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UTILITY PATENT APPLICATION TRANSMITTAL (ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))		Attorney Docket No. HOB-1001
		First Inventor Ron Brawer
		Title SOFT-PROJECTILE LAUNCHING DEVICE
		Express Mail Label No.

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
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1. ☐ Fee Transmittal Form (e.g., PTO/SB/17) 2. ☐ Applicant claims small entity status. See 37 CFR 1.27. 3. ☒ Specification [Total Pages <u>24</u>] Both the claims and abstract must start on a new page (For information on the preferred arrangement, see MPEP 608.01(a)) 4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>3</u>] 5. Oath or Declaration [Total Sheets _____] a. ☐ Newly executed (original or copy) b. ☐ A copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 18 completed) i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) name in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). 6. ☐ Application Data Sheet. See 37 CFR 1.76 7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (<i>Appendix</i>) ☐ Landscape Table on CD 8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PARTS 9. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee 10. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney (when there is an assignee) 11. ☐ English Translation Document (if applicable) 12. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☐ Copies of citations attached 13. ☐ Preliminary Amendment 14. ☐ Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 15. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 16. ☐ Nonpublication Request under 35 U.S.C.122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 17. ☐ Other:
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18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

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Dated: May 10, 2010

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SPECIFICATION

SOFT-PROJECTILE LAUNCHING DEVICE

FIELD

[0001] The present patent document relates to soft-projectile launching devices, such as projectile toys. More particularly, the present patent document relates to soft-projectile launching devices that launch super absorbent polymer projectiles and related devices and methods.

BACKGROUND

[0002] Children have a variety of different types of projectile launching toys available to them. For example, HASBRO® makes an entire line of NERF® weaponry that fire NERF® projectiles. NERF® is a trademarked term well known in the toy industry and is associated with soft foam-like material. Other than weaponry, NERF® is also commonly associated with sports balls such as footballs, basketballs, and others. Over the years, a large number of NERF® foam-based weaponry products have been developed, including various blasters that launch various types of NERF® projectiles including darts, rockets, and balls.

[0003] NERF® foam is a spongy cellular material produced by the reaction of polyester with a diisocyanate. The polyester resin reacts with the diisocyanate while CO₂ is simultaneously released by another reaction. The CO₂ gas creates open pockets within the polyurethane that give the NERF® foam its soft and light properties.

[0004] One reason the NERF® foam and other foam based projectile toys have become so popular has been due to the soft and light properties of the foam material. For example, NERF® balls were originally marketed as the “world’s first official indoor ball.” These same soft and light properties also make NERF® and other foams a great material for projectiles. Projectiles made from NERF® and other similar foams can be formed into balls and darts and fired from toy weaponry with little risk of injury. To this end, HASBRO® and other toy manufacturers have created numerous toy weaponry lines that shoot foam based projectiles including the N-Strike® line of toys.

[0005] Although NERF® and other foam like materials can be used to make toy weaponry projectiles that are relatively safe to project or launch, the properties of NERF® and other foam like materials have some significant drawbacks when used as projectiles for projectile launching toys. Because foam based materials such as NERF® foam are light, they are highly susceptible to air forces when trying to project them through the air in free flight as occurs when fired from toy weaponry. The soft, light properties of foam and NERF® type products are due to their low density. The low density of foam based projectiles decreases the momentum of the projectiles, which in turn increases the effect of air resistance, drag, and other motion retarding forces. This causes foam based projectiles to rapidly slow after initial firing and easily curve off line.

[0006] There are also small projectile systems for gaming and professional training purposes. These include paint ball guns and airsoft guns, but these systems are for adult use only due to the energy imparted to the projectile and the ability of the projectile to do serious harm.

SUMMARY OF THE INVENTION

[0007] One object of the present patent document is to provide an alternative soft-projectile launching system to those presently on the market. To this end, in one embodiment, a projectile launching device is provided that launches projectiles made from super absorbent polymers. The projectile launching device comprises: a holder designed for containing the soft-projectile made from a super absorbent polymer; and a firing mechanism operatively arranged to accelerate the holder from a firing position.

[0008] In another embodiment the holder of the soft-projectile launching system is slideably contained by the device. In another embodiment, the holder for a soft-projectile translates between the firing position and a launch point for the soft-projectile. In yet another embodiment the soft-projectile launching system further comprises a barrel having an interior in communication with the firing position wherein the holder for a soft-projectile translates down the barrel such that a soft-projectile launches from the barrel with little or no contact with the interior of the barrel.

[0009] In one embodiment, the soft-projectile launching system may have a firing mechanism incapable of storing energy independent of the user. Yet in other embodiments, the launching system may store energy. The soft-projectile launching systems of the present patent document may use air pressure, springs, rubber bands or any other suitable firing mechanism to launch the soft-projectile.

[0010] In another aspect of the present patent document, ammunition for a soft-projectile projection device is provided. The ammunition according to one embodiment comprises a plurality of projectiles made from a super absorbent polymer. The projectiles may be contained in a magazine. The projectiles may be hydrated or dehydrated.

[0011] In one embodiment, the projectiles have a diameter of less than 10 millimeters when hydrated. In yet another embodiment, the projectiles have a diameter of more than about 4mm and less than about 9mm when hydrated.

[0012] In another aspect of the present patent document, a magazine for a device for projecting soft-projectiles is provided. The magazine according to one embodiment comprises: a container having an interior volume having at least one opening wherein the container is configured to operatively mate with a device for projecting soft-projectiles and a plurality of projectiles made from a super absorbent polymer contained within the interior volume. The projectiles in the magazine may be hydrated or dehydrated and the magazine may include an inlet opening configured to only allow dehydrated projectiles to pass through into the magazine.

[0013] In one embodiment, the magazine further comprises a locking mechanism that prevents an outlet opening from opening unless the magazine is mated with a corresponding projection device.

[0014] In yet another aspect, a method of producing soft-projectiles is provided. The method comprises the steps of: placing a plurality of pieces of a super absorbent polymer in a liquid; allowing time for the plurality of pieces of a super absorbent polymer to absorb the liquid; and placing the plurality of pieces of a super absorbent polymer in a magazine.

[0015] In yet another aspect, a kit for making a plurality of soft-projectiles from a super absorbent polymer is provided. In one embodiment, the kit comprises: a predetermined quantity of dehydrated projectiles stored in a container, the dehydrated projectiles comprising a super absorbent polymer; instructions for adding the dehydrated projectiles into a interior chamber of a magazine and hydrating the dehydrated projectiles in the interior chamber of the magazine. The container may, for example, comprise a sealed pouch or other low cost, disposable container.

[0016] In another embodiment, an adaptation mechanism for a projectile toy comprises: a soft-projectile holder adapted to hold a soft-projectile made from a super absorbent polymer; and an attachment mechanism connected to the soft-projectile holder wherein the attachment mechanism is designed to mate to a firing mechanism of the projectile toy.

[0017] The super absorbent polymer projectile launching toys and/or weaponry described herein may increase the user experience as compared to foam-based projectile toys, yet they remain safe for children to use. Further aspects, objects, desirable features, and advantages of the devices and methods disclosed herein will be better understood from the detailed description and drawings that follow in which various embodiments are illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration only and are not intended as a definition of the limits of the claimed invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 illustrates a cross section of one embodiment of a projectile launching toy designed for use with a plurality of projectiles made from a super absorbent polymer.

[0019] FIG. 2 illustrates a cross section of one embodiment of a projectile launching toy designed for use with a projectile made from a super absorbent polymer.

[0020] FIG. 3 illustrates a cross section of a projectile magazine for use with a projectile launching toy such as that shown in Fig 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] The term “magazine” is used herein to refer to any container that holds super absorbent polymer projectiles for a projectile toy gun or other projectile weaponry. The magazine could be of any shape size or volume and have any number of openings as long as it

holds super absorbent polymer projectiles in a useable manner for a corresponding super absorbent polymer projectile launching device.

[0022] Super absorbent polymers (SAP's) were first invented by the United States Department of Agriculture (USDA) in the 1960's and are commonly used in personal disposable hygiene products such as diapers, protective underwear, and sanitary napkins. SAP's are polymers that can absorb an extremely large amount of liquid relative to their own mass. SAP's absorb aqueous solutions through hydrogen bonding with water molecules.

[0023] The present patent document discloses and teaches projectile launching devices, such as toys, amateur guns and weaponry that use projectiles formed from a super absorbent polymer (SAP). As a result, the projectiles launched by the devices of the present patent document are soft-projectiles. Further, once hydrated, the unique properties that SAP's exhibit give the soft-projectiles several advantages over current projectile materials such as paint balls, plastics, and foams. For example, hydrated SAP projectiles can maintain their shape under modest pressure. The ability of SAP projectiles to maintain their shape allows them to be projected with a reasonable force and velocity without breaking apart. However, under excessive pressure, hydrated SAP projectiles will break down and lose their shape. Because SAP projectiles break down under excessive pressure, the force at impact is spread over a much wider surface area, thus reducing the likelihood of injury.

[0024] SAP projectiles can also be designed to break down at different pressures based on their composition. This allows them to be tailored to have specific qualities as soft-projectiles. The total absorbency and swelling capacity of a SAP varies depending on the degree of cross-linking within the polymer. The lower the density of the cross-linking the higher the absorbent capacity of the SAP. Thus, low density cross-linked SAP's generally have a higher absorbent

capacity and swell to a larger degree than more highly cross-linked SAP's. Low density cross-linked SAP's also have a softer and more cohesive gel formation. High cross-link density polymers exhibit lower absorbent capacity and swell. The gel strength is firmer and can maintain particle shape even under higher pressures.

[0025] Consequently, by using a SAP with a higher cross-link density, a soft-projectile can be made to fly farther and faster without breaking apart and have a stronger impact. In contrast, soft-projectiles made from a SAP with a lower cross-link density will break apart more easily and have a much softer impact. Depending on the level of safety required, different SAP's with different cross-link densities may be used. For example, SAP's can be constructed that would be considered "highly compliant" by industry standards.

[0026] Soft-projectiles made from a SAP are preferably round but may be of other shapes as well, including, for example, dart shapes, cylinder shapes, bullet shapes, oval, square, rectangular or any other shape. Round is a preferable shape not only because it has fairly good ballistic characteristics but because SAP's are easily formed in round shapes.

[0027] Soft-projectiles made from a SAP can be any size. Preferably, however, the soft-projectiles made from a SAP are between about 3 millimeters (mm) and about 15mm in diameter when hydrated and more preferably between about 5mm and 8mm in diameter when hydrated. Typically, the soft-projectiles are about 1mm or less when the SAP forming the projectile is dehydrated.

[0028] Larger soft-projectiles made from a SAP are possible. For example, rounds having a diameter of 30mm have been created. However, there is approximately a 20% tolerance on the final diameter of the hydrated SAP soft-projectiles and therefore, the larger rounds are more difficult to make consistently uniform in diameter.

[0029] The SAP projectiles may be colorless to prevent any staining upon impact.

Alternatively, soft-projectiles made from a SAP may also have additives added during the formulation of the SAP or during hydration that will create a temporary or indelible signature upon hitting a target. For example, soft-projectiles made from a SAP may be colored by adding a dye to the SAP or the aqueous solution during the hydrating process. Depending on the dye employed, the resulting signature may be of any desired color. Further, the employed dye compound may be visible under normal lighting conditions or only under a ultra violet black light. Other additives may also be used including those that give the soft-projectiles a tracer effect such as glow-in-the-dark additives or other materials with luminescent properties.

[0030] Soft-projectiles made from water absorbing polymers, classified as hydrogels, will absorb aqueous solutions through hydrogen bonding with the water molecule. A SAP's ability to absorb water is a factor of the ionic concentration of an aqueous solution. Consequently, soft-projectiles made from a SAP are preferably grown in water with a PH of 7. More preferably soft-projectiles made from a SAP are grown in distilled water, where they may absorb 500 times their weight, and from 30-60 times their dehydrated volume.

[0031] FIG. 1 illustrates a cross section of one embodiment of a projection device 10, which in the present embodiment is a projectile launching toy, designed for use with soft-projectile 16. The soft-projectiles of the present patent document are formed from a super absorbent polymer. As shown in Fig. 1, projection device 10 is in the general form of a gun. However, in other embodiments, projection device 10 can have shapes and designs of other devices. For example, projection device 10 can be a bow, crossbow, sling shot, hand gun, machine gun, futuristic weapon, catapult, or shaped as any other type of weaponry. Projection device 10 can be made of

a number of suitable materials including metals, rubbers and plastics; however, injection molded plastic is a preferred construction material.

[0032] Projection device 10 has a firing position 30. The firing position 30 is where the soft-projectile 16 is positioned just prior to being fired or launched from the projection device 10.

The firing mechanism of the embodiment shown in Fig. 1 is based on air pressure, which is created in air compression chamber 31. However, the firing mechanism of the projection device 10 may be based on any of the known ways of firing or launching projectiles or ammunition from a projection device. For example, springs or rubber bands can be stretched and released to launch the projectile from the projection device 10. These springs or rubber bands may further use a mechanical advantage to increase the velocity of the projectile as it is launched. As an example, compounds bows use a system of levers or pulleys to make the transfer of energy from the spring of the bow to the projectile more efficient. In addition to springs and rubber bands, air pressure can be used, as in the embodiment illustrated in Fig. 1. Air pressure can be created in a number of ways including, for example, from a plunger operated by the user, from a cartridge containing compressed gas (such as the CO₂ cartridges used with paint ball guns), from air that has been pumped into an internal chamber and then released, or from an explosion in a chamber.

[0033] In addition, various techniques of launching a projectile may also be combined. For example, the embodiment shown in Fig. 1 uses the combination of a spring and air pressure. The components of Fig. 1 will now be further described with respect to the use of projection device 10 to launch a soft-projectile made from a SAP 16.

[0034] To begin the process of firing a soft-projectile 16 made from a SAP with the device shown in Fig. 1, a user pulls back on the handle 11 which retracts the plunger 12 out of the aft end 17 of a plunger cylinder 19. The plunger 12 is attached to spring 18. As the spring 18 is

stretched, air is sucked into an air compression chamber 31 located between plunger seal 24 and air seal 22. Air seal 22 abuts against a stop (not shown) just behind the firing position 30 to prevent air seal 22 from following the plunger 12 past a certain point as it is drawn back.

Consequently, the spring 18 is stretched. When the user releases the handle 12, the spring 18 quickly pulls the plunger 12 back inside the plunger cylinder 19. This creates a rapid increase in air pressure in the air compression chamber 31 between plunger seal 24 and air seal 22.

Consequently, air seal 22 is propelled rapidly through barrel 15 towards the distal end of barrel 15 and simultaneously accelerates the holder for a soft-projectile 14 and the soft-projectile 16. The soft-projectile 16 is launched from the projection device 10 on a free trajectory and the air seal 22 and soft-projectile holder 14 are retained within the barrel 15 of projection device 10.

[0035] In the embodiment of the projection device 10 shown in Fig. 1, the air seal 22 and the soft-projectile holder 14 are retained via their connection to the spring 18. However, the soft-projectile holder 14 and air seal 22 may be retained by other means. For example, a stop (not shown) may be installed inside of barrel 15 to prevent air seal 22 or soft-projectile holder 14 from escaping but allow the soft-projectile 16 to pass freely. Preferably, the stop is located adjacent the barrel exit to maximize the distance over which the soft-projectile 16 is carried in the holder 14 before exiting the barrel.

[0036] Once the soft-projectile made from a SAP 16 has been launched, the plunger 12 and plunger seal 24 have been pulled inside the plunger cylinder 19 to the extent possible. In this position, the plunger seal 24 is located just behind the firing position 30. When the user wants to fire another round, the user pulls back on the handle 11. As the plunger 12 is retracted, air seal 22 and soft-projectile holder 14 are drawn behind the magazine or feed hopper 50. Once the air

seal 22 and the soft-projectile holder 14 are positioned behind the magazine or feed hopper 50, another soft-projectile made from a SAP 16 can fall into the firing position 30.

[0037] Toy guns and weaponry are typically classified into two different categories: 1) devices that can transfer stored energy into the projectile; and 2) devices that are incapable of storing energy independent of the user. The projection device 10 embodied in Fig. 1 is of the latter type. However, the device in Fig. 1 could be easily modified to store energy. For example, a one way valve could be added in combination with a trigger mechanism to prevent air seal 22 and soft-projectile holder 14 from advancing. The plunger 12 could be used to pump additional pressure into the air compression chamber 31 behind air seal 22. The user would then pull the trigger to release the pressure that has built up from multiple pumps of the plunger 12.

[0038] FIG. 2 illustrates a cross section of another embodiment of a projection device 10 designed for use with soft-projectiles 16 made from a super absorbent polymer. Projection device 10 of the present embodiment is a projectile launching toy. In the device 10 shown in Fig. 2, The smaller diameter tube 27 is wrapped back around to the back of the projection device 10 and laid on top of the projection device 10 so that tube portions 26 and 28 are continuously connected. In the embodiment in Fig. 2, the volume in front of plunger seal 24 transitions from plunger cylinder 19, which has a comparatively large diameter, to a tube 27, which has a smaller diameter than plunger cylinder 19. The change in the diameter of the air compression chamber 31 from the plunger cylinder 19, which comprises a tube of a relatively larger diameter, to a smaller diameter tube 27 will cause, during use of the device, a rapid increase in the velocity of the air flow in correlation with the conservation of energy and Bernoulli's principle. Consequently, the rapid air flow is forced down the length of the smaller tube 27 until it escapes out the front of the projection device 10. As the air rushes down the smaller diameter tube 27 the

soft-projectile holder 14, which fits with an air seal inside the smaller diameter tube 27, is rapidly accelerated with the air, carrying the soft-projectile 16 made from a SAP and launching it out of the projection device 10.

[0039] Unlike the embodiment of Fig. 1, the soft-projectile holder 14 is not retained by the spring. In the embodiment of Fig. 2, the soft-projectile holder 14 is slideably contained by the barrel 15, but is not otherwise attached. The soft-projectile holder 14 acts as a free sliding piston that may operate independently of the plunger 12. A stop near the end of the barrel 15 and a stop near tube position 28 retains the soft-projectile holder 14 within a desired operating region of the barrel 15. The stop near the end of the barrel 15 should be designed to retain the soft-projectile holder 14 without interfering with the launching of the soft-projectile 16 made from a SAP.

[0040] Fig. 2 illustrates a device 10 having a smaller tube 27 that wraps from a position relatively near the distal or front end 13 of plunger cylinder 19 back to a position relatively near the proximal or back end 17 of plunger cylinder 19 and then extends down the length of the plunger cylinder 19. This is not required and the smaller tube could simply extend straight away from distal end 13. However, by wrapping the tube as shown in Fig. 2, the more rigid structure of the plunger cylinder can be used to help stiffen the tube 27.

[0041] The soft-projectile holder 14 is preferably designed to minimize, or even prevent altogether, the contact of the soft-projectile 16 with the barrel 15 as the soft-projectile 16 travels down the barrel 15. Although soft-projectile holder 14 is not a requirement, minimizing the contact between the soft-projectile 16 and the barrel 15 is preferable. The soft-projectile 16 will tend to retain its shape, especially if the cross-link density is high. However, if the soft-projectile 16 is nicked, scratched, or damaged by the barrel as it accelerates, it may disintegrate prior to exiting the barrel 15, especially if the cross-link density is low. If the soft-projectile 16

disintegrates prior to exiting the barrel 15, the soft-projectile 16 will not fly accurately or the correct distance. Consequently, the design of the soft-projectile holder 14 should take care to encase enough of the soft-projectile 16 to prevent it from touching the sides of the barrel 15 as it travels. The soft-projectile holder 14 is preferably cup shaped in a form that mates with the exterior surface of the soft-projectiles 16 to be employed with the device. However, the soft-projectile holder 14 may be bucket shaped, crescent shape, or any other shape that helps prevent or suitably minimize the contact between the soft-projectile 16 and the barrel 15.

[0042] In addition to preventing contact between the soft-projectile 16 and the barrel 15 during launch, the soft-projectile holder 14 also helps transfer the energy of the firing mechanism into the motion of the soft-projectile 16. In addition, if shaped similar to soft-projectile 16, the soft-projectile holder 14 helps distribute the force generated by the firing mechanism evenly over the soft-projectile 16 and therefore, helps prevent the soft-projectile 16 from breaking during launch. Consequently, a holder 14 that mates more appropriately with the shape of the outside surface of the soft-projectile 16 is preferable. Furthermore, the soft-projectile holder 14 may help center the soft-projectile 16 and keep the soft-projectile 16 centered as it travels down the barrel 15. To this end, a soft-projectile holder 14 in the shape of a hemisphere may be used with round soft-projectiles 16. The hemispherically shaped holder 14 may have a diameter slightly larger than the soft-projectile 16 to not only help prevent contact with the interior of the barrel 15, but also to accommodate variations the diameters of soft-projectiles 16.

[0043] Although the embodiments of Fig.'s 1 and 2 illustrate a device 10 using a spring and air pressure, and preferably a combination of a spring and air pressure is used, projection device 10 can use a catapult system, sling shot, bow style or any other type of acceleration system to launch the soft-projectile 16. As another example, projection device 10 can accelerate the soft-

projectile or soft-projectile holder by an accelerating mass, like the hammer of a gun, impacting the soft-projectile or soft-projectile holder. Furthermore, these devices can all be set up to work with stored energy or work with only energy provided by a user without departing from the embodiments of the present patent document.

[0044] FIG. 3 illustrates a cross section of a magazine 50 for use with a projectile device 10, such as the projectile launching toy shown in Fig. 1. Magazine 50 can be of any shape or size and is intended to contain the soft-projectiles 16 made from a SAP. Magazine 50 can be made of metal, glass, plastic, rubber, or any other suitable material. Preferably magazine 50 is constructed of injected molded plastic. Magazine 50 may be reusable and refillable or designed for a single use and disposable. Magazine 50 can be loaded with already hydrated soft-projectiles 16 made from a SAP. Alternatively, magazine 50 can be loaded with dehydrated soft-projectiles 16 made from a SAP. If dehydrated soft-projectiles are used, water or another aqueous solution is added to the magazine 50 to hydrate the soft-projectiles 16 made from a SAP. Magazine 50 is preferably sealable to prevent water or moisture from the soft-projectiles 16 from leaking out.

