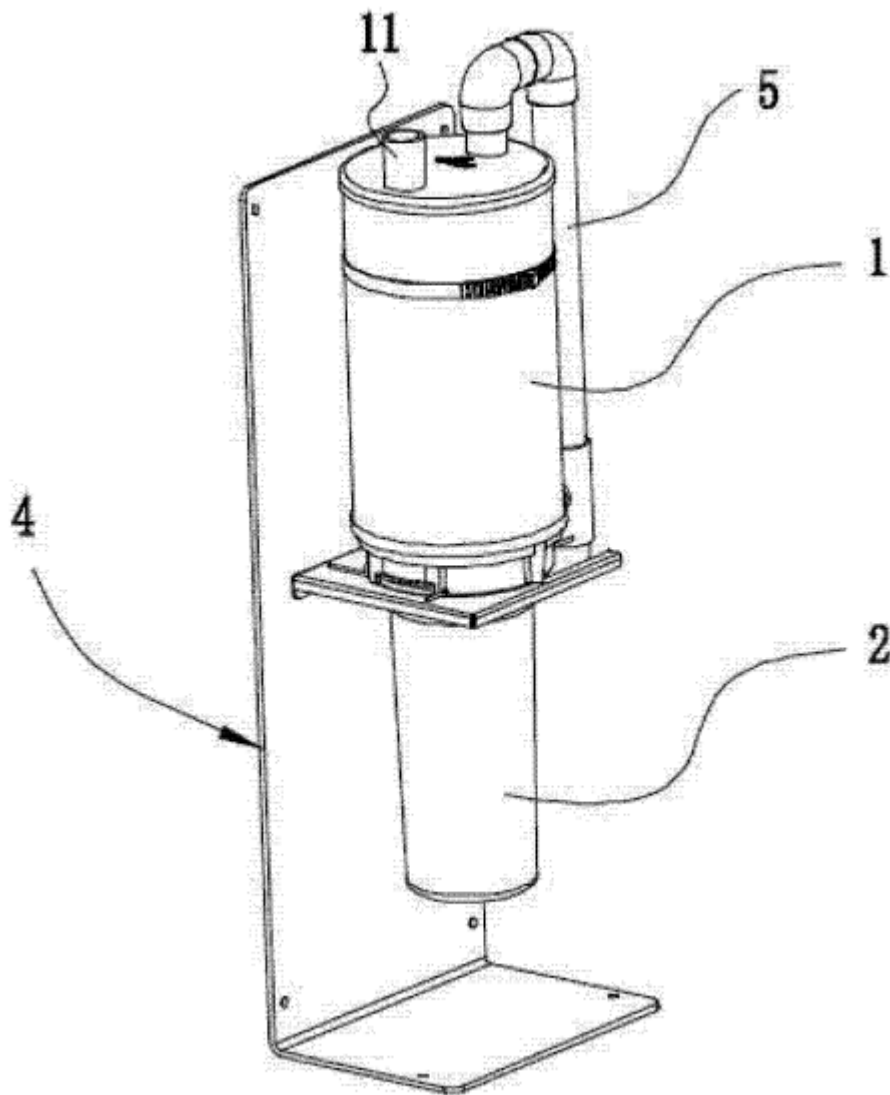


Fig. 1

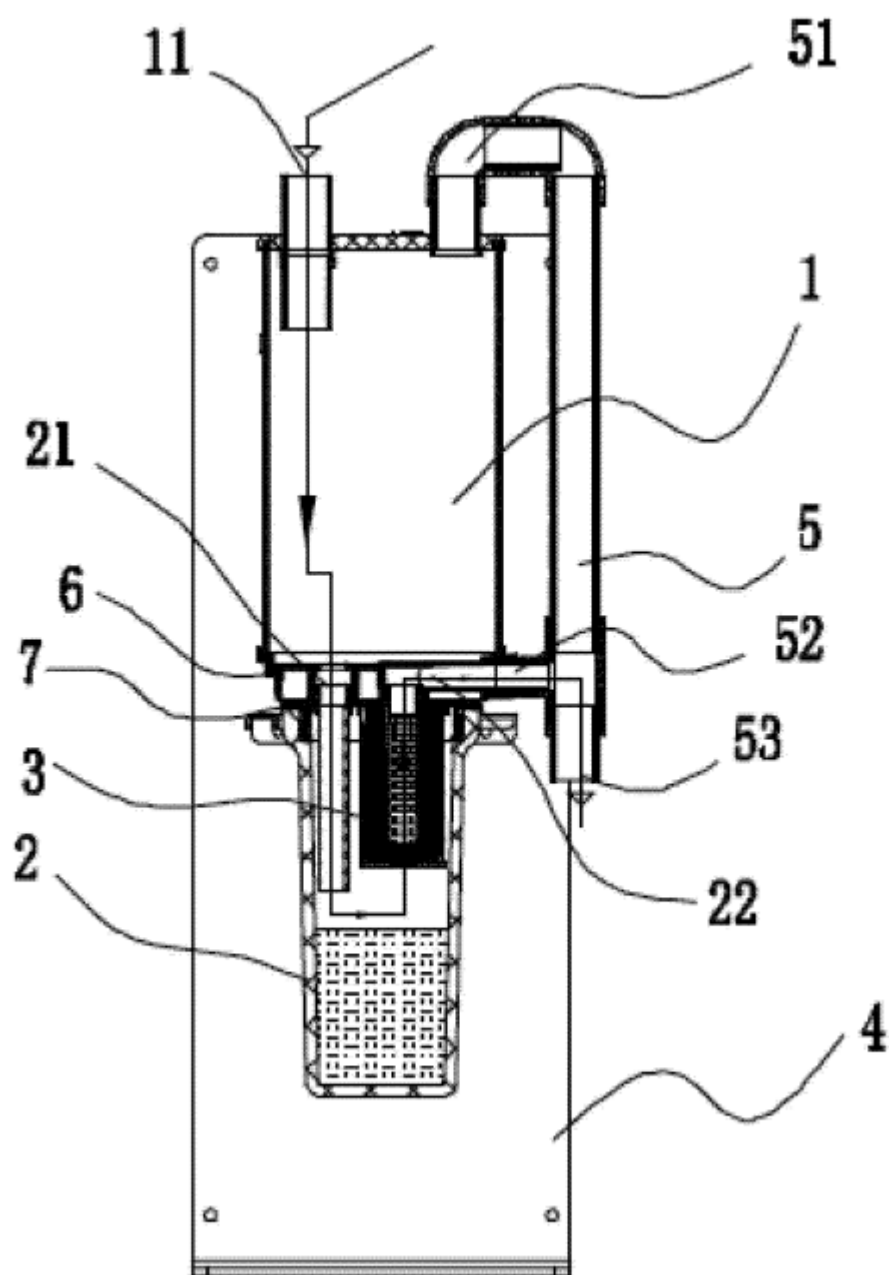


Fig. 2

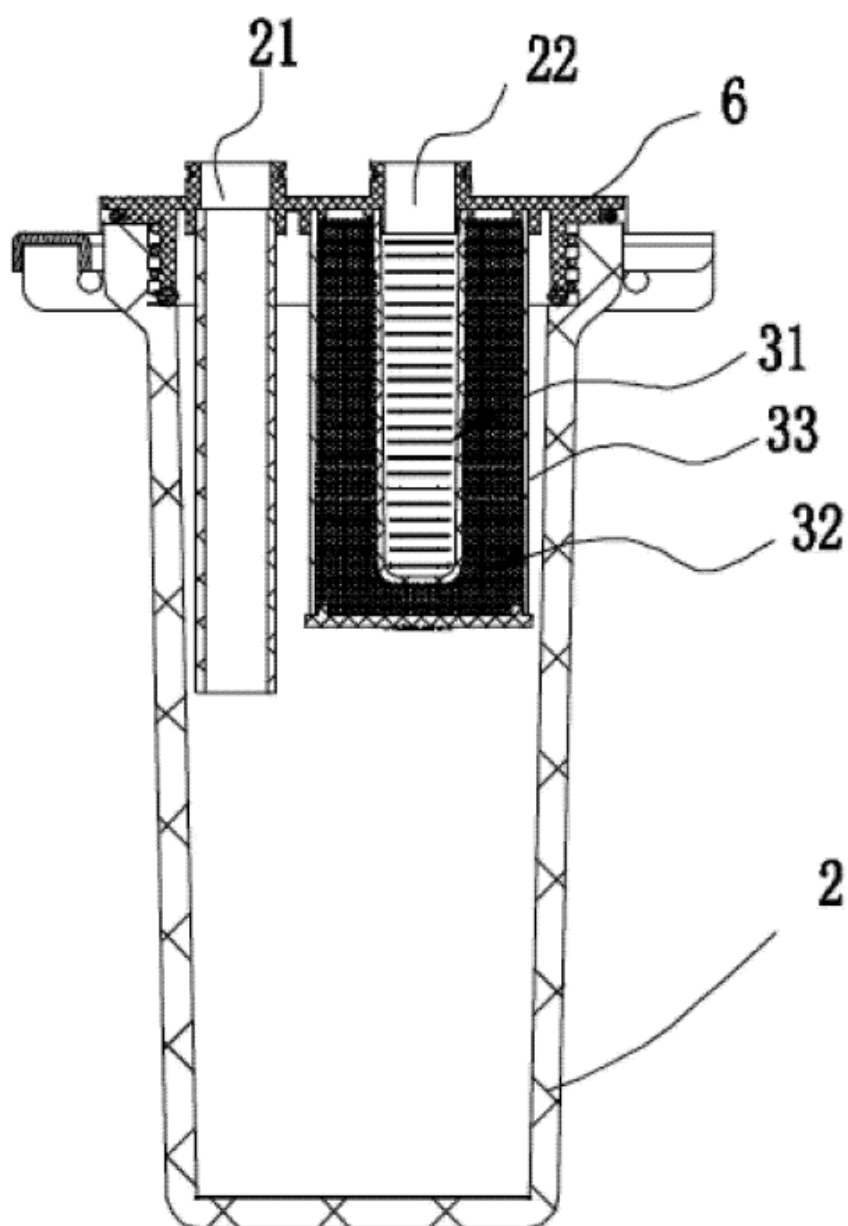
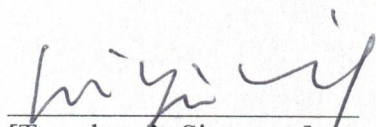
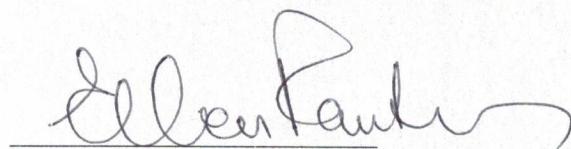


Fig. 3

I, Pi Yin Chiang, hereby certify under penalty of perjury that I am competent to translate from Simplified Chinese to English and that the attached translation is, to the best of my knowledge and belief, a true and accurate translation of the document entitled "CN102989232A_Original" from Simplified Chinese to English.


[Translator's Signature]

Sworn to before me the 21 day of July, 2023


Signature, Notary Public

Stamp, Notary Public