[0045] Magazine 50 has a first opening 52 designed to mate with a projection device 10. Preferably the first opening 52 of magazine 50 includes a locking mechanism, such as a trap door, that prevents the first opening from opening when the magazine 50 is not mated to a corresponding projection device 10. The locking mechanism provides a safety mechanism that prevents foreign objects from being loaded into the magazine 50 and launched by the projection device 10. The locking mechanism can be a keying system, child safety device, or other locking mechanism that prevents foreign objects from being loaded into the magazine.

[0046] The opening on the projection device 10 that mates with the magazine preferably has a corresponding locking mechanism to complement the locking mechanism on the magazine 50. Consequently, soft-projectiles 16 may only be loaded into the projection device 10 from the magazine 50. Similar to the locking mechanism that prevents foreign objects being loaded into the magazine 50, the corresponding locking mechanism on the opening in the projection device prevents foreign objects from being loaded directly into the projection device 10 and then launched.

[0047] As shown in Fig. 3, the magazine 50 may have a second opening 54 for refilling the magazine with soft-projectiles 16 made from a SAP into the magazine. The second opening 54 may be large enough to allow hydrated soft-projectiles 16 to be loaded directly into the magazine. In such a case, the interface between the magazine 50 and the projection device 10 should be designed to prevent foreign objects from being loaded from the magazine 50 into the projection device 10 and subsequently launched.

[0048] Alternatively, the second opening 54 may further include a screen 56 designed to prevent passage of objects larger than a particular size. The dehydrated SAP pieces forming the soft-projectiles 16 may typically have a diameter of about 1 millimeter (mm) or less. In such embodiments, the screen 56 can be designed to only allow objects of approximately 1mm or less in diameter to pass through. The dehydrated soft-projectiles 16 can then be loaded into the magazine 50 and water or another aqueous solution can be added and the soft-projectiles 16 can swell to their appropriate size. The screen 56 is a safety mechanism to make sure foreign objects are not loaded into the magazine 50 and then subsequently launched from the projection device 10. Although it is recognized that foreign objects of less than 1mm can be loaded into the

magazine, objects of less than 1mm are much less likely to cause significant damage if subsequently launched by the projection device 10 because of their reduced size and weight.

[0049] The dehydrated soft-projectiles 16 may be sold in a kit designed to refill a magazine 50. In one embodiment, the kit comprises a pre-counted number of dehydrated rounds designed to fill up a particular magazine when hydrated. A magazine 50 preferably holds between 150 and 250 rounds and more preferably holds about 200 soft-projectiles 16. However, the magazine 50 and the kit that fills the magazine 50, can hold any number of soft-projectiles. For example, larger clips of approximately 500 to 1000 rounds may be used for machine guns, Gatling guns, or other rapid fire projection devices 10. In contrast, magazines or clips of 6 to 20 rounds may be used for single shot toys and weaponry.

[0050] The kit preferably further includes instructions on how to insert the dehydrated rounds into the magazine 50 and grow the dehydrated rounds inside the magazine 50. After purchasing a kit, a user would dump the dehydrated rounds into the magazine and follow the directions to add distilled water or another appropriate aqueous solution to hydrate the rounds and swell them into their appropriate size for launching from a projectile device 10.

[0051] In addition to projection devices designed specifically to launch soft-projectiles 16, embodiments of the present patent document include adaption devices to adapt existing projectile toys and weaponry to launch soft-projectiles 16. Adaption devices attach to the firing mechanism of the existing toy or weaponry and allow the transfer of energy from the firing mechanism into kinetic motion of the SAP projectile 16 without damaging the SAP projectile 16. Preferably, soft-projectile holders 14, similar to those of Fig. 1 and 2, are retrofit to the existing toys and/or weaponry to protect the soft-projectile made from a SAP 16. However, such holders

are not required, and other methods may be used without departing from the scope of the embodiments of the present patent document.

[0052] Although the inventions have been described with reference to preferred embodiments and specific examples, it will readily be appreciated by those skilled in the art that many modifications and adaptations of the methods and devices described herein are possible without departure from the spirit and scope of the inventions as claimed hereinafter. Thus, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the inventions as claimed below.

CLAIMS

What is claimed is:

1. A device for projecting a soft-projectile made from a super absorbent polymer, the device comprising:

a holder designed for containing the soft-projectile made from a super absorbent polymer; and

a firing mechanism operatively arranged to accelerate the holder from a firing position.
2. The device for projecting a soft-projectile made from a super absorbent polymer of claim 1, wherein the holder is slideably contained by the device.
3. The device for projecting a soft-projectile made from a super absorbent polymer of claim 2, wherein the holder translates between the firing position and a release point for the soft-projectile.
4. The device for projecting a soft-projectile made from a super absorbent polymer of claim 3, further comprising a barrel having an interior in communication with the firing position wherein the holder for a soft-projectile translates down the barrel such that a soft-projectile launches from the barrel with little or no contact with the interior of the barrel.
5. The device for projecting a soft-projectile made from a super absorbent polymer of claim 1, wherein the firing mechanism is incapable of storing energy independent of a user.

6. The device for projecting a soft-projectile made from a super absorbent polymer of claim 1, wherein air pressure is used to launch the soft-projectile from the device.

7. A projectile toy for launching a super absorbent polymer in free flight, the toy comprising:

a holder designed for receiving a projectile made from a super absorbent polymer;

and

an energy transfer device operatively arranged with respect to a launching position to transfer energy into motion of the projectile.

8. The projectile toy for launching a super absorbent polymer in free flight of claim 7, wherein the holder is slideably contained by the toy.

9. The projectile toy for launching a super absorbent polymer in free flight of claim 8, wherein the holder translates between the launching position and a release point for the projectile.

10. The projectile toy for launching a super absorbent polymer in free flight of claim 9, further comprising a barrel having an interior in communication with the launching position wherein the holder translates down the barrel such that a projectile launches from the barrel with little or no contact with the interior of the barrel.

11. The projectile toy for launching a super absorbent polymer in free flight of claim 7, wherein the energy transfer device is incapable of storing energy independent of a user.

12. The projectile toy for launching a super absorbent polymer in free flight of claim 7, wherein the energy transfer device uses air pressure to launch the projectile from the toy.

13. Ammunition for a projection device, the ammunition comprising:
a predetermined number of soft-projectiles made from a super absorbent polymer;
and
a sealed container for storing the predetermined number of soft projectiles made from a super absorbent polymer.

14. The ammunition for a projection device of claim 13 wherein the sealed container comprises a magazine.

15. The ammunition for a projection device of claim 13 wherein the plurality of soft-projectiles are hydrated.

16. The ammunition for a projection device of claim 13 wherein the plurality of soft-projectiles have a diameter of less than about 10 millimeters.

17. The ammunition for a projection device of claim 13 wherein the plurality of soft-projectiles have a diameter of more than about 4mm and less than about 9mm.

18. A magazine for a device for projecting soft-projectiles, the magazine comprising:
a container having an interior volume having at least one opening wherein the container is configured to operatively mate with a device for projecting a soft-projectile; and
a plurality of soft-projectiles made from a super absorbent polymer contained within the interior volume.

19. The magazine for a device for projecting soft-projectiles of claim 18, wherein the plurality of soft-projectiles made from a super absorbent polymer are dehydrated.

20. The magazine for a device for projecting soft-projectiles of claim 18, wherein the plurality of soft-projectiles made from a super absorbent polymer are hydrated.

21. The magazine for a device for projecting soft-projectiles of claim 18, further comprising a screen covering a first opening of the at least one openings wherein the screen is designed to allow dehydrated soft-projectiles made from a super absorbent polymer to pass through.

22. The magazine for a device for projecting soft-projectiles of claim 18, wherein a first opening of the at least one opening is designed to allow hydrated soft-projectiles made from a super absorbent polymer to transfer into a projection device.

23. The magazine for a device for projecting soft-projectiles of claim 22, further comprising a locking mechanism that prevents the first opening from opening unless the magazine is mated with the projection device.

24. A method of producing soft-projectiles, the method comprising:
placing a plurality of pieces of super absorbent polymer in a liquid;
allowing time for the plurality of pieces of super absorbent polymer to absorb the liquid and form projectiles; and
placing the plurality of pieces of a super absorbent polymer in a magazine.

25. The method of producing soft-projectiles of claim 24, wherein the step of placing the plurality of pieces of super absorbent polymer in a magazine is performed before the step of placing the plurality of pieces of a super absorbent polymer in a liquid.

26. A kit for making a plurality of soft-projectiles from a super absorbent polymer, the kit comprising:
a predetermined quantity of dehydrated soft-projectiles stored in a container, the dehydrated soft-projectiles comprising a super absorbent polymer;
instructions for adding the dehydrated soft-projectiles into a interior chamber of a magazine and hydrating the dehydrated projectiles in the interior chamber of the magazine.

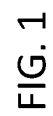
27. An adaptation mechanism for a projectile toy, the adaptation mechanism comprising:

a soft-projectile holder adapted to hold a soft-projectile made from a super absorbent polymer; and

an attachment mechanism connected to the soft-projectile holder wherein the attachment mechanism is designed to mate to a firing mechanism of the projectile toy.

ABSTRACT

A device for projecting a soft-projectile made from a super absorbent polymer, the device comprising a holder designed for containing the soft-projectile made from a super absorbent polymer; and a firing mechanism operatively arranged to accelerate the holder from a firing position.

$1/3$ 

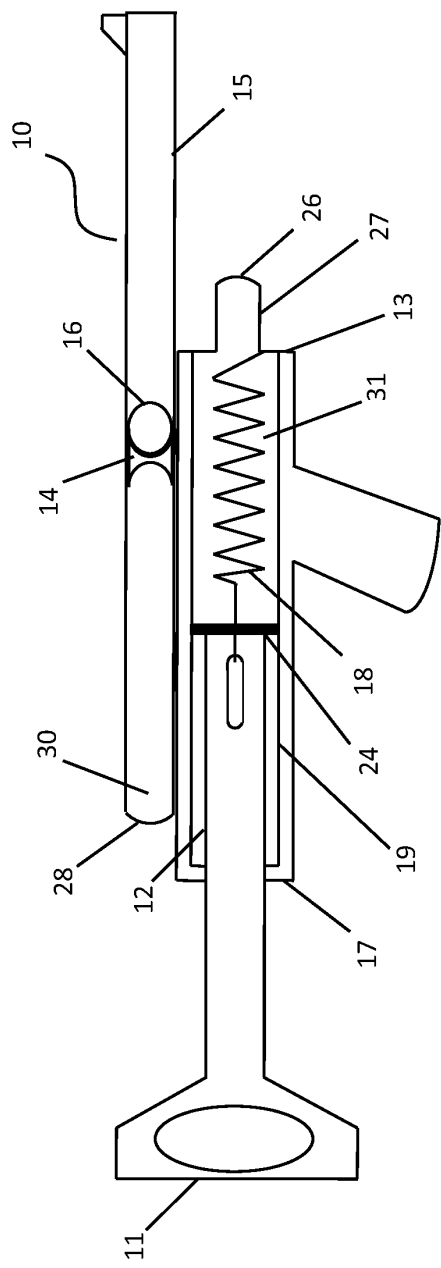


FIG. 2

SOFT-PROJECTILE LAUNCHING DEVICE

INVENTOR: BRAWER ET AL.

DOCKET : HOB-1001

3/3

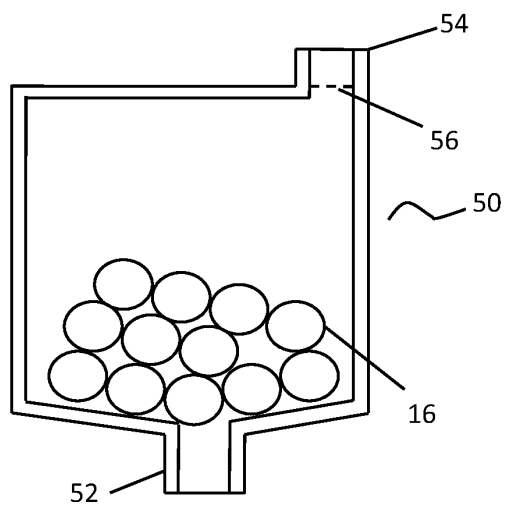


FIG. 3

Electronic Acknowledgement Receipt	
EFS ID:	7584558
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Ron Brawer
Customer Number:	91477
Filer:	Paul Graham Novak/Rosa Bugarin
Filer Authorized By:	Paul Graham Novak
Attorney Docket Number:	HOB-1001
Receipt Date:	10-MAY-2010
Filing Date:	
Time Stamp:	19:19:39
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	Transmittal of New Application	B1750_1002_US_New_Appln_ Transmittal_Sheet.pdf	117934 c5b0903dfbc41fae0113fa51c992cedf8669 decf	no	1

Warnings:

Information:

2		HOB_1001_Final_Patent_Specification.pdf	143527 d265ed302bd358f111c05ecfae911893982664b9	yes	24
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	17	
	Claims		18	23	
	Abstract		24	24	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	HOB_1001_Figs_Final.pdf	25425 a2c9c97c40d6d4ed7cf6ee81d3a369fbc20a5fb7	no	3
Warnings:					
Information:					
Total Files Size (in bytes):			286886		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

Date: 05/10/10

PTO/SB/06 (12-04)

Approved for use through 7/31/2006. 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 12/777,134	
APPLICATION AS FILED – PART I						
(Column 1)		(Column 2)		SMALL ENTITY		OR
OTHER THAN SMALL ENTITY						
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A		N/A	330
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A		N/A	540
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A		N/A	220
TOTAL CLAIMS (37 CFR 1.16(i))	27	minus 20 = 7	x\$26		x\$52	364
INDEPENDENT CLAIMS (37 CFR 1.16(h))	7	minus 3 = 4	x\$110		x\$220	880
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$260 (\$130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR					
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			195		390	
			TOTAL		TOTAL	2334
* If the difference in column 1 is less than zero, enter "0" in column 2.						
APPLICATION AS AMENDED – PART II						
(Column 1)		(Column 2)		(Column 3)		
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY		OR
	Total (37 CFR 1.16(i))	Minus **	=	RATE (\$)	ADDITIONAL FEE (\$)	OTHER THAN SMALL ENTITY
	Independent (37 CFR 1.16(h))	Minus ***	=	X =		RATE (\$)
	Application Size Fee (37 CFR 1.16(s))			X =		ADDITIONAL FEE (\$)
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			N/A		N/A
			TOTAL		TOTAL	
			ADD'T FEE		ADD'T FEE	
(Column 1)		(Column 2)		(Column 3)		
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	SMALL ENTITY		OR
	Total (37 CFR 1.16(i))	Minus **	=	RATE (\$)	ADDITIONAL FEE (\$)	OTHER THAN SMALL ENTITY
	Independent (37 CFR 1.16(h))	Minus ***	=	X =		RATE (\$)
	Application Size Fee (37 CFR 1.16(s))			X =		ADDITIONAL FEE (\$)
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			N/A		N/A
			TOTAL		TOTAL	
			ADD'T FEE		ADD'T FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** 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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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
12/777,134	05/10/2010	3641	0.00	HOB-1001	27	7

CONFIRMATION NO. 3713

91477

Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

FILING RECEIPT



OC000000041694357

Date Mailed: 05/21/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Ron Brawer, Residence Not Provided;

Power of Attorney: None

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 05/19/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/777,134**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

SOFT-PROJECTILE LAUNCHING DEVICE

Preliminary Class

124

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent

page 1 of 3

in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/777,134	05/10/2010	Ron Brawer	HOB-1001

CONFIRMATION NO. 3713

FORMALITIES LETTER



91477
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

Date Mailed: 05/21/2010

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
Applicant must submit \$330 to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).
- The oath or declaration is missing.
A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **\$1244** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **\$130** for a non-small entity, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$2464** for a non-small entity

- **\$330** Statutory basic filing fee.
- **\$130** Surcharge.
- The application search fee has not been paid. Applicant must submit **\$540** to complete the search fee.

- The application examination fee has not been paid. Applicant must submit **\$220** to complete the examination fee for a non-small entity.
- Total additional claim fee(s) for this application is **\$1244**
 - **\$880** for **4** independent claims over 3.
 - **\$364** for **7** total claims over 20.

Replies should be mailed to:

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Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.

<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/smunpanthovong/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: December 21, 2010
Electronic Signature for Rosa Bugarin: /Rosa Bugarin/

Docket No.: H6845.1001-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Keith G. Meggs et al.

Application No.: 12/777,134

Filed: May 10, 2010

For: SOFT-PROJECTILE LAUNCHING DEVICE

Confirmation No.: 3713

Art Unit:

Examiner: Not Yet Assigned

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION

MS Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Notice to File Missing Parts of Application – Filing Date Granted mailed May 21, 2010, Applicant respectfully submits a Declaration, an Application Data Sheet, and a Petition for Extension of Time.

Please charge our Credit Card in the amount of \$2,407.00 covering the fees set forth in 37 CFR 1.17(a)(5), 1.16(f), 1.16(a)(1), 1.16(k), 1.16(o), 1.16(i), and 1.16(h). 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. 04-1073, under Order No. H6845.1001-US.

Dated: December 21, 2010

Respectfully submitted,
Electronic signature: /David A. Randall/
David A. Randall
Registration No.: 37,217
DICKSTEIN SHAPIRO LLP
2049 Century Park East Suite 700
Los Angeles, California 90067-3109
(310) 772-8300
Attorney for Applicant

DOCSLA-65370v1

Declaration for Patent Application English Language Declaration		Attorney Docket No.	H6845.1001-US	
		First Named Inventor	Keith G. Meggs	
		COMPLETE IF KNOWN:		
☐ Submitted with initial filing ☒ Submitted after initial filing (surcharge required 37 CFR 1.16(e))	Application No.	12/777,134-Conf. #3713		
	Filing Date	May 10, 2010		
	Art Unit	Not Yet Assigned		
	Examiner	Not Yet Assigned		

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SOFT-PROJECTILE LAUNCHING DEVICE

the specification of which

☐ is attached hereto
OR
☒ was filed on 05/10/2010
as United States Application No. or PCT International Application No. 12/777,134
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

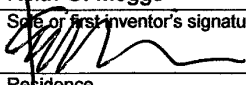
I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign applications(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's right certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed	Certified Copy Attached	
				YES	NO
(Number)	(Country)	(Filing Date)	☐	☐	☐
(Number)	(Country)	(Filing Date)	☐	☐	☐
(Number)	(Country)	(Filing Date)	☐	☐	☐

☐ Additional prior foreign applications are listed on a supplemental data sheet attached hereto.

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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Keith G. Meggs	
Signature of first inventor's signature 	Date 21 DEC 2010
Residence Rancho Palos Verdes, California	
Citizenship US	
Mailing Address 6023 Scotmist Drive Rancho Palos Verdes, California 90275	
Full name of second inventor Ronald Brawer	
Second inventor's signature	Date
Residence Manhattan Beach, California	
Citizenship US	
Mailing Address 752 14th Street Manhattan Beach, California 90266	
Full name of third inventor Michael G. Hoeting	
Third inventor's signature	Date
Residence Cincinnati, Ohio	
Citizenship US	
Mailing Address 3758 Drakewood Drive Cincinnati, Ohio 45209	

Full name of fourth inventor, if any Neil Hamilton	
Fourth inventor's signature	Date
Residence Covington, Kentucky	
Citizenship US	
Mailing Address 596 Brandtly Ridge Covington, Kentucky 41015	

Declaration for Patent Application English Language Declaration		Attorney Docket No.	H6845.1001-US	
		First Named Inventor	Keith G. Meggs	
		COMPLETE IF KNOWN:		
☐ Submitted with initial filing ☒ Submitted after initial filing (surcharge required 37 CFR 1.16(e))	Application No.	12/777,134-Conf. #3713		
	Filing Date	May 10, 2010		
	Art Unit	Not Yet Assigned		
	Examiner	Not Yet Assigned		

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SOFT-PROJECTILE LAUNCHING DEVICE

the specification of which

☐ is attached hereto
OR
☒ was filed on 05/10/2010
as United States Application No. or PCT International Application No. 12/777,134
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign applications(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's right certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed	Certified Copy Attached	
				YES	NO
_____ (Number)	_____ (Country)	_____ (Filing Date)	☐	☐	☐
_____ (Number)	_____ (Country)	_____ (Filing Date)	☐	☐	☐
_____ (Number)	_____ (Country)	_____ (Filing Date)	☐	☐	☐

☐ Additional prior foreign applications are listed on a supplemental data sheet attached hereto.

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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Keith G. Meggs	
Sole or first inventor's signature	Date
Residence Rancho Palos Verdes, California	
Citizenship US	
Mailing Address 6023 Scotmist Drive Rancho Palos Verdes, California 90275	
Full name of second inventor Ronald Brawer	
Second inventor's signature <i>Ronald Brawer</i>	Date <i>December 19, 2010</i>
Residence Manhattan Beach, California	
Citizenship US	
Mailing Address 752 14th Street Manhattan Beach, California 90266	
Full name of third inventor Michael G. Hoeting	
Third inventor's signature	Date
Residence Cincinnati, Ohio	
Citizenship US	
Mailing Address 3758 Drakewood Drive Cincinnati, Ohio 45209	

Full name of fourth inventor, if any Neil Hamilton	
Fourth inventor's signature	Date
Residence Covington, Kentucky	
Citizenship US	
Mailing Address 596 Brandtly Ridge Covington, Kentucky 41015	

Declaration for Patent Application English Language Declaration		Attorney Docket No.	H6845.1001-US
		First Named Inventor	Keith G. Meggs
COMPLETE IF KNOWN:			
☐ Submitted with initial filing ☒ Submitted after initial filing (surcharge required 37 CFR 1.16(e))	Application No.	12/777,134-Conf. #3713	
	Filing Date	May 10, 2010	
	Art Unit	Not Yet Assigned	
	Examiner	Not Yet Assigned	

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SOFT-PROJECTILE LAUNCHING DEVICE

the specification of which

☐ is attached hereto
OR
☒ was filed on 05/10/2010
as United States Application No. or PCT International Application No. 12/777,134
and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

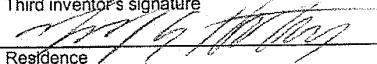
I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application.

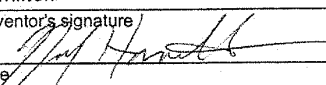
I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's right certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed	Certified Copy Attached	
				YES	NO
(Number)	(Country)	(Filing Date)	☐	☐	☐
(Number)	(Country)	(Filing Date)	☐	☐	☐
(Number)	(Country)	(Filing Date)	☐	☐	☐

☐ Additional prior foreign applications are listed on a supplemental data sheet attached hereto.

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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Keith G. Meggs	
Sole or first inventor's signature	Date
Residence Rancho Palos Verdes, California	
Citizenship US	
Mailing Address 6023 Scotmist Drive Rancho Palos Verdes, California 90275	
Full name of second inventor Ronald Brawer	
Second inventor's signature	Date
Residence Manhattan Beach, California	
Citizenship US	
Mailing Address 752 14th Street Manhattan Beach, California 90266	
Full name of third inventor Michael G. Hoeting	
Third inventor's signature 	Date 12-20-10
Residence Cincinnati, Ohio	
Citizenship US	
Mailing Address 3758 Drakewood Drive Cincinnati, Ohio 45209	

Full name of fourth inventor, if any Neil Hamilton	
Fourth inventor's signature 	Date 12-20-10
Residence Covington, Kentucky	
Citizenship US	
Mailing Address 596 Brandtly Ridge Covington, Kentucky 41015	

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2009 <i>(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)</i>		Docket Number (Optional) H6845.1001-US																									
Application Number 12/777,134-Conf. #3713		Filed May 10, 2010																									
For SOFT-PROJECTILE LAUNCHING DEVICE																											
Art Unit 3641		Examiner Not Yet Assigned																									
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): <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 15%; text-align: center;"><u>Fee</u></th> <th style="width: 15%; text-align: center;"><u>Small Entity Fee</u></th> <th style="width: 30%;"></th> </tr> </thead> <tbody> <tr> <td>☐ One month (37 CFR 1.17(a)(1))</td> <td style="text-align: center;">\$130</td> <td style="text-align: center;">\$65</td> <td>\$ _____</td> </tr> <tr> <td>☐ Two months (37 CFR 1.17(a)(2))</td> <td style="text-align: center;">\$490</td> <td style="text-align: center;">\$245</td> <td>\$ _____</td> </tr> <tr> <td>☐ Three months (37 CFR 1.17(a)(3))</td> <td style="text-align: center;">\$1110</td> <td style="text-align: center;">\$555</td> <td>\$ _____</td> </tr> <tr> <td>☐ Four months (37 CFR 1.17(a)(4))</td> <td style="text-align: center;">\$1730</td> <td style="text-align: center;">\$865</td> <td>\$ _____</td> </tr> <tr> <td>☒ Five months (37 CFR 1.17(a)(5))</td> <td style="text-align: center;">\$2350</td> <td style="text-align: center;">\$1175</td> <td>\$ <u>1,175.00</u></td> </tr> </tbody> </table> ☒ Applicant claims small entity status. See 37 CFR 1.27. ☐ A check in the amount of the fee is enclosed. ☒ Payment by credit card. ☐ The Director has already been authorized to charge fees in this application to a Deposit Account. ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>04-1073</u>. 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/inventor. ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96). ☒ attorney or agent of record. Registration Number <u>37,217</u> ☐ attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____ _____ /David A. Randall/ Signature _____ David A. Randall Typed or printed name _____ December 21, 2010 Date _____ (310) 772-8354 Telephone Number NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below. ☐ Total of <u>1</u> forms are submitted.					<u>Fee</u>	<u>Small Entity Fee</u>		☐ One month (37 CFR 1.17(a)(1))	\$130	\$65	\$ _____	☐ Two months (37 CFR 1.17(a)(2))	\$490	\$245	\$ _____	☐ Three months (37 CFR 1.17(a)(3))	\$1110	\$555	\$ _____	☐ Four months (37 CFR 1.17(a)(4))	\$1730	\$865	\$ _____	☒ Five months (37 CFR 1.17(a)(5))	\$2350	\$1175	\$ <u>1,175.00</u>
	<u>Fee</u>	<u>Small Entity Fee</u>																									
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☒ Five months (37 CFR 1.17(a)(5))	\$2350	\$1175	\$ <u>1,175.00</u>																								

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: December 21, 2010

Electronic Signature for Rosa Bugarin: /Rosa Bugarin/

Electronic Patent Application Fee Transmittal				
Application Number:		12777134		
Filing Date:		10-May-2010		
Title of Invention:		SOFT-PROJECTILE LAUNCHING DEVICE		
First Named Inventor/Applicant Name:		Ron Brawer		
Filer:		David A. Randall./Rosa Bugarin		
Attorney Docket Number:		HOB-1001		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Claims in excess of 20	2202	7	26	182
Independent claims in excess of 3	2201	4	110	440
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Late filing fee for oath or declaration	2051	1	65	65
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 5 months with \$0 paid	2255	1	1175	1175
Miscellaneous:				
Total in USD (\$)				2324

Electronic Acknowledgement Receipt	
EFS ID:	9091596
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Ron Brawer
Customer Number:	91477
Filer:	David A. Randall./Rosa Bugarin
Filer Authorized By:	David A. Randall.
Attorney Docket Number:	HOB-1001
Receipt Date:	21-DEC-2010
Filing Date:	10-MAY-2010
Time Stamp:	19:51:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2324
RAM confirmation Number	8677
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Applicant Response to Pre-Exam Formalities Notice	H6845_1001-US_Response_to_Missing_Parts.pdf	99304 170beb4518dc5805dfe7e3cfe85f49be9c03a4	no	1
Warnings:					
Information:					
2	Oath or Declaration filed	H6845_1001_KeithDeclaration.pdf	116766 33fe7e1578eeb649859ec6b6d17a907a119b08b4	no	3
Warnings:					
Information:					
3	Oath or Declaration filed	H6845_1001_US_RonDeclaration.pdf	114373 d73c51fa9d78853f9e47c6800878394b59a151e1	no	3
Warnings:					
Information:					
4	Oath or Declaration filed	H6845_1001_US_MichaelNeilDecl.pdf	144552 8c24e1ecd8957a2eb1080839573bc9e3e399e173	no	3
Warnings:					
Information:					
5	Extension of Time	H5645_1001_US_Petition_for_Extension_of_Time.pdf	118025 f13c7e5623595e34ef9131d8b1d5623810d5115a	no	1
Warnings:					
Information:					
6	Fee Worksheet (PTO-875)	fee-info.pdf	41775 069ba3cb186722532d48f2563be17b2db03d5af4	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			634795		

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.



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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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
12/777,134	05/10/2010	3641	1149	H6845.1001-US	27	7

CONFIRMATION NO. 3713

UPDATED FILING RECEIPT



OC000000045201399

91477
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

Date Mailed: 01/04/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Keith G. Meggs, Rancho Palos Verdes, CA;
Ronald Brawer, Manhattan Beach, CA;
Michael G. Hoeting, Cincinnati, OH;
Neil Hamilton, Covington, KY;

Power of Attorney: None

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 05/19/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/777,134**

Projected Publication Date: 11/10/2011

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

SOFT-PROJECTILE LAUNCHING DEVICE

Preliminary Class

124

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER**Title 35, United States Code, Section 184****Title 37, Code of Federal Regulations, 5.11 & 5.15****GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 12/777,134				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	82		N/A				
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A	270		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	110		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	27	minus 20 = *	7	x 26 =	182	OR				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	7	minus 3 = *	4	x 110 =	440					
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 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).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	1084		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** 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 found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US

CONFIRMATION NO. 3713

PUBLICATION NOTICE



OC000000050902544

91477
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

Title:SOFT-PROJECTILE LAUNCHING DEVICE

Publication No.US-2011-0271940-A1

Publication Date:11/10/2011

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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P.O. Box 1450
Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713
91477	7590	02/02/2012	EXAMINER	
Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067			DAVID, MICHAEL D	
			ART UNIT	PAPER NUMBER
			3641	
			MAIL DATE	DELIVERY MODE
			02/02/2012	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	12/777,134	MEGGS ET AL.	
	Examiner	Art Unit	
	MICHAEL DAVID	3641	

-- 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 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 10 May 2010.

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) 1-27 is/are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☐ Claim(s) ____ is/are allowed.

7) ☐ Claim(s) ____ is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☒ Claim(s) 1-27 are subject to restriction and/or election requirement.

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).

12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some c) ☐ None of:
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)	4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____.
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) ☐ Notice of Informal Patent Application
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____.	6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-12, drawn to projectile launcher, classified in class 124, subclass 56.
 - II. Claims 13-17, drawn to ammunition, classified in class 102, subclass 501.
 - III. Claims 18-23 and 27, drawn to a magazine or ammunition holder, classified in class 42, subclass 49.01.
 - IV. Claims 24-25, drawn to a method of making projectiles, classified in class 86, subclass 18.
 - V. Claim 26, drawn to a kit for making projectiles, classified in class 86, subclass 1.1.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I, II, and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination I (projectile launcher) has separate utility such as with ammunition different than that of claim 13, or with a magazine/holder different than that of claims 18 or 27. The same holds true for Subcombinations II (ammunition) and III (magazine/ammunition holder). See MPEP § 806.05(d).

The examiner has required restriction between subcombinations usable together. Where applicant elects a subcombination and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

3. Inventions (I, II, or III) and IV are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product. See MPEP § 806.05(h). In the instant case the product (claims 1, 7, 13, 18, and 27) as claimed can be used in a materially different process of using the product such as one that does not require a liquid (as required by process claim 24).

4. Inventions (I-IV) and V are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, at least invention V is a kit that includes instructions for making projectiles, while inventions I-IV do not have instructions.

5. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because at least the following reason(s) apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);**
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election

shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

7. The examiner has required restriction between product and process claims. Where applicant elects claims directed to the product, and the product claims are subsequently found allowable, withdrawn process claims that depend from or otherwise require all the limitations of the allowable product claim will be considered for rejoinder. All claims directed to a nonelected process invention must require all the limitations of an allowable product claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product are found allowable, an otherwise proper restriction requirement between product claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product claim will not be rejoined. See MPEP § 821.04(b). Additionally, in order to retain the right to rejoinder in accordance with the above policy, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product claims. **Failure to do so may result in a loss of the right to rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL DAVID whose telephone number is (571)270-3737. The examiner can normally be reached on Monday-Friday, 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 571-272-6873. 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.

/Michael David/
Primary Examiner, Art Unit 3641

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: March 2, 2012
Electronic Signature for Rosa Bugarin : /Rosa Bugarin/

Docket No.: H6845.1001-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Keith G. Meggs

Application No.: 12/777,134

Confirmation No.: 3713

Filed: May 10, 2010

Art Unit: 3641

For: SOFT-PROJECTILE LAUNCHING DEVICE

Examiner: Michael D. David

RESPONSE TO RESTRICTION REQUIREMENT

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the restriction requirement set forth in the Office Action mailed February 2, 2012, Applicants hereby elect Group II without traverse for initial examination on the merits. Group II includes claims 13-17 drawn to ammunition for a projection device. Applicants reserve the right to file divisional applications to pursue non-elected claims.

Dated: March 2, 2012

Respectfully submitted,

Electronic signature: /David A. Randall/
David A. Randall
Registration No.: 37,217
DICKSTEIN SHAPIRO LLP
2049 Century Park East Suite 700
Los Angeles, California 90067-3109
(310) 772-8300
Attorney for Applicant

DOCSLA-89835v1

Electronic Acknowledgement Receipt	
EFS ID:	12217393
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	David A. Randall./Rosa Bugarin
Filer Authorized By:	David A. Randall.
Attorney Docket Number:	H6845.1001-US
Receipt Date:	02-MAR-2012
Filing Date:	10-MAY-2010
Time Stamp:	19:04:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response to Election / Restriction Filed	H6845_1001-US_Response_to_Restriction_Reeq.pdf	99913 97ee275c2bc5ed38795e7cff85c49258c7188453	no	1

Warnings:

Information:

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.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: March 16, 2012
Electronic Signature for Rosa Bugarin : /Rosa Bugarin/

Docket No.: H6845.1001-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Keith G. Meggs

Application No.: 12/777,134

Confirmation No.: 3713

Filed: May 10, 2010

Art Unit: 3641

For: SOFT-PROJECTILE LAUNCHING DEVICE

Examiner: Michael D. David

FIRST PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INTRODUCTORY COMMENTS

Prior to the examination on the merits, please amend the above identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of the claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

DOCSLA-89912v3

AMENDMENTS TO THE CLAIMS

Claims 1-12 (Cancelled)

13. (Original) Ammunition for a projection device, the ammunition comprising:
a predetermined number of soft-projectiles made from a super absorbent polymer;
and
a sealed container for storing the predetermined number of soft projectiles made
from a super absorbent polymer.

14. (Original) The ammunition for a projection device of claim 13 wherein the sealed
container comprises a magazine.

15. (Currently Amended) The ammunition for a projection device of claim 13 wherein
the ~~plurality of~~ soft-projectiles are hydrated.

16. (Currently Amended) The ammunition for a projection device of claim 13 wherein
the ~~plurality of~~ soft-projectiles have a diameter of less than about 10 millimeters.

17. (Currently Amended) The ammunition for a projection device of claim 13 wherein
the ~~plurality of~~ soft-projectiles have a diameter of more than about 4mm and less than about 9mm.

Claims 18-27 (Cancelled)

28. (New) The ammunition for a projection device of claim 15, wherein the hydrated
soft-projectiles are substantially spherical.

29. (New) The ammunition for a projection device of claim 28, wherein the hydrated
soft-projectiles are colored.

30. (New) The ammunition for a projection device of claim 15, wherein the super
absorbent polymer has a sufficient cross linking density to substantially prevent the soft-projectiles

from breaking apart when launched from a projection device for which the soft-projectiles are designed to be launched.

31. (New) Ammunition for a projectile launcher comprising:
a plurality of soft-projectiles having the same shape, each soft projectile being formed from hydrated super absorbent polymer.

32. (New) The ammunition of claim 31, wherein the ammunition is disposed within a feed chamber of a projectile launcher.

33. (New) The ammunition of claim 32, wherein the feed chamber is in selective communication with a barrel of the projectile launcher.

34. (New) The ammunition of claim 31, wherein the soft-projectiles are substantially spherical.

35. (New) The ammunition of claim 34, wherein the soft-projectiles have a diameter of less than about 10 millimeters.

36. (New) The ammunition of claim 34, wherein the soft-projectiles have a diameter greater than about 4mm and less than about 9mm.

37. (New) The ammunition of claim 32, wherein the super absorbent polymer has a cross linking density sufficient to prevent the soft-projectiles from breaking apart when launched from the projectile launcher.

38. (New) A projectile launcher including the ammunition of claim 31 disposed within a feed chamber of the projectile launcher, and wherein the projectile launcher is adapted to load a soft-projectile from the feed chamber to a firing position.

39. (New) The projectile launcher of claim 38, wherein the projectile launcher is a toy.

40. (New) The projectile launcher of claim 38, wherein the projectile launcher is in the shape of a gun.

41. (New) The projectile launcher of claim 38, wherein the feed chamber is provided within a magazine.

42. (New) The projectile launcher of claim 38, wherein the soft-projectiles are substantially spherical.

43. (New) The projectile launcher of claim 38, wherein the super absorbent polymer has a cross linking density sufficient to prevent the soft-projectiles from breaking apart when launched from the projectile launcher.

44. (New) The projectile launcher of claim 38, wherein the projectile launcher is designed to use air pressure to launch the soft-projectiles.

45. (New) The projectile launcher of claim 38, further comprising a firing mechanism that stores energy independent of a user.

46. (New) The projectile launcher of claim 38, further comprising a firing mechanism that is incapable of storing energy independent of a user.

47. (New) The projectile launcher of claim 38, further comprising a firing mechanism that directly applies a force to a soft-projectile located in the firing position to launch the soft-projectile from the projectile launcher in free flight.

48. (New) The projectile launcher of claim 38, further comprising a firing mechanism that indirectly applies a force to a soft-projectile located in the firing position to launch the soft-projectile from the projectile launcher in free flight.

49. (New) The projectile launcher of claim 38, further comprising:

an air compression chamber;
a piston disposed within and axially aligned with the air compression chamber; and
a spring operatively arranged to bias the piston toward a rest position from a cocked position within the air compression chamber.

50. (New) The projectile launcher of claim 49, further comprising a smaller diameter tube in communication with the air compression chamber, and wherein a biasing force of the spring is sufficient to cause the piston to move from the cocked position to the rest position to force air from the air compression chamber into the smaller diameter tube and cause a soft-projectile located at the firing position to accelerate and be launched from the projectile launcher.

51. (New) The projectile launcher of claim 38, wherein the absorbency of the super absorbent polymer is sufficiently limited to allow the soft-projectiles to be launched from the projectile launcher without breaking apart.

52. (New) A projectile launching system, comprising:
ammunition comprising a plurality of soft-projectiles formed from hydrated super absorbent polymer; and
a projectile launcher for launching the ammunition in free flight.

53. (New) The system of claim 52, further comprising a sealed container for storage of the ammunition.

54. (New) The system of claim 52, wherein the projectile launcher is a toy.

55. (New) The system of claim 52, wherein the projectile launcher is in the shape of a gun.

56. (New) The system of claim 52, wherein the projectile launcher includes a feed chamber for loading the soft-projectiles within projectile launcher.
57. (New) The system of claim 56, wherein the feed chamber is provided within a magazine.
58. (New) The system of claim 56, wherein the projectile launcher is adapted to load the soft-projectiles from the feed chamber to a firing position of the projectile launcher.
59. (New) The system of claim 52, wherein the soft-projectiles are substantially spherical.
60. (New) The system of claim 52, wherein the super absorbent polymer has a cross linking density sufficient to prevent the soft-projectiles from breaking apart when launched from the projectile launcher.
61. (New) The system of claim 52, wherein the projectile launcher is designed to use air pressure to launch the soft-projectiles.
62. (New) The system of claim 52, wherein the projectile launcher comprises a firing mechanism that stores energy independent of a user.
63. (New) The system of claim 52, wherein the projectile launcher comprises a firing mechanism that is incapable of storing energy independent of a user.
64. (New) The system of claim 52, wherein the projectile launcher comprises a firing mechanism that directly applies a force to the ammunition.
65. (New) The system of claim 52, wherein the projectile launcher comprises a firing mechanism that indirectly applies a force to the ammunition.

Claims 13-17 and 28-65 remain pending in the application. Applicants have cancelled claims 1-12 and 18-27 to simplify the prosecution and not for reasons of patentability. Applicants have also amended claims 15-17 to broaden certain aspects of the subject matter claimed in each of those claims.

In addition, Applicants have added new claims 28-65 to more fully protect the various aspects of the disclosed embodiments. All of the new claims correspond to the elected Group II of the restriction requirement mailed February 2, 2012 because all of the new claims include the limitation of ammunition corresponding to Group II Applicant elected in response to the February 2, 2012 restriction requirement.

In view of the foregoing, Applicants respectfully submit that the present application is in condition for allowance and request an early indication of the same.

Dated: March 16, 2012

Respectfully submitted,

Electronic signature: /David A. Randall/

David A. Randall

Registration No.: 37,217

DICKSTEIN SHAPIRO LLP

2049 Century Park East Suite 700

Los Angeles, California 90067-3109

(310) 772-8300

Attorney for Applicant

Electronic Acknowledgement Receipt	
EFS ID:	12327865
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	Paul Graham Novak/Rosa Bugarin
Filer Authorized By:	Paul Graham Novak
Attorney Docket Number:	H6845.1001-US
Receipt Date:	16-MAR-2012
Filing Date:	10-MAY-2010
Time Stamp:	17:38:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	H6845_1001-US_Preliminary_Amendment.pdf	117578 7902b97ea5e0e1b24b4c289a4d8328b3b5de49b3	no	7

Warnings:

Information:

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New Applications Under 35 U.S.C. 111

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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.

Electronic Patent Application Fee Transmittal				
Application Number:		12777134		
Filing Date:		10-May-2010		
Title of Invention:		SOFT-PROJECTILE LAUNCHING DEVICE		
First Named Inventor/Applicant Name:		Keith G. Meggs		
Filer:		Paul Graham Novak/Rosa bugarin		
Attorney Docket Number:		H6845.1001-US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Claims in excess of 20	2202	26	30	780
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				780

Electronic Acknowledgement Receipt	
EFS ID:	12329110
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	Paul Graham Novak/Rosa bugarin
Filer Authorized By:	Paul Graham Novak
Attorney Docket Number:	H6845.1001-US
Receipt Date:	16-MAR-2012
Filing Date:	10-MAY-2010
Time Stamp:	19:25:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$780
RAM confirmation Number	6223
Deposit Account	041073
Authorized User	RANDALL,DAVID
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	30507 a13e7bc69733a8cf7adcc77f54d8b93b1e3bdoec	no	2

Warnings:

Information:

Total Files Size (in bytes):	30507
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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.

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 12/777,134		Filing Date 05/10/2010		☐ To be Mailed			
APPLICATION AS FILED – PART I												
(Column 1)			(Column 2)			SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY				
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A		N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A		N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*		X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*		X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 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))												
					TOTAL			TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.												
APPLICATION AS AMENDED – PART II												
(Column 1)			(Column 2)			(Column 3)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY	
AMENDMENT	03/16/2012	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 27	Minus	** 27	= 0	X \$30 =	0	OR	X \$ =			
	Independent (37 CFR 1.16(h))	* 7	Minus	*** 7	= 0	X \$125 =	0	OR	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))											
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
						TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))											
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** 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.												

Legal Instrument Examiner:
/DEBORAH NASH/

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713
91477	7590	04/13/2012	EXAMINER	
Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067			DAVID, MICHAEL D	
			ART UNIT	PAPER NUMBER
			3641	
			MAIL DATE	DELIVERY MODE
			04/13/2012	PAPER

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.

Office Action Summary	Application No. 12/777,134	Applicant(s) MEGGS ET AL.	
	Examiner MICHAEL DAVID	Art Unit 3641	

-- 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 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 16 March 2012.

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) 13 and 28-65 is/are pending in the application.

5a) Of the above claim(s) ____ is/are withdrawn from consideration.

6) ☐ Claim(s) ____ is/are allowed.

7) ☐ Claim(s) ____ is/are rejected.

8) ☐ Claim(s) ____ is/are objected to.

9) ☒ Claim(s) 13 and 28-65 are subject to restriction and/or election requirement.

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).

12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: ____.

DETAILED ACTION

In light of the amendments and new claims submitted on 3/16/2012, a new restriction requirement is set forth below.

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 13-17 and 28-30, drawn to ammunition and a magazine/container, classified in class 42, subclass 49.01.
 - II. Claims 31-51, drawn to ammunition, classified in class 102, subclass 501.
 - III. Claims 52-65, drawn to a launcher and ammunition, classified in class 124, subclass 56.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions (I or III) and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination (I or III) as claimed does not require the particulars of the subcombination as claimed because they do not require a plurality of soft projectiles having the same shape. The subcombination has separate utility such as in a magazine/container different than that of claim 13 (or on their own, without even a magazine), or in a projectile launcher different than that of claim 52 (or on their own, without even a projectile launcher).

The examiner has required restriction between combination and subcombination inventions. Where applicant elects a subcombination, and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

3. Inventions I and III are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination I has separate utility such as on their own or in a launcher different than subcombination III. Subcombination III has separate utility such as on their own or in a magazine/container different than subcombination I. See MPEP § 806.05(d).

The examiner has required restriction between subcombinations usable together. Where applicant elects a subcombination and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a

claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

2. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because at least the following reason(s) apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);**
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

4. The examiner has required restriction between product and process claims. Where applicant elects claims directed to the product, and the product claims are subsequently found allowable, withdrawn process claims that depend from or otherwise

require all the limitations of the allowable product claim will be considered for rejoinder.

All claims directed to a nonelected process invention must require all the limitations of an allowable product claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product are found allowable, an otherwise proper restriction requirement between product claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product claim will not be rejoined. See MPEP § 821.04(b). Additionally, in order to retain the right to rejoinder in accordance with the above policy, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product claims. **Failure to do so may result in a loss of the right to rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL DAVID whose telephone number is (571)270-3737. The examiner can normally be reached on Monday-Friday, 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 571-272-6873. 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.

/Michael David/
Primary Examiner, Art Unit 3641

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: August 3, 2012
Electronic Signature for: Pia Murphy : /Pia Murphy/

Docket No.: H6845.1001-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Keith G. Meggs et al.

Application No.: 12/777,134

Confirmation No.: 3713

Filed: May 10, 2010

Art Unit: 3641

For: SOFT-PROJECTILE LAUNCHING DEVICE

Examiner: M. D. David

RESPONSE TO RESTRICTION REQUIREMENT

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the restriction requirement set forth in the Office Action mailed April 13, 2012, Applicants hereby elect Group II, claims 31-51, without traverse for continued examination.

Applicants reserve the right to file divisional applications to pursue the non-elected claims.

Dated: August 3, 2012

Respectfully submitted,

Electronic signature: /David A. Randall/
David A. Randall

Registration No.: 37,217
DICKSTEIN SHAPIRO LLP
2049 Century Park East Suite 700
Los Angeles, California 90067-3109
(310) 772-8300
Attorney for Applicants

DOCSLA-98105v1

Electronic Patent Application Fee Transmittal				
Application Number:		12777134		
Filing Date:		10-May-2010		
Title of Invention:		SOFT-PROJECTILE LAUNCHING DEVICE		
First Named Inventor/Applicant Name:		Keith G. Meggs		
Filer:		Shyh-Jye Wang/Pia Murphy		
Attorney Docket Number:		H6845.1001-US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
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:				
Extension - 3 months with \$0 paid	2253	1	635	635

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				635

Electronic Acknowledgement Receipt	
EFS ID:	13419518
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	Shyh-Jye Wang/Pia Murphy
Filer Authorized By:	Shyh-Jye Wang
Attorney Docket Number:	H6845.1001-US
Receipt Date:	03-AUG-2012
Filing Date:	10-MAY-2010
Time Stamp:	20:55:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$635
RAM confirmation Number	6494
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Extension of Time	H6845_1001-US_- _Extension_of_Time.pdf	132733 b4d465124cb84bb020a1cb121f3e1f674dc e76fc	no	1
Warnings:					
Information:					
2	Response to Election / Restriction Filed	H6845_1001-US_- _Response_to_Restriction_Req uirement.pdf	107595 6fdc321ca2c87b7e5f54e7bef7b3dd90c4ff3 24f	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30457 cdd4e32e9b7dedc83f6c07f48d45aa24310a c824	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			270785		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2009 <i>(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)</i>		Docket Number (Optional) H6845.1001-US																									
Application Number 12/777,134-Conf. #3713		Filed May 10, 2010																									
For SOFT-PROJECTILE LAUNCHING DEVICE																											
Art Unit 3641		Examiner M. D. David																									
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): <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 15%; text-align: center;"><u>Fee</u></th> <th style="width: 15%; text-align: center;"><u>Small Entity Fee</u></th> <th style="width: 30%;"></th> </tr> </thead> <tbody> <tr> <td>☐ One month (37 CFR 1.17(a)(1))</td> <td style="text-align: center;">\$130</td> <td style="text-align: center;">\$65</td> <td>\$ _____</td> </tr> <tr> <td>☐ Two months (37 CFR 1.17(a)(2))</td> <td style="text-align: center;">\$490</td> <td style="text-align: center;">\$245</td> <td>\$ _____</td> </tr> <tr> <td>☒ Three months (37 CFR 1.17(a)(3))</td> <td style="text-align: center;">\$1110</td> <td style="text-align: center;">\$555</td> <td>\$ 555.00</td> </tr> <tr> <td>☐ Four months (37 CFR 1.17(a)(4))</td> <td style="text-align: center;">\$1730</td> <td style="text-align: center;">\$865</td> <td>\$ _____</td> </tr> <tr> <td>☐ Five months (37 CFR 1.17(a)(5))</td> <td style="text-align: center;">\$2350</td> <td style="text-align: center;">\$1175</td> <td>\$ _____</td> </tr> </tbody> </table> ☒ Applicant claims small entity status. See 37 CFR 1.27. ☐ A check in the amount of the fee is enclosed. ☒ Payment by credit card. ☐ The Director has already been authorized to charge fees in this application to a Deposit Account. ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 04-1073 . 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/inventor. ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96). ☒ attorney or agent of record. Registration Number 37,217 ☐ attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____ _____/David A. Randall/_____ Signature _____/August 3, 2012_____ Date _____/David A. Randall_____ Typed or printed name _____/ (310) 772-8354_____ Telephone Number NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below. ☐ Total of 1 forms are submitted.					<u>Fee</u>	<u>Small Entity Fee</u>		☐ One month (37 CFR 1.17(a)(1))	\$130	\$65	\$ _____	☐ Two months (37 CFR 1.17(a)(2))	\$490	\$245	\$ _____	☒ Three months (37 CFR 1.17(a)(3))	\$1110	\$555	\$ 555.00	☐ Four months (37 CFR 1.17(a)(4))	\$1730	\$865	\$ _____	☐ Five months (37 CFR 1.17(a)(5))	\$2350	\$1175	\$ _____
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I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: August 3, 2012

Electronic Signature for: Pia Murphy : /Pia Murphy/

DOCSLA-98108v1

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 12/777,134		Filing Date 05/10/2010		☐ To be Mailed	
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☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 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))										
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AMENDMENT	08/03/2012	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
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	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =	
	☐ Application Size Fee (37 CFR 1.16(s))							OR		
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
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				Application Number	12/777,134-Conf. #3713
				Filing Date	May 10, 2010
				First Named Inventor	Keith G. Meggs
				Art Unit	3641
				Examiner Name	M. D. David
Sheet	1	of	1	Attorney Docket Number	H6845.1001-US

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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
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Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				
	BA	EP-2253375-A1	11-24-2010	Nippon Catalytic Chem Ind		
	BB	GB-316,645	01-04-1972	Herlach et al.		

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IDS (Citation) by Applicant (13 References) (1 page)



(11) EP 2 253 375 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
24.11.2010 Bulletin 2010/47

(51) Int Cl.:
B01J 20/30 (2006.01) *B01J 20/26* (2006.01)
B65B 31/02 (2006.01) *C08J 3/12* (2006.01)

(21) Application number: 09718585.4

(86) International application number:
PCT/JP2009/054913

(22) Date of filing: 13.03.2009

(87) International publication number:
WO 2009/113678 (17.09.2009 Gazette 2009/38)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR
Designated Extension States:
AL BA RS

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(30) Priority: 13.03.2008 JP 2008064408
28.03.2008 JP 2008088072
25.04.2008 JP 2008115446
25.04.2008 JP 2008115751
18.07.2008 JP 2008187904
18.09.2008 JP 2008238918

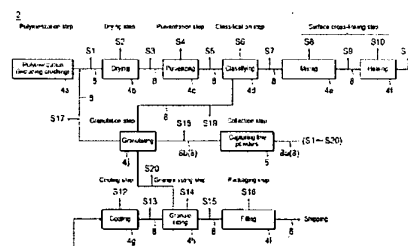
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(54) **METHOD FOR PRODUCTION OF PARTICULATE WATER ABSORBENT COMPRISING WATER-ABSORBABLE RESIN AS MAIN INGREDIENT**

(57) Provided is a production method for the particulate water-absorbing agent, which can contribute to property enhancement, and further improvement of productivity or the like, as well. One example of the production method for the particulate water-absorbing agent relevant to the present invention includes the polymerization step for obtaining a polymer gel; the drying step for drying the polymer gel to obtain a dried substance; the pulverization step for pulverizing the dried substance or the polymer gel to obtain the particulate water-absorbing resin; the classification step for sieving the particulate water-absorbing resin; the granule sizing step for granule sizing the particulate water-absorbing agent obtained from the particulate water-absorbing resin; and the transporting step for transporting the products produced in each of the steps to other steps. Preferably, one or more steps selected from the pulverization step, the classification step, the granule sizing step and the transporting step after the pulverization step are set under reduced pressure state.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

5 TECHNICAL FIELD

[0001] The present invention relates to a method for producing a particulate water-absorbing agent composed principally of a water-absorbing resin.

10 BACKGROUND ART

[0002] In recent years, in hygiene products such as disposable diapers, sanitary napkins and incontinent pads, the water-absorbing resin as a composition material thereof has been widely used, as a water-absorbent agent, in view of absorbing a body liquid. As such a water-absorbing resin, for example, there have been known a cross-linked product of partially neutralized polyacrylic acid, a hydrolysate of a starch-acrylic acid graft polymer, a saponified product of a vinyl acetate-acrylate ester copolymer, a hydrolysate of an acrylonitrile copolymer or an acrylamide copolymer and a cross-linked product thereof, and a cross-linked product of a cationic monomer and the like. This water-absorbing resin may be used after converted to also a sheet-like, fiber-like or film-like form, and, it is generally used in a water-absorbing agent after converted to a powder-like form (particulate). As such powders (particles), for example, the particulate water-absorbing agent, having a weight average particle diameter thereof of about 200 to 800 μm , is used widely. The particulate water-absorbing agent is produced via many steps. These steps may include the polymerization step, the drying step, the pulverization step, the classification step, the surface cross-linking step, and the like.

[0003] In producing the particulate water-absorbing agent, enhancement of various properties are considered. A production step has been studied with an object of enhancing various properties. For example, US-A-2003/087983 (Patent Document 1) discloses a production method for removing metallic foreign substances by a magnetic ray irradiation step. This production method can suppress deterioration of a water-absorbing resin effectively.

[0004] In a production process of the particulate water-absorbing agent, moisture evaporates from a polymer gel or the like. Humidity containing this steam can spread to the whole area of a production facility via a production apparatus or a pipeline of each step. This humidity can generate dew condensation in the inside of the production apparatus or the pipeline. When the particulate water-absorbing resin during the production process absorbs humidity or moisture, the particulate water-absorbing resins themselves may aggregate or the particulate water-absorbing resin tends to attach to the inner surface of the production apparatus or the pipeline, which disturbs stable production. In addition to this, moisture absorption by the particulate water-absorbing resin in the production step may decrease quality of the particulate water-absorbing agent obtained finally.

[0005] In addition, in producing the particulate water-absorbing agent, formation of the fine powders (for example, the fine powders with a particle diameter of below 150 μm) of the water-absorbing resin is accompanied. If the fine powders are contained in disposable diapers and the like, they clog absorbent articles composed of the particulate water-absorbing agent, which causes decrease in liquid permeability of the absorbent articles. In addition, the fine powders influence surface cross-linking effect of the particulate water-absorbing agent, and even if surface cross-linking is performed to the particulate water-absorbing agent containing the fine powders, there can be the case where various properties such as liquid permeability, absorbency against pressure are not enhanced sufficiently.

[0006] Amount of the fine powders generating in producing the particulate water-absorbing agent can become several % by weight to ten and several % by weight, and in certain cases, as many as several tens % by weight of solid content of the polymer gel obtained in the polymerization step, that is, a dry substance or a dried pulverized substance. Because disposal of the fine powders accompanies generation of disposal cost of the fine powders in addition to decrease in yield of the particulate water-absorbing agent, it incurs increase in production cost of the particulate water-absorbing agent. Because the fine powders are inferior in properties, it is difficult to utilize the fine powders to other applications without disposal. Because demand for the fine powders is generally low, it is also difficult to sell the fine powders.

[0007] Accordingly, as a method for obtaining a cheap particulate water-absorbing agent containing less fine powders, many methods for reusing the fine powders, that is, recycling methods for the fine powders have been proposed. As the recycling methods for the fine powders, there are (I) a method for mixing the fine powders as they are into an aqueous solution containing a monomer before polymerization to polymerize (refer to Patent Document 2), (II) a method for mixing the fine powders as they are into a gel in the way of polymerization to polymerize (refer to Patent Documents 3 and 4), (III) a method for mixing the fine powders as they are into a polymer gel obtained by polymerization, (IV) a method for mixing a large particle obtained by granulating the fine powders in aqueous liquid into a polymer gel obtained by polymerization (refer to Patent Document 5) and the like. Among these, in the methods (I) to (III), the fine powders are used as they are. In these methods, uniform mixing of the fine powders is difficult, and further the fine powders absorb a monomer, water or the like and thus could decrease performance thereof. From this viewpoint, a method (IV) is considered

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preferable, which utilizes granulated particles composed of a plurality of the fine powders. In the method (IV), the granulated particles (secondary particles) as large particles are formed by binding the fine powders (single particles) themselves generally by use of water as a binder. Because the aqueous liquid as water is contained in the granulated particles, it is necessary to dry the granulated particles. In addition, as an application of the method (IV), it is also considered a method for making particles by pulverizing the granulated gels (tertiary particles) obtained by further aggregating the granulated particles themselves composed of a plurality of the fine powders. However, this method results in containing a large quantity of water by the granulated gel, and therefore consumes a large quantity of energy for drying the granulated gel. Such a method cannot be said to be a preferable method due to increase in production cost.

[0008] The production method for the particulate water-absorbing agent usually includes the step (surface cross-linking step) for cross-linking the neighborhood of the surface of the water-absorbing resin by adding a surface cross-linking agent to the water-absorbing resin and heating. This step is apt to be accompanied with the step for cooling the particulate water-absorbing agent thus heated. In this cooling step, there may be the case where a method for removing the fine powders of the water-absorbing resin and/or a part of the remaining surface cross-linking agent, while cooling the particulate water-absorbing agent thus heated by the air generated by reduced pressure (refer to Patent Document 6). In this method, surface cross-linking is performed in a state that the fine powders generated in the step before this step are contained as they are. Therefore, the remaining fine powders cannot be removed, and thus there is a problem that the remaining fine powders deteriorate work environment. Because the fine powders deteriorate mixing property of the water-absorbing resin with the surface cross-linking agent, there is also a problem that the neighborhood of the surface of the water-absorbing resin is not cross-linked sufficiently. Further, action of a part of the surface cross-linking agent makes granulation of the remaining fine powders, and the fine powders granulated are crushed in the subsequent steps or in producing an water-absorbing material (for example, in producing absorbent articles such as disposable diapers and the like), and the fine powders thus crushed fly as dust, and thus there are also worry about causing a problem of deterioration of work environment, and a problem that the fine powders thus crushed obstruct performance (for example, liquid permeability) of the absorbent articles.

[0009] In addition, with enhancement of performance of the particulate water-absorbing agent, enhancement of properties of the water-absorbing resin, such as absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC) to be described later, has been required. In order to respond to this request, a firm surface cross-link structure is introduced to the surface of the water-absorbing resin, or many additives (for example, water-insoluble fine particle and the like) are used. However, such steps take a long time process in many cases. Therefore, the water-absorbing resin particles are destroyed to incur by-production of the fine powders. That is, requiring of high property to the water-absorbing resin results in increasing the fine powders in the water-absorbing agent obtained.

PRIOR DOCUMENTS

35 PATENT DOCUMENTS

[0010] Patent Document 1: US-A-2003/087983
 Patent Document 2: USP No.5342899
 Patent Document 3: USP No.4970267
 Patent Document 4: USP No.4950692
 Patent Document 5: USP No.6458921
 Patent Document 6: US-A-2004/0181031

DISCLOSURE OF THE INVENTION

45 PROBLEM TO BE SOLVED BY THE INVENTION

[0011] The methods described in the above publications have attained recycling of the fine powders, and however, it is a present state that removal of the fine powders contained in the particulate water-absorbing agent is not yet sufficient. Because of insufficient removal of the fine powders, there is a problem that various properties, such as liquid permeability, absorbency against pressure, or the like of the particulate water-absorbing agent cannot be enhanced sufficiently.

[0012] In addition, in the particulate water-absorbing agent, ensuring of stable production is required. In particular, in the production facility having an industrial scale, it is important that the facility is operated stably.

[0013] Accordingly, it is an object of the present invention to provide a method for producing the particulate water-absorbing agent, which can contribute to property enhancement, and further improvement of productivity and the like.

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MEANS FOR SOLVING THE PROBLEM

5 [0014] In the present invention, in the method for producing the particulate water-absorbing agent composed principally of the water-absorbing resin, reduced pressure state is used. Conventionally, it has been known in the field of the water-absorbing resin to perform reduced pressure polymerization or reduced pressure drying to prevent thermal deterioration. On the other hand, in the present invention, effectiveness of reduced pressure was found from a viewpoint completely different from the conventional reduced pressure polymerization or reduced pressure drying. That is, the present inventors found that a novel production method for performing reduced pressure in the step after the drying step, that is, in the step including and subsequent to the pulverization step, can contribute to enhancement of property such as liquid permeation or the like. In addition, it was clarified that various factors participate in property enhancement by this reduced pressure.

10 [0015] Further, the present inventors found that the present production method using reduced pressure can contribute to stable production. Further, it was clarified that this production method can also contribute to improvement of work environment.

15 [0016] That is, a method for producing the particulate water-absorbing agent relevant to the present invention includes a polymerization step for obtaining a polymer gel, a drying step for drying the polymer gel to obtain a dried substance, a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin, a classification step for sieving the particulate water-absorbing resin; a transporting step for transporting the products produced in each of the steps to the other steps. In this production method, one or more steps selected from the pulverization step, the classification step and the transporting step after the pulverization step, are set under reduced pressure state.

20 [0017] Another method for producing the particulate water-absorbing agent relevant to the present invention includes a polymerization step for obtaining a polymer gel, a drying step for drying the polymer gel to obtain a dried substance, a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin; a classification step for sieving the particulate water-absorbing resin, a granule sizing step for granule sizing the particulate water-absorbing agent obtained from the particulate water-absorbing resin obtained in the classification step, a transporting step for transporting the products produced in each of the steps to the other steps. In this production method, one or more steps selected from the pulverization step, the classification step, the granule sizing step, and the transporting step after the pulverization step, are set under reduced pressure state.

25 [0018] Another method for producing the particulate water-absorbing agent relevant to the present invention includes a polymerization step for obtaining a polymer gel, a drying step for drying the polymer gel to obtain a dried substance, a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin, a classification step for sieving the particulate water-absorbing resin, a surface cross-linking step for cross-linking the neighborhood of the surface of the particulate water-absorbing resin obtained in the classification step to obtain a particulate water-absorbing agent, a packaging step for filling a packaging material container with the particulate water-absorbing agent for packaging, and a transporting step for transporting the products produced in each of the steps to the other steps. In this production method, one or more steps selected from the pulverization step, the classification step, the surface cross-linking step, the packaging step, and the transporting step after the pulverization step, are set under reduced pressure state.

30 [0019] Another method for producing the particulate water-absorbing agent relevant to the present invention includes, a polymerization step for obtaining a polymer gel, a drying step for drying the polymer gel to obtain a dried substance, a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin, a classification step for sieving the particulate water-absorbing resin, a surface cross-linking step for cross-linking the neighborhood of the surface of the particulate water-absorbing resin obtained in the classification step to obtain a particulate water-absorbing agent, a granule sizing step for granule sizing the particulate water-absorbing agent, a packaging step for filling a packaging material container with the particulate water-absorbing agent for packaging, and a transporting step for transporting the products produced in each of the steps to the other steps. In this production method, one or more steps selected from the pulverization step, the classification step, the surface cross-linking step, the granule sizing step, the packaging step, and the transporting step after the pulverization step, are set under reduced pressure state.

35 [0020] Preferably, the pulverization step is set under reduced pressure state. Preferably, the transporting step performed next to the pulverization step is set under reduced pressure state.

40 [0021] Preferably, all steps including and subsequent to the pulverization step are set under reduced pressure state. The production method of the present invention essentially includes the polymerization step, the drying step, the pulverization step, the classification step and the transporting step, and in addition to these, as needed, includes the surface cross-linking step, the cooling step, the granule sizing step, the packaging step, the collection step and the granulation step. In the present invention, all steps including and subsequent to the pulverization step mean all steps from the pulverization step to the step performed finally in the present production method (the final step). Specifically, among the

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classification step, the surface cross-linking step, the cooling step, the granule sizing step, the packaging step and the transporting step, the step to be performed finally is the final step. For example, in the case of the production method including the packaging step, all steps including and subsequent to the pulverization step mean the step from the pulverization step to the packaging step.

5 [0022] Preferably, the production method of the present invention includes the granulation step.

[0023] Preferably, equal to or more than 50% of total time required including and subsequent to the pulverization step is set under reduced pressure state. For example, equal to or more than 50% of time required from the pulverization step to the packaging step is set under reduced pressure state. That is, preferably, in treatment time required from the pulverization step to the packaging step, time to be under reduced pressure state is set equal to or more than 50%. The final step in the production steps of the present invention is, for example, the packaging step. As the final step in the case of production method not having the packaging step, for example, the transporting step and the granule sizing step and the like are included.

10 [0024] Preferably, the transporting step includes the transporting step by pressurization. Preferably, all steps including and subsequent to the pulverization step are set under reduced pressure state or pressurized state. It should be noted that, it is preferable that the step set under pressurized state is the transporting step. It is preferable that the steps other than the transporting step are not set under pressurized state.

15 [0025] Preferably, degree of reduced pressure relative to atmospheric pressure, of inside of the step under the reduced pressure state is set at over 0 kPa and equal to or lower than 10 kPa.

[0026] Preferably, in the present production method, the particulate water-absorbing resin is an irregular pulverized shaped particle of a polyacrylic acid (salt)-based water-absorbing resin.

20 [0027] Preferably, in the present production method, the polymerization step is performed by continuous kneader polymerization or continuous belt polymerization.

[0028] Preferably, in the present production method, the surface cross-linking step is performed using a surface cross-linking agent having dehydration esterification reactivity of one or more kinds selected from a group consisting of an oxazolidinone compound, an alkylene carbonate compound, a polyvalent alcohol compound, and an oxetane compound, at a temperature in the range of 150 to 250°C.

25 [0029] Preferably, in the present production method, absorbency against non-pressure (CRC) of the particulate water-absorbing agent is equal to or higher than 15 g/g, and saline flow conductivity (SFC) thereof is equal to or higher than $30 (\times 10^{-7} \text{ cm}^3 \cdot \text{s} \cdot \text{g}^{-1})$.

30 [0030] Preferably, in the present production method, content of fine powders of below 150 μm of the water-absorbing agent is below 1% by weight.

ADVANTAGES OF THE INVENTION

35 [0031] In the present invention, by setting inside of the step including and subsequent to the pulverization step to reduced pressure state, property of the particulate water-absorbing agent is enhanced. In addition, by exhaust accompanied with the reduced pressure, dehumidification is performed. By this dehumidification, moisture absorption of the particulate water-absorbing resin in the step is suppressed. Accordingly, aggregation of the particulate water-absorbing resins themselves or attachment of the particulate water-absorbing resin to the apparatus or the like is suppressed, which can stabilize production. Further, in the present invention, the fine powders can be removed effectively. As a result, the particulate water-absorbing agent obtained by the production method of the present invention is superior in various properties such as liquid permeation or absorbency against pressure. In addition, by the present invention, leakage of the fine powders generating in the production steps to the exterior part can be suppressed.

45 BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

50 Fig. 1 is a schematic configuration drawing showing production facility to be used to produce the particulate water-absorbing agent by the production method of the present invention.

Fig. 2 is a drawing showing a schematic configuration of a pulverization apparatus and a classification apparatus contained in the production facility of Fig. 1.

Fig. 3 is a drawing showing a schematic configuration of a granule sizing apparatus contained in the production facility of Fig. 1.

55

BEST MODE FOR CARRYING OUT THE INVENTION

[0033] In the present invention, novel knowledge was obtained that reduced pressure can enhance property of the

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particulate water-absorbing agent. In particular, it was clarified that the effect is significant, in the case where equal to or more than 50% of time required in the step including and subsequent to the pulverization step, is set under reduced pressure state. Explanation will be given below in detail on a method for producing the particulate water-absorbing agent composed principally of the water-absorbing resin relevant to the present invention, and however, scope of the present invention should not be limited to these explanations.

(1) Definition of terms

(a) "The water-absorbing resin"

[0034] In the present description, "the water-absorbing resin" means a water swelling and water insoluble polymer gelling agent, and one having the following properties. That is, it means a polymer gelling agent having an absorbency (CRC/specified in Example) of essentially equal to or higher than 5 g/g, preferably 10 to 100 g/g, and further preferably 20 to 80 g/g, and in addition, extractables (specified in ERT450.2-02 (2002)) of essentially 0 to 50% by weight, preferably 0 to 30% by weight, further preferably 0 to 20% by weight, and particularly preferably 0 to 10% by weight. It should be noted that, the water-absorbing resin is not limited to a form where whole amount (100%) is a polymer, and may include additives and the like to be described later, in a range to maintain the performance.

(b) "Polyacrylic acid (salt)"

[0035] In the present description, "polyacrylic acid (salt)" means a polymer composed principally of acrylic acid (salt) as a repeating unit. Specifically, it means a polymer containing acrylic acid (salt) essentially in 50 to 100% by mole, preferably 70 to 100% by mole, further preferably 90 to 100% by mole, particularly preferably substantially 100% by mole, as a monomer excluding a cross-linking agent. The salt as the polymer contains essentially a water-soluble salt, and is preferably a monovalent salt, and further preferably an alkali metal salt or an ammonium salt. Among them, the alkali metal salt is particularly preferable, and further a sodium salt is preferable.

(c) "The water-absorbing agent"

[0036] In the present description, "the water-absorbing agent" means a gelling agent of aqueous liquid, composed principally of the water-absorbing resin. It should be noted that, the aqueous liquid is not limited to water, and may be urine, blood, feces, waste liquid, moisture or steam, ice, a mixture of water and organic solvent and/or inorganic solvent, rain water, underground water or the like, and not especially limited as long as it contains water. Among them, as the aqueous liquid, more preferably urine, in particular human urine is included. Content of the water-absorbing resin (polyacrylic acid (salt)-based water-absorbing resin) relevant to the present invention is preferably 70 to 99.9% by weight, more preferably 80 to 99.7% by weight, and further preferably 90 to 99.5% by weight relative to total amount. As components other than the water-absorbing resin, in view of water absorbing speed or impact resistance of powders (particles), water is preferable and the additives to be described later are contained, as needed.

(d) "EDANA" and "ERT"

[0037] "EDANA" is an abbreviation of European Disposables and Nonwovens Association, and "ERT" is an abbreviation of the measurement method (ERT/EDANA Recommended Test Methods) for the water-absorbing resin of an European standard (nearly a world standard). In the present description, unless otherwise specified, the ERT original (known document: revised in 2002) is referred to in measuring properties of the water-absorbing resin.

(e) "The particle"

[0038] In the present description, "the particle" means a solid having fluidity of a particle diameter of equal to or smaller than 5 mm, specified by sieve classification. Water content is not especially limited as long as it is a solid, but, usually it is below 30% by weight, and further preferably equal to or less than 20% by weight. In addition, the lower limit of the particle diameter is, for example, 1 nm. Further, it may be enough to have a certain fluidity as powders, and for example, it means a solid whose Flow Rate (ERT450 2-02) can be measured, or a solid which can be sieve classified by (ERT420.2-02). Shape of the solid is not especially limited, and includes pulverized irregular shaped particles, spherical-shape, nearly spherical-shape, or a granulated substance (aggregated substance) thereof. However, preferably irregular pulverized shaped particles are included.

[0039] It should be noted that, in the present description, "X to Y" showing a range indicates to be equal to or higher than X and equal to or lower than Y. In addition, "1 ton (1 t)" showing a weight indicates to be 1 Metric ton.

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(2) The method for producing the particulate water-absorbing agent

[0040] Fig. 1 is a schematic configuration drawing showing one example of production facility 2 for the particulate water-absorbing agent composed principally of the water-absorbing resin relevant to one embodiment of the present invention. The production step relevant to the present embodiment includes the polymerization step, the drying step, the pulverization step, the classification step, the surface cross-linking step, the cooling step, the granule sizing step, and the filling step. Further, this production method includes the transporting step for transporting a product produced in each of the steps to the next step. All of these steps are not necessarily essential. The present invention includes at least the polymerization step, the drying step, the pulverization step, the classification step and the transporting step.

[0041] This production facility 2 is provided with a polymerization apparatus 4a where the polymerization step is performed, a drying apparatus 4b where the drying step is performed, a pulverization apparatus 4c where the pulverization step is performed, a classification apparatus 4d where the classification step is performed, a mixing apparatus 4e and a heating apparatus 4f where the surface cross-linking step is performed, a cooling apparatus 4g where the cooling step is performed, a granule sizing apparatus 4h where the granule sizing step is performed, and a filling apparatus 4i where the filling step is performed. Further, the facility 2 is provided with a fine-powder capturing apparatus 6 where the collection step for collecting the fine powders is performed. In this production facility 2, each of these apparatuses is connected by a pipeline 8. This production facility 2 can produce the particulate water-absorbing agent continuously. Further, in the production facility 2, a granulation apparatus 4j, where the granulation step for granulating the fine powders collected in the collection step is performed, is installed.

[0042] Explanation will be given below in detail on each step.

[The polymerization step]

[0043] The polymerization step is the step for polymerizing a monomer, which can become the water-absorbing resin by polymerization (hereafter may also be referred to as a monomer), to generate a polymer gel. A polymerization method used in the production method relevant to the present invention is not especially limited, and for example, bulk polymerization, precipitation polymerization, aqueous solution polymerization, reversed phase suspension polymerization or the like is included. In view of performance and easiness of polymerization control, aqueous solution polymerization or reversed phase suspension polymerization, where the monomer can be used as an aqueous solution, is preferable. The polymerization apparatus 4a for performing the polymerization step is not especially limited, and a conventionally known one may be used.

[0044] The monomer is not especially limited, and, for example, one shown below is included: for example, an anionic unsaturated monomer such as (meth)acrylic acid, maleic acid (anhydride), itaconic acid, cinnamic acid, vinyl sulfonic acid, allyltoluene sulfonic acid, vinyltoluene sulfonic acid, styrene sulfonic acid, 2-(meth)acrylamido-2-methylpropane sulfonic acid, 2-(meth)acryloylethane sulfonic acid, 2-(meth)acryloylpropane sulfonic acid, 2-hydroxyethyl (meth)acryloyl phosphate, or the like, and a salt thereof; a mercapto group-containing unsaturated monomer; a phenolic hydroxy group-containing unsaturated monomer; an amide group-containing unsaturated monomer such as (meth)acrylamide, N-ethyl (meth)acrylamide, N,N-dimethyl (meth)acrylamide; an amino group-containing unsaturated monomer such as N,N-dimethylaminoethyl (meth)acrylate, N,N-dimethylaminopropyl (meth)acrylate, N,N-dimethylaminopropyl (meth)acrylamide, or the like; or the like. These monomers may be used alone or two or more kinds may be used in combination as appropriate. In view of performance and cost of the resultant water-absorbing resin, the water-absorbing resin is preferably a polyacrylic acid (salt)-based water-absorbing resin, and as a monomer therefor, it is preferable to use acrylic acid and/or a salt thereof (for example, a salt of sodium, lithium, potassium, ammonium, amines or the like, and among these the sodium salt is preferable in view of cost), as a principal component. Use amount of acrylic acid and/or the salt thereof is preferably equal to or more than 70% by mole, more preferably equal to or more than 80% by mole, further preferably equal to or more than 90% by mole, and particularly preferably equal to or more than 95% by mole relative to total monomer components (excluding an internal cross-linking agent to be described later). (The upper limit is 100% by mole.) It should be noted that, when the monomer is an acid group-containing monomer, neutralization rate thereof is not especially limited, and the polymer gel may be neutralized after polymerization, as needed. In applications where there may be contact to a human body, such as hygiene goods, neutralization after polymerization is not necessary. This neutralization rate is preferably from 40% by mole to 90% by mole, and more preferably from 50% by mole to 80% by mole.

[0045] When the above-described monomer is used as an aqueous solution in the polymerization step, concentration of the monomer in the aqueous solution (hereafter may also be referred to as "a monomer solution") is not especially limited, and, it is preferably within a range of 10 to 70% by weight, and further preferably within a range of 20 to 60% by weight. In addition, when the aqueous solution polymerization or reversed phase suspension polymerization is performed, a solvent other than water may be used in combination, as needed. It should be noted that, kind of the solvent to be used in combination is not especially limited. Further, a polymerization inhibitor or an iron component may be contained

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in these monomers. As content of the iron component, equal to or less than 5 ppm by weight is preferable, and equal to or less than 1 ppm by weight is more preferable. In addition, the polymerization inhibitor is not especially limited, and, for example, methoxy phenols may be used preferably. In this case, use amount of the polymerization inhibitor is equal to or less than 160 ppm by weight, which has been disclosed in USP No. 7049366.

5 [0046] In the polymerization step, for example, a radical polymerization initiator may be used. This radical polymerization initiator is not especially limited, and one or more kinds may be selected and used from those utilized in usual polymerization of the water-absorbing resin, depending on kind of the monomer to be polymerized, polymerization conditions and the like. For example, a thermal decomposition-type initiator (for example, a persulfate such as sodium persulfate, potassium persulfate, ammonium persulfate, or the like; a peroxide such as hydrogen peroxide, t-butylperoxide, t-butylhydroperoxide, methyl ethyl ketone peroxide, or the like; an azo compound such as an azonitrile compound, an azoamidine compound, a cyclic azoamidine compound, an azoamide compound, an alkylazo compound, 2,2'-azobis (2-amidinopropane) dihydrochloride, 2,2'-azobis[2-(2-imidazoline-2-yl) propane] dihydrochloride, or the like; or the like or a photodecomposition-type initiator (for example, a benzoin derivative, a benzyl derivative, an acetophenone derivative, a benzophenone derivative, an azo compound or the like); or the like may be included. Among these, in view of cost and reduction capability of residual monomer, the thermal decomposition type initiator is preferable, and a persulfate salt is particularly preferable. In addition, because combined use of a reducing agent can promote decomposition of the radical polymerization initiator, it is possible to make a redox-type initiator by combining both. The reducing agent is not especially limited, and, for example, sulfurous acid (salt) (for example, sodium sulfite, potassium sulfite, ammonium sulfite or the like), hydrogen sulfite (salt) (for example, sodium hydrogen sulfite, potassium hydrogen sulfite, ammonium hydrogen sulfite or the like) pyrosulfurous acid (salt), L-ascorbic acid (salt), a reductive metal (salt) such as ferrous salt or the like; dithionous acid (salt), trithionous acid (salt), tetrathionous acid (salt), thiosulfurous acid (salt), dimethylsulfoxide, phosphorous acid (salt), nitrous acid (salt), thiourea dioxide, amino acid, amines (ethanolamine or the like), or the like is included. More preferable one is combined use of the photodecomposition-type initiator and the thermal decomposition-type initiator. Use amount of the radical polymerization initiator to be used in the above-described polymerization step is not especially limited. However, usually 0.001 to 2% by weight is preferable, and 0.01 to 0.5% by weight is more preferable relative to use amount of the monomer. The use amount of the radical polymerization initiator of below 0.001% by weight relative to use amount of the monomer, increases the unreacted monomer, and increases amount of residual monomers in the resultant water-absorbing resin, and is thus not preferable. On the other hand, the use amount of over 2% by weight increases water-soluble components in the resultant water-absorbing resin, and is thus not preferable. It should be noted that, in this polymerization step, instead of the above-described radical polymerization initiator, the monomer may be polymerized by irradiation of activated energy rays such as radiation rays, electron beams, UV rays, or the like.

[0047] In the polymerization step, an internal cross-linking agent may be used, as needed. As the internal cross-linking agent, a conventionally known internal cross-linking agent, having two or more polymerizable unsaturated groups or two or more reactive groups, in one molecule, is included. Specifically, for example, N,N'-methylenebis(meth)acrylamide, (poly) ethylene glycol di(meth) acrylate, (poly)propylene glycol di(meth) acrylate, trimethylolpropane tri(meth)acrylate, glycerin tri(meth)acrylate, glycerin acrylate methacrylate, ethylene oxide modified trimethylolpropane tri(meth)acrylate, pentaerythritol hexa(meth)acrylate, triallyl cyanurate, triallyl isocyanurate, triallyl phosphate, triallyl amine, polyallyloxy-alkane, (poly) ethylene glycol diglycidyl ether, glycerol diglycidyl ether, ethylene glycol, polyethylene glycol, propylene glycol, glycerin, 1,4-butanediol, pentaerythritol, ethylene diamine, ethylene carbonate, propylene carbonate, polyethylene imine, glycidyl (meth)acrylate or the like is included. Among these, in consideration of reactivity, one or two or more kinds may be used. In particular, as the internal cross-linking agent, a compound having two or more polymerizable unsaturated groups is preferable. Use amount of the internal cross-linking agent may be determined as appropriate by desired property of the water-absorbing resin. However, usually use amount of the internal cross-linking agent is preferably in a range of 0.001 to 5% by mole relative to the monomer. Too low use amount of the internal cross-linking agent tends to decrease strength of the polymer gel and increase soluble content, and on the contrary, too much use amount tends to deteriorate property such as absorbency. It should be noted that, the internal cross-linking agent may be added to a reaction system once as a whole, or may be added dividedly.

[0048] In the polymerization step, further as needed, various foaming agents such as a carbonate (hydrogen) salt, carbon dioxide, an azo compound, an inert organic solvent, or the like; a hydrophilic polymer such as starch-cellulose, a derivative of starch-cellulose, polyvinyl alcohol, polyacrylic acid (salt), a cross-linked substance of polyacrylic acid (salt), or the like; various surfactants; a chain transfer agent such as hypophosphorous acid (salt) or the like; or the like, may be added to the reaction system, as appropriate, within a range not to impair effect of the present invention (for example, the various foaming agents in equal to or lower than 30 parts by weight, the hydrophilic polymer in equal to or lower than 30 parts by weight, and the chain transfer agent in equal to or lower than 1 part by weight relative to 100 parts by weight of the monomer).

[0049] Polymerization temperature in the polymerization step is not especially limited, but, setting at usually 10 to 140°C is preferable. The polymerization temperature below 10°C not only lengthens polymerization time and decreases

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productivity but also could deteriorate property of the water-absorbing resin. On the other hand, the polymerization temperature over 140°C could deteriorate property of the water-absorbing resin. Polymerization time is also not especially limited, and may be determined as appropriate depending on kinds of the monomers and the polymerization initiator, polymerization temperature, or the like. In addition, the above-described polymerization is performed usually under normal pressure, in view of easiness of the apparatus and the operation thereof, and however, in order to decrease boiling point in polymerization system, it is also a preferable aspect that this polymerization is performed under reduced pressure.

[0050] In this production step, in view of performance and easiness of polymerization control, for example, after mixing sodium persulfate as the thermal decomposition-type initiator and L-ascorbic acid as the reducing agent, into a monomer solution composed of an aqueous solution of a partial sodium salt of acrylic acid containing polyethylene glycol diacrylate as the internal cross-linking agent, this mixed solution may be supplied to a flat plane steel belt having a weir at the side, and aqueous solution polymerization may be performed continuously on this belt. Such a polymerization method is called belt polymerization. As a polymerization method other than this belt polymerization, continuous kneader polymerization described in Example 1 of USP No. 6867269 may be used. The water-absorbing resin having desired performance can be obtained in this case as well.

[0051] That is, in the present invention, it is preferable that the polymerization step is performed by continuous kneader polymerization or continuous belt polymerization. In such a case, irregular pulverized shaped particles with high property are obtained in high productivity in the subsequent drying step or the like, but, the fine powders or powder dust tend to generate in the subsequent pulverization step or the like. However, in order to solve such problems, the present invention can be applied suitably. The continuous kneader polymerization has been disclosed, for example, in USP No. 6987151 and USP No. 6710141. In addition, the continuous belt polymerization has been disclosed, for example, in USP No. 4893999, USP No. 6241928, and US-A-2005-215734 or the like.

[The drying step]

[0052] The drying step is the step for drying the polymer gel (water-containing gel-like polymer) obtained in the above-described polymerization step. Preferably, the polymer gel obtained in the polymerization step is usually subjected to crushing treatment to make a particle state of about 0.1 to 5 mm and supplied to the drying step. Because surface area of the gel increases by making particulate gel, the drying step can progress smoothly. The crushing means is not especially limited, and, for example, various cutting means such as a meat chopper, a roller-type cutter, a guillotine cutter, a slicer, a roll cutter, a shredder, scissors, or the like may be used alone or in combination as appropriate. A drying method in this drying step is not especially limited, and a method using a usual dryer or a heating furnace as the drying apparatus 4b is adopted widely, and for example, one or two or more kinds of a band drier, an agitated drier, a fluid bed drier or the like can be used suitably. As drying temperature, setting at relatively high temperature is preferable, specifically 100 to 250°C is preferable, 120 to 220°C is more preferable, and 150 to 200°C is further preferable. Drying time is not especially limited, and, it may be set under such time so as to attain desirable solid content rate of the resultant dried substance. It is preferable that solid content rate (remained amount after heated at 180°C for 3 hours) of the dried substance obtained in the drying step is equal to or higher than 90% by mass, in view of easiness of pulverization. In general, in view of production efficiency, it is preferable that the drying time is usually within two hours, although it depends on particle diameter of the polymer gel, drying temperature, air volume or the like.

[0053] That is, increase in the solid content rate of the dried substance obtained in the drying step tends to generate the fine powders or powder dust easily in pulverization. However, in order to solve such a problem, the present invention can be applied suitably in drying under condition of high temperature and high solid content.

[The pulverization step]

[0054] The pulverization step is the step for pulverizing a polymer gel or a dried substance thereof. Pulverization is usually performed for a dried substance of the polymer gel obtained in the drying step, but, it may be performed for the polymer gel obtained in the polymerization step before drying. By this pulverization, the particulate water-absorbing resin as the pulverized substance is obtained. Pulverization is preferably performed so that the particulate water-absorbing resin with desired particle diameter (preferably, a weight average particle diameter of 200 to 800 μm) can be obtained as many as possible. A method for pulverization is not especially limited, and a conventionally known method can be adopted. As the pulverization apparatus 4c, for example, a roll mill, a knife mill, a hammer mill, a pin mill, a jet mill, or the like is exemplified. Because this pulverization generates the fine powders, the fine powders are included in the particulate water-absorbing resin obtained in the pulverization step.

[0055] That is, the particulate water-absorbing resin obtained by the pulverization step becomes irregular pulverized shaped particles. Such a shape is preferable due to providing large specific surface area, and makes fixing to pulp easy as well. In addition, in the pulverization step, the fine powders or powder dust (dust) easily generate, however, because

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of enabling to solve such a problem, the present invention can be applied preferably.

[The classification step]

5 [0056] The classification step is the step for classifying a pulverized substance obtained in the above-described pulverization step. In the classification step, the pulverized substance is sieved. In this classification step, by selecting particles having desired particle diameter (preferably, a weight average particle diameter of 200 to 800 μm), the objective particulate water-absorbing resin can be obtained. A classification method is not especially limited, and a conventionally known method can be adopted. The classification apparatus 4d for performing the classification step is not especially
10 limited, and, it is preferable that sieve classification (a metal sieve, made of stainless steel) is used. In addition, it is preferable that multiple pieces of the sieves are used at the same time in the classification step to obtain objective property and particlesize. It should be noted that, in this classification step, the particulate water-absorbing resin contained as the fine powders in the pulverized substance, may be obtained as a residual substance.

15 [The surface cross-linking step]

[0057] In the present invention, it is preferable that the surface cross-linking step is performed after the classification step. The surface cross-linking step is the step for cross-linking the neighborhood of the surface of the particulate water-absorbing resin obtained in the above-described classification step, using a surface cross-linking agent, to obtain the
20 particulate water-absorbing agent. The "surface cross-linking" means to increase cross-link density at the surface of the particulate water-absorbing resin. "The neighborhood of the surface" indicates a part of the surface layer of the particulate water-absorbing resin, and a part with a thickness of equal to or less than several tens μm or equal to or less than 1/10 of total thickness, and, this thickness is determined as appropriate depending on objectives. Such a surface cross-linking can be confirmed by decrease in absorbency against non-pressure (CRC) from that of the water-absorbing resin before the surface cross-linking step.

[0058] As the surface cross-linking agent to be used in the surface cross-linking step, a conventionally known surface cross-linking agent exemplified in USP No. 6228930, USP No. 6071976, USP No. 6254990 or the like is used suitably. It is preferable to use one or two or more kinds of a surface cross-linking agent having dehydration esterification reactivity, selected from a group consisting of an oxazolidinone compound, an alkylene carbonate compound, a polyvalent alcohol
30 compound, and an oxetane compound. In such a surface cross-linking step, although the particulate water-absorbing agent with high property is obtained, it is necessary to perform the dehydration esterification reaction under high temperature condition, which decreases water content of the particulate water-absorbing agent. Therefore, although the fine powders or powder dust may sometimes generate, in order to solve such problems, the present invention can be applied suitably.

[0059] Specifically, although not limited, they include an (mono-, di- or poly-)oxazolidinone compound such as 2-oxazolidinone, or the like (USP No. 6559239); an alkylene carbonate compound such as 1,3-dioxolane-2-one, 4-methyl-1,3-dioxolane-2-one, 4,5-dimethyl-1,3-dioxolane-2-one, 4,4-di-methyl-1,3-dioxolane-2-one, 4-ethyl-1,3-dioxolane-2-one, 4-hydroxymethyl-1,3-dioxolane-2-one, 1,3-dioxane-2-one, 4-methyl-1,3-dioxane-2-one, 4,6-dimethyl-1,3-dioxane-2-one, 1,3-dioxolane-2-one, or the like (USP No. 5409771); a polyhydric alcohol compound such as ethylene glycol, diethylene glycol, propylene glycol, triethylene glycol, tetraethylene glycol, polyethylene glycol, 1,3-propanediol, dipropylene glycol, 2,2,4-trimethyl-1,3-pentanediol, polypropylene glycol, glycerin, polyglycerin, 2-butene-1,4-diol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1,2-cyclohexanedimethanol, 1,2-cyclohexanediol, trimethylol propane, diethanol amine, triethanol amine, polyoxypropylene, an oxyethylene-oxypropylene block copolymer, pentaerythritol, sorbitol, or the like; an oxetane compound (US-A-2002/72471). Among them, at least one kind selected from the polyhydric alcohol having carbon atoms of 2 to 10, and the oxetane compound having carbon atoms of 2 to 10 are more preferable. The polyhydric alcohol having carbon atoms of 3 to 8 is particularly preferable. In addition to these, an epoxy compound such as ethylene glycol diglycidyl ether, polyethylene glycol diglycidyl ether, glycerol polyglycidyl ether, diglycerol polyglycidyl ether, polyglycerol polyglycidyl ether, propylene glycol diglycidyl ether, polypropylene glycol diglycidyl ether, glycidol, or the like; a polyvalent amine compound such as ethylenediamine, diethylenetriamine, triethylenetetramine, tetraethylenepentamine, pentaethylenhexamine, polyethyleneimine, or the like, or an inorganic salt or an organic salt (an aziridinium salt or the like) thereof; a polyvalent isocyanate compound such as 2,4-tolylene diisocyanate, hexamethylene diisocyanate, or the like; a polyvalent oxazoline compound such as 1,2-ethylene-bis-oxazoline, or the like; a halo-epoxy compound such as epichlorohydrin, epibromohydrin, α -methyl epichlorohydrin, or the like; a polyvalent metal compound such as a hydroxide or chloride of zinc, calcium, magnesium, aluminum, iron, zirconium or the like; or the like may be used. These surface cross-linking agents may be used alone, or in consideration of reactivity, two or more
55 kinds may be used by mixing. It should be noted that, the surface cross-linking step may be performed two or more times in consideration of effect thereof, and in that case, as the surface cross-linking agent to be used in and after the second time, the same surface cross-linking agent as used in the first time may be used, or the surface cross-linking

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agent different from that used in the first time may be used.

[0060] In the surface cross-linking step, use amount of the above-described surface cross-linking agent depends on the surface cross-linking agent selected. However, use amount from 0.001 part by weight to 10 parts by weight is preferable, and from 0.01 part by weight to 5 parts by weight is more preferable, relative to 100 parts by weight of solid content of the particulate water-absorbing resin. By using the surface cross-linking agent in this range, cross-link density of the neighborhood of the surface of the particulate water-absorbing agent can be made higher than that of the inside. The case where the use amount of the surface cross-linking agent exceeds 10 parts by weight is not only uneconomical but also makes excessive supply of the cross-linking agent for forming an optimal cross-link structure to the particulate water-absorbing resin, and is thus not preferable. The case where the use amount of the surface cross-linking agent is below 0.001 part by weight does not provide sufficient improvement effect in enhancing performance of absorbency against pressure or the like of the particulate water-absorbing agent, and is thus not preferable.

[0061] In the surface cross-linking step, it is preferable to use water as a solvent in mixing the particulate water-absorbing resin and the surface cross-linking agent. Use amount of water depends on kind of the water-absorbing resin, particle diameter, and water content of the particulate water-absorbing resin or the like. However, use amount over 0 part by weight and equal to or lower than 20 parts by weight is preferable, and use amount within a range of 0.5 to 10 parts by weight is more preferable, relative to 100 parts by weight of solid content of the particulate water-absorbing resin. In mixing the particulate water-absorbing resin and the surface cross-linking agent, a hydrophilic organic solvent may be used in combination, as needed. In this case, as the hydrophilic organic solvent to be used in combination, for example, lower alcohols such as methyl alcohol, ethyl alcohol, n-propyl alcohol, isopropyl alcohol, n-butyl alcohol, isobutyl alcohol, t-butyl alcohol, or the like; ketones such as acetone, or the like; ethers such as dioxane, tetrahydrofuran, or the like; amides such as N,N-dimethylformamide, or the like; sulfoxides such as dimethylsulfoxide, or the like; or the like is included. Use amount of the hydrophilic organic solvent depends on kind of the water-absorbing resin, particle diameter and water content of the particulate water-absorbing resin or the like. However, use amount from 0 to equal to or lower than 20 parts by weight is preferable, and use amount within a range of 0 to 10 parts by weight is more preferable, relative to 100 parts by weight of solid content of the particulate water-absorbing resin.

[0062] In performing surface cross-linking, the following method is preferable, wherein, after getting the aqueous solution, in which a water and/or a hydrophilic organic solvent, and a surface cross-linking agent has been mixed in advance, and then the solution thereof is mixed by spraying or dropping to the particulate water-absorbing resin, and a method for mixing by spraying is more preferable. Size of a droplet sprayed is preferably within a range of 0.1 to 300 μm , and more preferably within a range of 0.1 to 200 μm , as an average particle diameter.

[0063] For mixing the particulate water-absorbing resin with the surface cross-linking agent, water and hydrophilic organic solvent, the mixing apparatus 4e is used. This mixing apparatus 4e is preferably provided with a large mixing force to mix both uniformly and surely. As the mixing apparatus 4e, for example, a cylinder-type mixing machine, a double wall cone-type mixing machine, a high speed stirring-type mixing machine, a V-type mixing machine, a ribbon-type mixing machine, a screw-type mixing machine, a twin arm-type kneader, a pulverizing-type kneader, a rotation-type mixing machine, an air flow-type mixing machine, Turbulizer, a batch-type Rhedige mixer, a continuous Rhedige mixer or the like is suitable.

[0064] In the surface cross-linking step, the surface cross-linking reaction can progress even at room temperature. However, in view of promotion of the reaction as well as removal of water and solvent added, it is preferable that, after mixing the particulate water-absorbing resin and the surface cross-linking agent, further heating treatment is performed to cross-link the neighborhood of the surface of the particulate water-absorbing resin. That is, in order to react the cross-linking agent on the neighborhood of the surface of the particulate water-absorbing resin, it is preferable for the heating treatment to be performed, in consideration of the reactivity of the cross-linking agent, and easiness and productivity of the production facility. In the heating treatment, treatment temperature is preferably equal to or higher than 80°C, although it depends on the surface cross-linking agent selected. The treatment temperature of below 80°C takes longer time in the heating treatment, and thus not only incurs decrease in productivity but also cannot attain uniform surface cross-linking. In this case, concerned is that not only absorption characteristics under pressure of the particulate water-absorbing agent decreases, but also the unreacted surface cross-linking agent remains. The treatment temperature over 250°C incurs deterioration of the particulate water-absorbing resin, and decreases performance of the particulate water-absorbing agent surface cross-linked, and is thus not preferable. From this viewpoint, the treatment temperature (temperature of a heating medium or temperature of a material/in particular, temperature of the heating medium) is preferably in a range of 100 to 250°C, more preferably in a range of 150 to 250°C (in particular, it is suitable for the surface cross-linking agent having dehydration esterification reactivity). Heating time is preferably in a range of 1 minute to 2 hours. Suitable examples of a combination of heating temperature and heating time are for 0.1 to 1.5 hour at 180°C and for 0.1 to 1 hour at 200°C.

[0065] As the heating apparatus 4f for performing the heating treatment, a conventional dryer or a heating furnace is used. For example, a dryer or a heating furnace of a conductive heat transfer-type, a radiation heat transfer-type, a hot air heat transfer-type, an inductive heating-type is suitable. Specifically, a dryer or a heating furnace of a belt-type, a

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groove stirring-type, a screw-type, a rotation-type, a disk-type, a kneading-type, a fluid bed-type, an air flow-type, an infrared ray-type, an electron beam-type is included.

[0066] In the surface cross-linking step, the heating treatment may be performed in a static state or under stirring. When the heating treatment is performed under stirring, the surface cross-linking may be completed by heating the mixture in the mixing apparatus, where the particulate water-absorbing resin and the surface cross-linking agent were mixed, or the surface cross-linking may be completed by heating the mixture, by charging the mixture, for example, into a twin-screw groove-type agitated drying apparatus.

[The cooling step]

[0067] The cooling step is the step performed arbitrarily after the surface cross-linking step, for example, the step disclosed in USP No. 6378453. This cooling step is the step wherein the particulate water-absorbing agent obtained by heating and cross-linking the neighborhood of the surface in the above-described surface cross-linking step is cooled before charging to the granule sizing step to be described later. The cooling apparatus 4g to be used in this cooling step is not especially limited, and, for example, a twin-screw agitated dryer or the like, where cooling water is passed through inside of the inner wall or other heat transfer surfaces can be used. Temperature of this cooling water is set at below heating temperature, preferably equal to or higher than 25°C and below 80 °C. In the surface cross-linking step, there may be the case where surface cross-linking of the particulate water-absorbing resin is performed at room temperature. In this case, because the particulate water-absorbing agent obtained by the surface cross-linking is not heated, this cooling step may not be performed. This cooling step is other step which may be included further in this production method, as needed.

[The addition step of additives]

[0068] In the present invention, the addition step for adding additives other than the surface cross-linking agent may be installed further. This addition step is preferably installed at and after the polymerization step, and more preferably installed at and after the drying step. The additives may be added in the cooling step or other steps. As the additives, for example, the following (A) a deodorant component (preferably, a plant component), (B) a polyvalent metal salt, (C) an inorganic particle (including (D) a composite water-containing oxide), (E) a liquid permeability improver, (F) other additives and the like may be added. By this addition, various functions can be furnished to the particulate water-absorbing agent. Further, the following (G) chelating agent may be added to the particulate water-absorbing agent. In the step for using such additives, the water-absorbing agent with high property (for example, high SFC) can be obtained. However, the additives themselves can become powder dust. Therefore, in order to solve such problems, the present invention can be applied suitably.

[0069] In this production method, use amount of the (A) to (E) and (F) differs depending on objectives and functions to be furnished, however, it is usually, as addition amount of one kind thereof, in a range of 0.001 to 10 parts by weight, preferably 0.001 to 5 parts by weight, and further preferably 0.002 to 3 parts by weight, relative to 100 parts by weight of the water-absorbing resin. Usually, when this addition amount is lower than 0.001 parts by weight, sufficient effect and functions to be furnished by the additives cannot be obtained, and when this addition amount is over 10 parts by weight, effect comparable to the addition amount cannot be obtained or water absorbing performance decreases.

(A) The deodorant component

[0070] The particulate water-absorbing agent obtained by the production method of the present invention can be formulated with the deodorant component, preferably the plant component, in the above-described amount, to exert deodorant property. As the plant component, at least one kind of a compound selected from polyphenol, flavone (s), and caffeine is preferable, and at least one kind of a compound selected from tannin, tannic acid, gall, gallnut and gallic acid is further preferable. As a plant containing the plant component which can be added to the particulate water-absorbing agent, other than these plant components, for example, camellia, Eurya japonica, Ternstroemia gymnanthera or the like is included as the Theaceae plant; rice, bamboo grass, bamboo, corn, wheat or the like is included as the Poaceae plant, and coffee or the like is included as the Rubiaceae plant. As a form of the plant component, which can be used in the present invention, essence (essential oil) extracted from a plant, a plant itself, a plant residue or an extract residue by-produced in the production process in plant processing industry or food processing industry, or the like is included, but it is not especially limited.

(B) The polyvalent metal salt

[0071] The polyvalent metal salt may be formulated into the particulate water-absorbing agent obtained by the pro-

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duction method of the present invention, in order to enhance liquid permeability and powder hygroscopic fluidity. Preferable amount of this polyvalent metal salt is as described above. As this polyvalent metal salt, a polyvalent metal salt of an organic acid and a polyvalent metal salt of an inorganic acid are exemplified. As the preferable inorganic polyvalent metal salt, for example, aluminum chloride, aluminum polychloride, aluminum sulfate, aluminum nitrate, potassium aluminum bisulfate, sodium aluminum bisulfate, potassium alum, ammonium alum, sodium alum, sodium aluminate, calcium chloride, calcium nitrate, magnesium chloride, magnesium sulfate, magnesium nitrate, zinc chloride, zinc sulfate, zinc nitrate, zirconium chloride, zirconium sulfate, zirconium nitrate or the like is included. In addition, in view of solubility with an absorbing liquid such as urine, use of a salt having crystal water thereof is preferable. A particularly preferable one is an aluminum compound. Among this aluminum compound, aluminum chloride, aluminum polychloride, aluminum sulfate, aluminum nitrate, potassium aluminum bisulfate, sodium aluminum bisulfate, potassium alum, ammonium alum, sodium alum, sodium aluminate are preferable, and aluminum sulfate is particularly preferable. Powders of water-containing crystal such as aluminum sulfate-octadeca hydrate salt, aluminum sulfate-tetradeca to octadeca hydrate salt may be used most suitably. They may be used as only one or two more kinds may be used in combination. In view of handling property and mixing property with the particulate water-absorbing agent, the polyvalent metal salt is used preferably in a solution state, and is used particularly preferably in an aqueous solution state.

[0072] In addition, polyvalent metal salts of organic acids to be used, and mixing methods thereof are exemplified, for example, in USP No. 7282262. As the polyvalent metal salt of the organic acid, having carbon atoms of equal to or more than 7 in the molecule, to be used in the present invention, a metal salt other than an alkaline salt, of an aliphatic acid, apetroleumacid, a polymer acid or the like, is included. As an organic acid composing a polyvalent metal salt of this organic acid, an aliphatic acid having a long chain or a branched chain, such as capronic acid, octylic acid, octynoic acid, decanoic acid, lauric acid, myristic acid, palmitic acid, oleic acid, stearic acid, or the like; a petroleum acid such as benzoic acid, myristic acid, naphthenic acid, naphthoic acid, naphthoxyacetic acid, or the like; a polymer acid such as poly(meth)acrylic acid, polysulfonic acid, or the like can be exemplified. However, an organic acid having a carboxyl group in the molecule is preferable, and an aliphatic acid such as capronic acid, octylic acid, octynoic acid, decanoic acid, lauric acid, myristic acid, palmitic acid, oleic acid, stearic acid, a cow aliphatic acid, a castor oil hardened aliphatic acid is more preferable. Analiphatic acid not having an unsaturated bond in the molecule, such as capronic acid, octanoic acid, decanoic acid, lauric acid, myristic acid, palmitic acid, or stearic acid is further preferable. And a long chain aliphatic acid with carbon atoms of equal to or more than 12, not having an unsaturated bond in the molecule, such as lauric acid, myristic acid, palmitic acid, and stearic acid is most preferable.

(C) The inorganic particle

[0073] The inorganic particle, in particular, a water-insoluble inorganic particle may be formulated into the particulate water-absorbing agent obtained by the production method of the present invention in order to prevent blocking in moisture absorption. As the inorganic particle to be used in the present invention, specifically, for example, a metal oxide such as silicon dioxide, titanium oxide, or the like; silicic acid (salt) such as natural zeolite, synthetic zeolite, or the like; kaolin, talc, clay, bentonite or the like is included. Among these, silicon dioxide and silicic acid (salt) are more preferable, and silicon dioxide and silicic acid (salt), having an average particle diameter of 0.001 to 200 μm , measured by the Coulter counter method, is further preferable.

(D) The composite water-containing oxide

[0074] The particulate water-absorbing agent obtained by the production method of the present invention shows superior hygroscopic fluidity (fluidity of powders after the water-absorbing resin or the water-absorbing agent absorbed moisture), and further, in order to make exert superior deodorant function, a composite water-containing oxide containing zinc and silicon, or a composite water-containing oxide containing zinc and aluminum may be formulated.

(E) The liquid permeability improver

[0075] The liquid permeability improver means the additive such as a water-insoluble inorganic fine particle, a water-soluble polyvalent metal salt, a water-soluble polymer, polyamine, for enhancing saline flow conductivity (SFC) of the water-absorbing resin or the water-absorbing agent having a saline flow conductivity (SFC) of equal to or higher than $6 (\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1})$ to be described later, by equal to or higher than $10 (\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1})$. Therefore, even the additives exemplified in the (A) to (D) may correspond to this liquid permeability improver. In this production method, this liquid permeability improver is preferably a water-soluble polyvalent metal compound or a polycation compound. Specifically, it is preferably a compound of one or more kinds selected from a group consisting of an aluminum compound, a zirconium compound, a titanium compound, and a compound having an amino group. In more specifically, for example, the water-soluble polyvalent metal compound such as aluminum sulfate, potassium alum, ammonium alum, sodium alum, (poly)

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aluminum chloride, a hydrate thereof, or the like; the polycation compound such as the polymeric polyamine compound, preferably the water-soluble polymeric polyamine, more specifically, polyethyleneimine, polyvinylamine, polyallylamine, or the like having a weight average molecular weight of 200 to 1000000; the water-insoluble inorganic fine particle such as silica, alumina, bentonite, or the like; or the like is included, and they may be used as only one kind, or may be used in two or more kinds in combination. Among these, the water-soluble polyvalent metal salt such as aluminum sulfate, potassium alum or the like is preferable in view of enhancing saline flow conductivity (SFC). In addition, the liquid permeability improver is preferably an aqueous solution, in view of easily adding more uniformly to the whole surface of the water-absorbing resin, and having no segregation or the like of the liquid permeability improver. The liquid permeability improver is used preferably in a ratio of 0.001 to 10% by weight, and more preferably in a ratio of 0.01 to 5% by weight, relative to the water-absorbing resin.

(F) Other additives

[0076] To the particulate water-absorbing agent obtained by the production method of the present invention, as needed, for example, a disinfectant, an antimicrobial agent, perfume, various inorganic powders, a foaming agent, a pigment, a dye, a hydrophilic staple fiber, a fertilizer, an oxidizing agent, a reducing agent, water-soluble salts, or the like may be added, as appropriate, in a range not to impair effect of the present invention (for example, equal to or less than 30 parts by weight, and further equal to or less than 10 parts by weight, relative to 100 parts by weight of the particulate water-absorbing agent), and by this various functions can be furnished.

(G) The chelating agent

[0077] The particulate water-absorbing agent to be used in the present invention may contain the chelating agent. The mixing step of the chelating agent is not especially limited, but, it is preferable that the chelating agent is mixed to the monomer monomer solution. As the chelating agent, a polymer chelating agent and a non-polymer chelating agent are exemplified. Preferably the non-polymer chelating agent containing an acid group, and further preferably, the non-polymer chelating agent containing a phosphoric acid group or a carboxylic acid group is used. Number of the acid group contained in this non-polymer chelating agent is 2 to 100, further preferably 2 to 50, and particularly preferably 2 to 10. As this chelating agent, a non-polymer chelating agent containing nitrogen is used, or a chelating agent containing nitrogen may also be used suitably. As this chelating agent, for example, an amino carboxylic acid-type metal chelating agent such as iminodiacetic acid, hydroxyethyliminodiacetic acid, nitrilotriacetic acid, nitrilotripropionic acid, ethylenediamine tetraacetic acid, hydroxyethylenediamine triacetic acid, hexamethylenediamine tetraacetic acid, diethylenetriamine pentaacetic acid, triethylenetetramine hexaacetic acid, trans-1,2-diaminocyclohexane tetraacetic acid, bis(2-hydroxyethyl)glycine, diaminopropanol tetraacetic acid, ethylenediamine-2-propionic acid, glycol ether diamine tetraacetic acid, bis(2-hydroxybenzyl)ethylenediamine diacetic acid, and a salt thereof; and a phosphorous compound such as ethylenediamine-N,N'-di(methylenephosphonic acid), ethylenediamine tetra(methylenephosphonic acid), nitriloacetic acid-di(methylenephosphonic acid), nitrilodiacetic acid-(methylenephosphonic acid), nitriloacetic acid-β-propionic acid-methylenephosphonic acid, nitrilo tris(methylenephosphonic acid), cyclohexanediamine tetra(methylenephosphonic acid), ethylenediamine-N,N'-diacetic acid-N,N'-di(methylenephosphonic acid), ethylenediamine-N,N'-di(methylenephosphonic acid), ethylenediamine tetra(methylenephosphonic acid), polymethylenediamine tetra(methylenephosphonic acid), diethylenetriamine penta(methylenephosphonic acid), and 1-hydroxyethylidene diphosphonic acid, and a salt thereof; are included. Use amount of the chelating agent is preferably from 10 ppm by weight to 1000 ppm by weight, relative to 100 parts by weight of the water-absorbing resin.

[0078] The additives exemplified in the (B) to (E) may be added as an aqueous solution or a water dispersion solution. In addition, when these additives are solid, they may be subjected to dry mixing into the water-absorbing resin, as powders (preferably having a particle diameter of equal to or smaller than 300 μm).

[0079] In addition, the (B) and (E) can be used suitably as a surface treatment agent. Surface treatment in the present application means that a region of the surface or the neighborhood of the surface of the water-absorbing resin has been surface cross-linked by chemical or physical modification. In this case, chemical modification means a state of modification accompanying with any of a chemical bonding, and physical modification means physical covering or attachment without accompanying with the chemical bonding. Bonding form in the surface treatment is not especially limited. In addition, the surface treatment is a concept including the surface cross-linking. Further, the surface treatment includes surface cross-linking with ionic bond of a surface carboxyl group by a polyvalent metal, such as trivalent aluminum, in addition to the surface cross-linking by the above cross-linking agent. These surface treatments are chemical modification accompanying with chemical bonding such as covalent bond or ionic bond with the water-absorbing resin. On the other hand, physical modification indicates a modified state of the same surface or the neighborhood of the surface of the water-absorbing resin modified only by physical attachment, without taking a form of chemical bonding such as covalent bond or ionic bond with the water-absorbing resin. Such a state is also included in the surface treatment in the present

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application. For example, the above-described state covered with the polyvalent alcohol, or a state covered with the water-soluble polyvalent metal salt without accompanying with chemical bonding is a surface treated state.

[0080] In particular, in the present invention, the polyvalent metal salt is preferable as the additives for enhancing liquid permeability. It is preferable that the polyvalent metal salt is mixed after the addition. As an apparatus for mixing, for example, a cylinder-type mixing machine, a screw-type mixing machine, a screw-type extruder, Turbulizer, Nauta-type mixing machine, a V-type mixing machine, a ribbon-type mixing machine, a twin arm-type kneader, a fluidized-type mixing machine, an air flow-type mixing machine, a rotating disk-type mixing machine, a roll mixer, a rolling-type mixing machine, Rhedige mixer, or the like may be included.

[0081] It should be noted that, the polyvalent metal salt is preferably mixed with the water-absorbing resin as an aqueous solution. Size of a droplet of the aqueous solution can be adjusted as appropriate. In view of preventing permeation and diffusion of a polyvalent metal ion (for example, an aluminum ion) into the inside of the water-absorbing resin, the aqueous solution preferably has a concentration of equal to or higher than 50%, more preferably equal to or higher than 60%, further preferably equal to or higher than 70%, further preferably equal to or higher than 80%, and particularly preferably equal to or higher than 90%, relative to saturated concentration at the predetermined temperature. Naturally, it may be an aqueous solution having the saturated concentration (=100% relative to the saturated concentration), or a dispersion solution having over the saturated concentration. Temperature of the aqueous solution is adjusted as appropriate in a range of equal to or lower than boiling point to adjust solubility or viscosity, and however, mixing is usually performed at about room temperature.

[The granule sizing step]

[0082] In the present invention, the granule sizing step may be provided. Although the particle diameter was adjusted in the above-described pulverization step and classification step, an aggregated substance having large particle diameter might be included in the particulate water-absorbing agent after the cooling step. This aggregated substance may be generated principally during mixing the surface cross-linking agent, or during a surface cross-linking reaction. In this granule sizing step, the particle size is re-adjusted, crushing treatment and classification treatment of this aggregated substance is performed. Such a granule sizing method has been disclosed in USP No. 7347330, US-A-2005-011325 or the like. Order and number of this granule sizing treatment and classification treatment is not especially limited. In this granule sizing step, for example, firstly the classification treatment is performed for the particulate water-absorbing agent. In this classification treatment, a classification apparatus such as a sieve or an air flow classification machine can be used. In this classification treatment, for example, by using a sieve having large sieve mesh size, the aggregated substance having large particle diameter can be obtained. In this way, after the aggregated substance having large particle diameter is removed, the fine powders having small particle diameter are removed by using a sieve having small sieve mesh size. For the aggregated substance obtained by this classification treatment, the crushing treatment is performed. By this crushing treatment, particles composing the aggregated substance can be crushed and separated to an individual particle, and the particulate water-absorbing agent as a single particle can be obtained. In this crushing treatment, for example, a knife cutter-type crushing machine is used. For the crushed substance obtained by this crushing treatment, the classification treatment is performed again. In this granule sizing step, while the fine powders having small particle diameter are removed, the particulate water-absorbing agent having desired particle diameter (preferably, a weight average particle diameter of 200 to 800 μm) can be obtained. In view of productivity, this granule sizing step is preferably performed after the cooling step. In this production method, an apparatus to be used in this crushing treatment and an apparatus to be used in the classification treatment configure the granule sizing apparatus 4h. It should be noted that, in this granule sizing step, the particulate water-absorbing agent contained as the fine powders may be obtained as a residual substance.

[The packaging step]

[0083] In the present invention, the packaging step may be provided after the granule sizing step. The packaging step is the step for filling a packaging material container with the particulate water-absorbing agent granule-sized in the above-described granule sizing step for packaging. For example, in this packaging step, the particulate water-absorbing agent transferred to a hopper fills the packaging material container, by use of the filling apparatus 4i. As the packaging material container, for example, a storing bag such as a flexible container bag or the like is used. In this production method, the particulate water-absorbing agent filling the storing bag is shipped as a product after the predetermined inspection.

[The transporting step]

[0084] In this production method, the transporting step is the step for transporting a product such as the polymer gel, the particulate water-absorbing resin, the particulate water-absorbing agent, or the like generated in each of the steps

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to the other steps. In this transporting step, for example, by controlling pressure in the pipeline 8 which connects each of the apparatuses themselves installed at each of the steps, a product generated in one step is transported to other step. In this production method, for example, a product such as the polymer gel, the particulate water-absorbing resin, the particulate water-absorbing agent or the like is transported by pneumatic transportation. It should be noted that, instead of the pneumatic transportation, a transportation machine such as a conveyor may be used. That is, by connecting the apparatus to be used at one step and the apparatus to be used at other step via a transportation machine such as a conveyor, a product generated in one step may be transported to other step. Further in the transporting step, the transportation may be performed by free falling utilizing gravitational force. In this production method, for example, the polymer gel generated in the polymerization step is transported to the drying apparatus 4b by the transporting step. A dried substance of the polymer gel dried in the drying step is transported to the pulverization apparatus 4c by the transporting step. The particulate water-absorbing resin obtained in the pulverization step is transported to the classification apparatus 4d by the transporting step. The particulate water-absorbing resin sieved in the classification step is transported to the mixing apparatus 4e by the transporting step. The particulate water-absorbing agent cross-linked at the surface part thereof in the surface cross-linking step is transported to the cooling apparatus 4g by the transporting step. The particulate water-absorbing agent cooled in the cooling step is transported to the granule sizing apparatus 4h by the transporting step. Alternatively, the particulate water-absorbing agent obtained from the particulate water-absorbing resin sieved in the classification step is transported to the granule sizing apparatus 4h by the transporting step. The particulate water-absorbing agent granule sized in the granule sizing step is transported to the filling apparatus 4i by the transporting step. Alternatively, the particulate water-absorbing agent cooled in the cooling step is transported to the filling apparatus 4i by the transporting step. In this production method, even in the case where the step other than the above steps is included, it is preferable that a product produced in this other step is transported to each of the steps by the transporting step. According to this production method, the particulate water-absorbing agent may be produced continuously. Each step other than the transporting step may be connected directly, but, it is preferably connected via the transporting step. Accordingly, it is preferable that the transporting steps are present in a number equivalent to the number of the steps other than the transporting steps. From this viewpoint, the number of the transporting step is preferably equal to or more than 2, more preferably equal to or more than 3, more preferably equal to or more than 4, and more preferably equal to or more than 5. The upper limit of the number of the transporting step is determined as appropriate, and, for example, it is set at equal to or less than 30, and further equal to or less than 20. Transportation apparatuses to be used in a plurality of the transporting steps may be the same apparatus, or different apparatuses.

[The collection step]

[0085] It is preferable that the production method of the present invention includes the collection step. As described above, in this production method, the fine powders generate by pulverizing the dried polymer gel in the pulverization step. The fine powders generate also by crushing processing in the granule sizing step. Further, the fine powders might also generate by wear or the like of the particulate water-absorbing resin and the particulate water-absorbing agent during transportation in the transporting step. Further, the fine powders may also generate when the particulate water-absorbing agent suffers damage in a process including and subsequent to the heating process in the surface cross-linking step. Further, in observing the substance captured by an apparatus to be described later, by use of a scanning electron microscope, an X-ray micro-analyzer or the like, the aggregated substance (dust) of inorganic fine particles, composed of silicon dioxide or the like, having a longer diameter of from 20 μm to 100 μm , might be present in the fine powders. Presence of such an aggregated substance (dust) is caused by the additives and dust in gas. By the collection step, such an aggregated substance (dust) may also be removed in addition to the fine powders (water-absorbing resin). By removing this aggregated substance (dust), work environment can be enhanced. In addition, removal of this aggregated substance (dust) can contribute to enhancement of property of the particulate water-absorbing agent.

[0086] In this production method, the fine powders are present in any of the steps. The fine powders may be contained in gas present in the apparatus where the step is performed, and in the pipeline 8. In this production method, the fine powders are contained in gas of inside of the step, in any of the steps. The collection step is the step for collecting the fine powders in gas by use of the trapping material. As described above, in this collection step, the fine-powder capturing apparatus 6 is used. The fine-powder capturing apparatus 6 has an apparatus which can suck the gas. By this suction of gas, reduced pressure state can be attained. In addition, by making thus suctioned gas pass through the trapping material, the fine powders can be captured. In this production method, the fine powders are transported to the fine-powder capturing apparatus 6 by the transporting step. The fine-powder capturing apparatus 6 may be used as a single unit, or as two or more units.

[0087] The fine powders are those having smaller particle diameter than that of the particulate water-absorbing agent aiming to obtain by the production method of the present invention, and conventionally, they have been usually treated as waste materials. As will be described later, weight average particle diameter (D_{50}) of the particulate water-absorbing agent (specified by the JIS standard sieve classification) is preferably 200 to 800 μm , and for example, weight average

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particle diameter (D50) of the particulate water-absorbing agent obtained by the production method of the present invention is preferably 200 to 450 μm . The fine powders are residue after removal so that weight average particle diameter (D50) of the obtained particulate water-absorbing agent becomes within a desired range. Specifically, weight average particle diameter (D50) of the fine powders is in range of 10 to 150 μm . Preferably, it is desirable that the fine powders contain particles having a particle diameter (specified by the JIS standard sieve classification) of practically below 150 μm , in 70 to 100% by mass, further 90 to 100% by mass. In addition, as shape of the fine powders, one with a sphere obtained by reversed phase suspension polymerization, and one with an irregular shape obtained by aqueous solution polymerization are included. In addition, the fine powders may be one being subjected or not subjected to the surface cross-linking treatment, or may be a mixture thereof.

10 [0088] Preferably, the fine-powder capturing apparatus 6 is provided with the trapping material. This trapping material is a filter. This trapping material is configured so that particles (the fine powders and the like) contained in this gas can be removed by passage of the gas. Preferably, as this trapping material, a bag filter is used. This bag filter is a cylindrical bag having an opening at one side.

15 [0089] In this production method, this fine-powder capturing apparatus 6 is joined to any of the apparatuses used in the above steps and the pipelines, which connect them, by the first pipeline 8a. In the fine-powder capturing apparatus 6 shown in Fig. 1, the first pipeline 8a is connected to at least any of the positions shown by the arrow lines S1 to S20 in Fig. 1. This first pipeline 8a may be connected to any of S1 to S20, or may be connected to a plurality of positions among S1 to S20, or may be connected to all of S1 to S20. This connected position is determined as appropriate in consideration of generation state of the fine powders. By this connection, the fine powders present in any of the steps are transported to this fine-powder capturing apparatus 6 through the first pipeline 8a. This first pipeline 8a may be branched so as to be able to be connected to a plurality of positions.

20 [0090] In this production method, gas is introduced to the fine-powder capturing apparatus 6 through the first pipeline 8a. In this introduction, reduced pressure state to be described later may be utilized. This gas passes through the trapping material. By this passing through, the fine powders are captured with the trapping material. Gas passed through this trapping material is exhausted outside of this fine-powder capturing apparatus 6. The fine powders captured with the trapping material are sieved off, for example, by vibration. The fine powders may be sieved off by blowing pulsed air. And preferably, the fine powders sieved off are transported to the granulation apparatus 4j to be described later through the second pipeline 8b. This fine-powder capturing apparatus 6 is superior in collecting efficiency of the fine powders. According to this production method, the fine powders generating in the production process are collected efficiently while preventing the scattering thereof.

25 [0091] In this production method, the fine powders collected with this fine-powder capturing apparatus 6 are exhausted through the second pipeline 8b. Preferably, this fine-powder capturing apparatus 6 is connected to the granulation apparatus 4j for performing the granulation step, by the second pipeline 8b. Detail of the granulation step will be described later. The granulated substance obtained by granulating the fine powders is joined to any of the apparatuses to be used in the steps, via the pipeline 8. In the fine-powder capturing apparatus 6 shown in Fig. 1, the granulation apparatus 4j is connected to the pipeline 8 which connects the polymerization apparatus 4a and the drying apparatus 4b. In this way, the fine powders granulated are charged to the drying step through the second pipeline 8b. In this production method, the fine powders can be reused without being disposed. This reuse may contribute to reduction of production cost.

30 [0092] In this production method, even when humidity is present inside the step, this humidity can be exhausted effectively. Accordingly, aggregation of the particulate water-absorbing resins themselves or attachment of the particulate water-absorbing resin to the apparatus or the like is suppressed, which can stabilize production. Further, in this production method, because gas, from which fine powders are removed, is exhausted outside, swirling up of the fine powders as dust can be suppressed. In this production method, good work environment can be maintained.

35 [0093] Further, in this production method, because the fine powders are removed efficiently from the particulate water-absorbing agent, the particulate water-absorbing agent superior in properties such as absorbency against pressure and liquid permeation can be obtained. In addition, because this production method is superior in trapping efficiency of the fine powders, by effective reuse of the fine powders thus collected, effect in view of production cost, that is, reuse of the fine powders, can be obtained as well.

40 [0094] In this production method, it is preferable that the trapping material superior in trapping efficiency of JIS 12-type carbon black (particle diameter: 0.03 μm to 0.2 μm) is used in the fine powder capturing apparatus 6. The fine powder capturing apparatus 6 provided with trapping material having high trapping efficiency can prevent deterioration of work environment caused by exhaust of the fine powders, as well as can collect the fine powders efficiently. From this viewpoint, this trapping efficiency is preferably equal to or higher than 90%, more preferably equal to or higher than 95%, still preferably equal to or higher than 99.9%, and particularly preferably equal to or higher than 99.99%.

45 [0095] The trapping efficiency of the trapping material is measured by a method, for example, JIS B9908:2001 type 1. This trapping efficiency can be obtained substantially, based on amount of dust before passing through the trapping material and amount of dust after passing through that, which is measured by a commercial dust meter. Specifically, by measuring amount of the dust in the first pipeline 8a of Fig. 1, amount of the fine powders W0 (mg/m³) before passing

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through the trapping material is obtained. By measuring amount of the dust in the second pipeline 8b, amount of the fine powders W_f (mg/m^3) after passing through the trapping material is obtained. By using W_0 and W_f obtained in this way, the trapping efficiency is calculated, based on the following calculation expression. It should be noted that, as this dust meter, for example, a product name "P5L Digital Dust Meter", manufactured by Shibata Scientific Technology, Ltd. is included. In addition, the dust measured here includes the fine powders and the aggregates of the water-absorbing resin. [0096]

[Expression 1]

$$\text{Trapping efficiency (\%)} = (1 - W_f/W_0) \times 100$$

[0097] When the fine powders reach inside the trapping material, the fine powders clog the trapping material. By this clogging, the gas becomes difficult to pass through this trapping material. From this viewpoint, as the trapping material, it is preferable that the fine powders capture the fine powders at the surface thereof. Use of such a trapping material not only traps the fine powders stably but also can reduce exchange frequency of this trapping material. The production method including the collection step of the fine powders by such a trapping material can contribute to productivity of the particulate water-absorbing agent. The trapping material is not especially limited, and for example, a filter cloth or a membrane filter made of woven fabric or nonwoven fabric is included, and in particular, the membrane filter is preferable. This membrane filter includes the membrane and the substrate. The membrane contains many fine pores or fine clearances. These pores or clearances are continuous in the thickness direction. This membrane can make gas passed through. The membrane is laminated on the substrate. The substrate can support the membrane. Although not shown, the substrate contains many fine pores or fine clearances. This substrate can make gas passed through. Size of the pores or clearances contained in the membrane is smaller than particle diameter of the fine powders generating in production of the particulate water-absorbing agent. Specifically, size (pore size) of the pores or clearances contained in the membrane is 0.1 to 20 μm , and thickness of the membrane is 0.01 to 1 mm. In addition, size (pore size) of the pores or clearances contained in the substrate is not especially limited, as long as it is larger than that of the pores or clearances contained in the membrane. Thickness of the substrate is 1 to 5 mm. In such a range, the fine powders do not enter into the membrane, and therefore, the fine powders carried to the fine powder capturing apparatus contained in the gas can be captured at the surface of this membrane.

[0098] In this production method, because the fine powders are captured at the surface of the membrane, they are hard to reach the substrate through the membrane. Because intrusion of the fine powders into the inside of the membrane filter is suppressed, clogging of the membrane filter caused by the fine powders can be prevented. That is, in this membrane filter, because the fine powders captured at the surface of the membrane are removed simply by physical impact (for example, pulse wave), difference between mass before using the membrane and mass after using the membrane is small. In this production method, amount per unit hour (hereafter, permeation flux) of the gas passing through this membrane filter is easy to be maintained suitably. Therefore, this membrane filter can contribute to decrease in pressure loss of this fine powder capturing apparatus 6. This membrane filter can reduce running cost. In this way, this production method is superior in productivity. In this production method, because the fine powders are removed efficiently from the particulate water-absorbing agent, the particulate water-absorbing agent superior in properties such as absorbency against pressure, liquid permeability or the like can be obtained.

[0099] In view of being able to obtain a large permeation flux, as for the substrate, woven fabric, nonwoven fabric, sponge or the like is exemplified. In view of versatility, as this substrate, nonwoven fabric is preferable. As a material of this substrate, polyester, polypropylene, polyacrylonitrile, nylon, polytetrafluoroethylene, polyphenylenesulfide, glass fiber, aramid fiber and polyimide are exemplified. The material of this substrate may be determined as appropriate in consideration of operation condition or the like of the fine powder capturing apparatus 6.

[0100] In the production method of the present invention, a material of the membrane is not especially limited, and, in view of being capable of easy shaking off the fine powders (superior in dust release) captured at the surface of the membrane, it is particularly preferable to be polytetrafluoroethylene. The membrane filter provided with this membrane made of polytetrafluoroethylene can contribute to enhancement of trapping efficiency of the fine powders by this fine powder capturing apparatus. Such a membrane filter can reduce running cost further. This production method is superior in productivity. In this production method, because the fine powders are removed efficiently from the particulate water-absorbing agent, the particulate water-absorbing agent superior in properties such as absorbency against pressure, liquid permeability or the like can be obtained.

[0101] As described above, in this production method of the present invention, the polyvalent metal salt or the inorganic particle may be formulated to the particulate water-absorbing agent, in the cooling step. This formulation prevents blocking of the particulate water-absorbing agent. Also in this case, because the membrane of the membrane filter can capture the fine powders at the surface thereof, intrusion of the fine powders into the inside of the membrane filter can

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be suppressed. By use of this membrane filter, exchange frequency of the trapping material in the fine powder capturing apparatus 6 can be reduced further. Therefore, this membrane filter can reduce running cost. In this way, this production method is superior in productivity.

5 [The granulation step]

[0102] The preferable production method of the present invention includes the granulation step. The granulation step is the step for obtaining the granulated particle by adding an aqueous liquid to the fine powders. The fine powders can be obtained at the classification step, the granule sizing step and the collection step. From the viewpoint of enhancing the recovery rate of the fine powders, it is preferable that all of the fine powders collected by the collection step can be supplied to this granulation step. The granulated particle is composed of a plurality of the fine powders. Weight average particle diameter of the granulated particle is equal to or smaller than 20 mm, preferably 0.3 to 10 mm, and more preferably 0.35 to 5 mm. Preferably, this granulated particle is charged to the drying step, and dried in the co-presence of the polymer gel. As described later, preferably, in this granulation step, the fine granules captured by a suction to perform the reduced pressure, is used. That is, it is preferable that in this granulation step, the fine powders collected by the collection step are used.

[0103] In this granulation step, it can be confirmed that a granulated substance generated is the granulated particle from the fact that a plurality of individual particles gather together while maintaining shape thereof and aggregates, or from the fact that they swell as a plurality of discontinuous particles in absorbing a solution, with an optical microscope.

[0104] In this granulation step, in view of drying load, the granulated particle has a water content of preferably equal to or lower than 75% by weight, more preferably equal to or lower than 70% by weight, and further preferably equal to or lower than 65% by weight (the lower limit is over 0% by weight, and preferably equal to or higher than 5% by weight). When the water content of the granulated particle is extremely higher than that of the polymer gel, drying could be partially incomplete when this granulated particle and the polymer gel are dried in a co-present state.

[0105] A solvent of the aqueous liquid to be used in this granulation step is not especially limited and, for example, water, an aqueous solution containing a hydrophilic organic solvent (for example, lower alcohols such as methyl alcohol, ethyl alcohol, n-propyl alcohol, isopropyl alcohol, n-butyl alcohol, isobutyl alcohol, t-butyl alcohol, or the like; ketones such as acetone or the like; ethers such as dioxane, tetrahydrofuran, or the like; amides such as N,N-dimethylformamide or the like; sulfoxides such as dimethylsulfoxide or the like) is included. From a view of property or granulation strength, it is desirable that the aqueous liquid contains water preferably in 90 to 100% by weight, and more preferably in 99 to 100% by weight, and is particularly preferably composed of only water. In the aqueous liquid, the additives may be dissolved into the solvent. The additives are at least one or more kind of additives selected from the group consisting of a thermal decomposition-type radical polymerization initiator, an oxidizing agent and a reducing agent. In addition, other additives such as a cross-linking agent, a chelating agent, a surfactant, or the like may be contained in the aqueous liquid in small amount within a range not to impair effect of the present invention. For example, as the cross-linking agent, the cross-linking agent as described above may be used. By containing the cross-linking agent in the aqueous liquid, reduction of water-soluble components, or enhancement of granulation strength can be expected.

[0106] In this granulation step, as the thermal decomposition-type radical polymerization initiator which can be used as the additive, the thermal decomposition-type initiator exemplified in the polymerization step may be used preferably in a similar way. Among these, a peroxide is preferable, and a persulfate salt such as sodium persulfate is particularly preferable. These thermal decomposition-type radical polymerization initiators may be only one or two or more kinds. The oxidizing agent is not especially limited as long as it can react with the monomer, while drying the granulated particle and the polymer gel in a co-present state. As this oxidizing agent, for example, an inorganic oxidizing agent such as a chlorate salt, a bromate salt, a chlorite salt, a hypochlorite salt, or the like; the persulfate salt or hydrogen peroxide exemplified also as the thermal decomposition-type radical polymerization initiator; an inorganic peroxide or an organic peroxide such as t-butyl peroxide, benzoyl peroxide, or the like; or the like is included. Among these, the persulfate salt or hydrogen peroxide is preferable, and the persulfate salt is particularly preferable. These oxidizing agents may be only one or two or more kinds. The reducing agent is not especially limited, and may be an organic reducing agent or an inorganic reducing agent. As this reducing agent, the inorganic reducing agent is preferable, and a sulfur-type, a phosphorous-type, or a nitrogen-type reducing agent is particularly preferable. Specifically, the reducing agent exemplified in the polymerization step may be used preferably in a similar way. Among these, the sulfur-type reducing agent, in particular, a sulfite salt, a hydrogen sulfite salt, a pyrosulfite salt, or a dithionite salt is preferable, and as a salt thereof, a sodium salt, a potassium salt, or an ammonium salt is preferable. Among these, sodium sulfite, or sodium hydrogen sulfite is particularly preferable. These reducing agents may be only one or two or more kinds. As this additive, among those described above, the thermal decomposition-type radical polymerization initiator is preferable, and in particular, use of the persulfate salt as the additive is preferable in view of exerting superior reducing effect of the residual monomer.

[0107] In this granulation step, content of the additive in the aqueous liquid is not especially limited, and, it is preferably 0.0001 to 1% by weight relative to the fine powders. The content below 0.0001% by weight could not decrease the

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residual monomer sufficiently, while, the content over 1% by weight could generate coloring in the final particulate water-absorbing agent obtained after drying. In addition, the additive (in particular, the thermal decomposition-type radical polymerization initiator) may be used in the polymerization step in some cases. In that case, content of the additive in the aqueous liquid, relative to the amount of the fine powders before granulation, is preferably 1 to 500% by weight, more preferably 5 to 400% by weight, and further preferably 10 to 300% by weight, relative to the amount (the amount per unit weight of the monomer component) of the additive added in the polymerization step. It should be noted that, when the additive is used in the polymerization step, the additive added in the polymerization step and the additive contained in the aqueous liquid may be the same kind or may be different kinds.

[0108] In the granulation step, use amount of the aqueous liquid is not especially limited, and, from 25 parts by weight to 280 parts by weight, relative to 100 parts by weight of the fine powders is preferable. More preferably, it is equal to or lower than 200 parts by weight, and further preferably, it is equal to or lower than 150 parts by weight. The use content of the aqueous liquid of over 280 parts by weight results in providing a unified giant gel-like substance with high water content, and thus it becomes necessary to further dry and pulverize this gel-like substance to make the granulated particle, and also, it requires tremendous load in drying. On the other hand, when the use amount of the aqueous liquid is less than 25 parts by weight, granulation strength becomes insufficient, and could not exert superior characteristics in a final product, as well as makes mixing inhomogeneous and therefore could make granulation difficult.

[0109] In this granulation step, when the fine powders are granulated, it is enough to mix the fine powders and the aqueous liquid, but, in particular, in the granulation, it is preferable that the aqueous liquid is heated in advance, and further it is a preferable aspect that granulation is performed by high speed mixing of said aqueous liquid heated and the fine powders. In this way, the granulated particle with directly controlled particle diameter can be obtained without making the unified giant gel-like substance, and as a result, it becomes not necessary to obtain the granulated particle by further drying and pulverizing the gel-like substance, and also, a problem caused when the unified giant gel-like substance is obtained, that is, a problem that since force required for mixing becomes enormous or the gel-like substance is kneaded in a bulk state, generation of scission or entanglement of a main chain causes deterioration of the particulate water-absorbing agent itself.

[0110] In this granulation step, in a preferable aspect of the granulation, temperature in heating the aqueous liquid is usually equal to or higher than 40°C, preferably equal to or higher than 50°C, more preferably equal to or higher than 60°C, and further preferably equal to or higher than 70°C. In addition, the upper limit of this temperature is equal to or lower than boiling point of the aqueous liquid, and the boiling point may be adjusted variously by adding salts or other solvents, or by changing pressure (reduced pressure, pressurization) or the like, but, because there is no big change even when the temperature is over 100°C, it is performed usually at equal to or lower than 100°C. It should be noted that, when the aqueous liquid is heated in advance, it is preferable that the additive is made separately as the aqueous liquid with relatively high concentration at room temperature or under cooling, and then this aqueous liquid is mixed with a relatively large quantity of the residual part of the aqueous liquid, which has been heated in advance, just before mixing with the fine powders.

[0111] In this granulation step, in a preferable aspect of the granulation, it is preferable that the aqueous liquid is heated in advance, and further the fine powders themselves are heated in advance. Temperature in heating these fine powders is also usually equal to or higher than 40°C, and preferably equal to or higher than 50°C. Because there is no big change even when the temperature is over 100°C, it is performed usually at equal to or lower than 100°C. It should be noted that, when the fine powders themselves are heated in advance, means thereof is not especially limited, and for example, they may be heated by drying and then retaining heat, or they may be heated separately from outside.

[0112] In this granulation step, in a preferable aspect of the granulation, the aqueous liquid and the fine powders heated are subjected to high speed mixing. High speed mixing means that time for completing mixing of the aqueous liquid and the fine powders, and then forming the granulated particle is short time. That is, it means that time from the point when the aqueous liquid and the fine powders contact to the point when the granulated particle forms, in other word, mixing time is short time. This mixing time is preferably equal to or shorter than 3 minutes, more preferably equal to or shorter than 1 minute, and most preferably 1 second to 60 seconds. When mixing time is longer, uniform mixing of the aqueous liquid and the fine powders becomes difficult, and it tends to provide the unified giant gel-like substance. In addition, when mixing time is longer, the additives contained in the aqueous liquid may decompose before the granulated particle generated and the polymer gel together are supplied to the drying step, and sufficient amount of the additive might not be present in the drying step. Further, continuing mixing for a long time could incur decrease in performance of the particulate water-absorbing agent, such as increase in water-soluble components or decrease in absorbency against pressure of the particulate water-absorbing agent obtained after completion of mixing.

[0113] In this granulation step, as a means to attain high speed mixing, charging the aqueous liquid heated all at once to the fine powders under stirring, is included. That is, in the case where the aqueous liquid is added gradually, for example, by a method such as spraying, the fine powders become a giant aggregated mass or kneaded on the way, and thus could cause deterioration of the particulate water-absorbing agent. Time for charging the heated aqueous liquid is preferably equal to or shorter than 60 seconds, further preferably equal to or shorter than 30 seconds, and most

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preferably equal to or shorter than 10 seconds. In addition, as a means for attaining high speed mixing, to the contrary from the above, there is also included a method for charging the fine powders in the heated aqueous liquid under stirring. Also in this cases, time for charging the fine powders is preferably equal to or shorter than 60 seconds, further preferably equal to or shorter than 30 seconds, and most preferably equal to or shorter than 10 seconds. In addition, as a means for attaining high speed mixing, there is also included a method for mixing the fine powders and the heated aqueous liquid at the same time all at once. Also in this cases, time for charging both is preferably equal to or shorter than 60 seconds, further preferably equal to or shorter than 30 seconds, and most preferably equal to or shorter than 10 seconds. In addition, it is also possible to obtain the granulated particles continuously by charging both continuously at the same time, and mixing in high speed. It should be noted that, as described above, in consideration of decomposition of the additive, it is preferable that time for making the granulated particles and the polymer gel coexist and drying is as short as possible, and when the polymer gel is obtained continuously in the polymerization step, it is a preferable aspect that the granulated particle is mixed thereto continuously, and send it to the drying step in a short period.

(The particulate water-absorbing agent)

[0114] Weight average particle diameter (D50) specified by JIS standard sieve classification of the particulate water-absorbing agent obtained by the production method of the present invention, is preferably 200 to 800 μm , more preferably 200 to 450 μm , more preferably 220 to 430 μm , and further preferably 250 to 400 μm . In addition, the particulate water-absorbing agent of the present invention can exert effect most, when it has specific particle diameter distribution. As for the preferable particle diameter distribution, particles occupying within the upper and the lower limit of 850 to 150 μm (specified by the JIS standard sieve; Z8801-1 (2000)), that is, ratio of particles having the weight average particle diameter (D50) of 150 to 850 μm , is preferably 90 to 100% by weight, further preferably 95 to 100% by weight, and particularly preferably from 98 to 100% by weight, relative to total of the water-absorbing agent. And, a substance passing 150 μm , that is, content of the fine powders having the weight average particle diameter of below 150 μm contained in the particulate water-absorbing agent, is preferably below 1% by weight, more preferably below 0.5% by weight, relative to total mass of the particulate water-absorbing agent. The particle diameter distribution is preferably in a specific range. Logarithm standard deviation (σ_c) thereof is set to preferably 0.20 to 0.50, and further preferably 0.30 to 0.40. When the weight average particle diameter (D50), the content rate of particles below 150 μm , and the logarithm standard deviation (σ_c) of particle diameter are outside the range, liquid permeability and water absorbing speed might decrease. It should be noted that, the logarithm standard deviation and the weight average particle diameter are specified by the specification of US-A-2006/0204755.

[0115] It should be noted that, particle shape of the particulate water-absorbing agent or the particulate water-absorbing resin relevant to the present invention is not especially limited. As this particle shape, spherical-shape, nearly spherical-shape, irregular pulverized shaped (which is a pulverized substance), bar shape, polygonal shape, sausage shape (for example; USP No.4973632), a particle with wrinkles (for example; USP No.5744564) or the like is included. They may be a single particle, or a granulated particle or a mixture of the single particle and the granulated particle. In addition, the particle may be foamed porous one. Preferably, a single particle with irregular pulverized shaped shape or a granulated substance thereof is included.

[0116] In view of malodor and hygiene, amount of the residual monomer of the particulate water-absorbing agent is preferably 0 to 500 ppm, more preferably 0 to 400 ppm, more preferably 0 to 300 ppm, more preferably 0 to 250 ppm, more preferably 0 to 200 ppm, further preferably 0 to 150 ppm, and particularly preferably 0 to 100 ppm. When a principal component of the monomer used in the polymerization is acrylic acid and/or a salt thereof, it is preferable that content of the unreacted acrylic acid and/or the salt thereof is equal to or less than 500 ppm. In measurement of amount of the residual monomer, 0.5 g of the water-absorbing agent is added to 1000 g of deionized water in a plastic container having a cap, and stirred for 2 hours. After stirring, the swelled and gelled water-absorbing agent is filtered with a filter paper, and analyzed with liquid chromatography. On the other hand, solutions with known concentrations of the monomer (acrylic acid) are similarly analyzed, and the resultant calibration curve is used as an external standard. Based on this external standard, amount of the residual monomer is determined in consideration of dilution rate of a filtrate.

[0117] As described above, the present invention provides a novel particulate water-absorbing agent having the following properties, which is composed principally of surface cross-linked polyacrylic acid (salt) based water-absorbing resin. In addition, one having the following properties exerts effect of the present invention significantly. Further, the present invention can be applied preferably for the production method for the particulate water-absorbing agent having the following properties.

[0118] Absorbency against non-pressure (CRC) of the particulate water-absorbing agent for a normal saline solution is preferably equal to or higher than 15 g/g. In general, when the particulate water-absorbing agent having the absorbency against non-pressure of below 15 g/g is used in absorbent articles such as disposable diapers, it could not provide high property. On the other hand, because the higher is the absorbency against non-pressure, the higher property of the absorbent articles is obtained, the upper limit thereof is not especially limited, but, in view of production difficulty as well

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as cost increase, it is preferable to be equal to or lower than 60 g/g. This absorbency against non-pressure is more preferably 15 to 50 g/g, and particularly preferably 25 to 35 g/g.

[0119] The particulate water-absorbing agent obtained by the production method of the present invention has AAP (Absorbency against Pressure) for a normal saline solution under pressure of 4.8 kPa, is preferably equal to or higher than 15 g/g, more preferably equal to or higher than 22 g/g, further preferably equal to or higher than 24 g/g and most preferably equal to or higher than 25 g/g. In general, when the particulate water-absorbing agent having the absorbency against pressure of below 15 g/g is used in absorbent articles such as disposable diapers, it could not provide high property. On the other hand, because the higher is the absorbency against pressure, the higher property of the absorbent articles is obtained, the upper limit thereof is not especially limited, but, in view of production difficulty as well as cost increase, the upper limit of the absorbency against pressure is preferably equal to or lower than 35 g/g.

[0120] The absorbency against pressure (AAP) can be obtained in accordance with a method described in USP No. 6071976. In more detail, absorbency against pressure (value at 60 minute) for a normal saline solution under 50 g/cm² (4.8 kPa), has been measured. This measurement is performed under an environment of 23 ± 2°C.

[0121] Liquid permeation (SFC) of the particulate water-absorbing agent obtainable by the production method of the present invention is a value representing liquid permeation on swelling of the particulate water-absorbing agent or the water-absorbing agent. The larger is the value of this liquid permeation (SFC), the particulate water-absorbing agent has the higher liquid permeation. By removal of the fine powders, value of liquid permeation (SFC) can be increased. This liquid permeation (SFC) is preferably equal to or higher than 30 ($\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1}$), more preferably equal to or higher than 50 ($\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1}$). When liquid permeation (SFC) is below 30 ($\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1}$), in the case where concentration of the particulate water-absorbing agent in the absorbent articles such as disposable diapers is equal to or higher than 30% by mass, in more specifically, in the case of equal to or higher than 50% by mass, absorption speed of urine could decrease and incur leakage. In the present application, this liquid permeation (SFC) is also called saline flow conductivity.

[0122] In this production method, from the viewpoint that superior properties of the above-described particulate water-absorbing agent can be stably maintained, as well as blocking can be prevented, it is preferable that dried gas is passed in each of the steps. As this gas, one having a dew point of equal to or lower than -30°C is preferable, one having equal to or lower than -35°C is more preferable, and one having equal to or lower than -40°C is particularly preferable. When it is difficult to pass dried gas, it is preferable that heated gas is passed. A heating method is not especially limited, but, the gas may be heated directly by using a heat source, and the gas to be passed may be heated indirectly by heating each apparatus or the pipeline 8 or the like installed between each of the steps. Temperature of this heated gas is preferably equal to or higher than 30°C, more preferably equal to or higher than 50°C, and further preferably equal to or higher than 70°C.

[0123] In the present invention, at least one step of the steps is set under reduced pressure state. One example of the present invention includes the polymerization step for obtaining the polymer gel, the drying step for drying the polymer gel to obtain a dried substance, the pulverization step for pulverizing the dried substance or the polymer gel to obtain the particulate water-absorbing resin, the classification step for sieving the particulate water-absorbing resin, the transporting step for transporting the products produced in each of the steps to other steps, and other step which may be contained further, and is a production method for the particulate water-absorbing agent, wherein one or more steps selected from the pulverization step, the classification step, the other step which may be included further, and the transporting step after the pulverization step are set under reduced pressure state. The other step which may be included further are, for example, one or more steps selected from the granule sizing step, the surface cross-linking step, the cooling step and the packaging step. The other step which may be included further is not essential in the present invention.

[0124] Which of the steps is set under reduced pressure state is not limited. Preferably, the pulverization step is set under reduced pressure state. Preferably, the classification step is set under reduced pressure state. Preferably, the granule sizing step is set under reduced pressure state. Preferably, the transporting step next to the pulverization step is set under reduced pressure state. Preferably, the transporting step after the pulverization step is set under reduced pressure state. Preferably, the transporting step between the pulverization step and the classification step is set under reduced pressure state. Preferably, one or more steps selected from the pulverization step, the classification step, the granule sizing step, the transporting step after the pulverization step are set under reduced pressure state. The surface cross-linking step and the packaging step may be set under reduced pressure state. Preferably, the pulverization step, the classification step, the granule sizing step, and the transporting step between these steps are set under reduced pressure state. In particular, in the steps including and subsequent to the pulverization step, the fine powders easily float. In this production method, gas (air) containing the fine powders may leak out from each apparatus or pipeline or the like. When gas containing the fine powders leaked out, amount of the fine powders contained in air inside a plant increases, and thus may deteriorate work environment. In addition, leakage of air containing the fine powders may decrease recovery rate of the fine powders. By setting the reduced pressure state, the leakage from the apparatus or pipeline or the like can be suppressed effectively. In addition, by this reduced pressure state, gas (air) containing the fine powders can be introduced effectively to the fine-powder capturing apparatus 6. In this case, it is preferable that

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the fine-powder capturing apparatus 6 is provided with a pressure reducing apparatus. This pressure reducing apparatus is an apparatus enabling to generate reduced pressure state. This pressure reducing apparatus can generate reduced pressure state by suction of gas. Because by this pressure reducing apparatus, air inside each step is suctioned to the fine-powder capturing apparatus 6, capturing of the fine powders by the fine-powder capturing apparatus 6 can be attained effectively. It is preferable that, in at least one step in the steps after the pulverization step, inside of the step is set under reduced pressure state.

[0125] In particular, in the pulverization step, the fine powders scatter easily. Therefore, it is preferable that the pulverization step is set under reduced pressure state. In addition, it is general that the granule sizing step has the step for crushing the fine powders, and in this crushing step, usually a pulverization machine is used. When the pulverization machine is used in the granule sizing step, scattering of the fine powders generates easily. Therefore, it is preferable that the granule sizing step is set under reduced pressure state. In this way, it is preferable that the step accompanying with pulverization of the water-absorbing resin or the water-absorbing agent is set under reduced pressure state.

[0126] It should be noted that, when the fine powders are granulated and reused as above, it is preferable that the granulated particle containing the fine powders is charged, for example, into the drying step. In this case, the fine powders may separate again from the granulated particle in some cases. In addition, in the granulation step, the fine powders may remain without being granulated in some cases. Therefore, in the step at or after charging the granulated particle, the fine powders may float in air in some cases. From such a viewpoint, the step before the pulverization step may be set under reduced pressure state. In addition, in Fig. 1, the transporting step (the fine powders transporting step) from the classification apparatus 4d to the granulation apparatus 4j may be set under reduced pressure state, or the transporting step (the fine powders transporting step) from the granule sizing apparatus 4h to the granulation apparatus 4j may be set under reduced pressure state. In this way, for example, the pressure reducing apparatus may be installed at one or more positions between the step S1 and the step S20 of Fig. 1. In view of enhancing effect caused by reduced pressure, preferably, the pressure reducing apparatus is installed at two or more positions, more preferably four or more positions between the step S1 and the step S20 of Fig. 1. In view of economic performance, the pressure reducing apparatus is installed at 20 or less positions, more preferably at 10 or less positions between the step S1 and the step S20 of Fig. 1.

[0127] The pressure reducing apparatus is not especially limited, as long as it can attain reduced pressure state. This pressure reducing apparatus may be an exhaust apparatus for performing simply exhaust, or may be a suction exhaust apparatus for exhausting this gas after making the suctioned gas pass through a filter. By this exhaust, humidity inside the step can be removed effectively. The fine-powder capturing apparatus 6 provided with the pressure reducing apparatus is the suction exhaust apparatus provided with the filter being able to capture the fine powders. As the exhaust apparatus, an exhaust fan or an exhaust blower is exemplified. It should be noted that, in adjusting the degree of reduced pressure as appropriate depending on the step or the apparatus, in view of increasing the degree of reduced pressure to decrease the fine powders, the exhaust blower is preferable.

[0128] Fig. 2 is a drawing showing one example of a schematic configuration of the pulverization apparatus 4c and the classification apparatus 4d in the facility 2. The pulverization apparatus 4c has a first pulverization apparatus 4c1, a second pulverization apparatus 4c2 and a pipeline in the step 12. The classification apparatus 4d may be installed in two units.

[0129] In the present embodiment, the two-stage pulverization step is performed. To the first pulverization apparatus 4c1, a dried substance supplied to the drying step is transported. By this first pulverization apparatus 4c1, the first stage of the pulverization step is performed, and the first pulverized substance is obtained. This first pulverized substance is supplied to the second pulverization apparatus 4c2 via the pipeline in the step 12. The second pulverization apparatus 4c2 is installed in two units. The pipeline in the step 12 is branched, and the first pulverized substance is supplied to each of the two units of the second pulverization apparatus 4c2. By the second pulverization apparatus 4c2, the first pulverized substance is pulverized more finely to obtain the second pulverized substance. This second pulverized substance is supplied to the classification apparatus 4d. To the two units of the classification apparatus 4d, the second pulverized substance is supplied. Among the classified substances classified with the classification apparatus 4d, one having a desired particle diameter is supplied to the surface cross-linking step (the mixing apparatus 4e). In addition, among the classified substances, one having too small particle diameter is supplied to the granulation step (the granulation apparatus 4j) as a fine powder. Among the classified substances, one having too large particle diameter is supplied again to the first pulverization apparatus 4c1.

[0130] Those shown by the arrow marks in Fig. 2 are positions where the exhaust apparatus is installed. As shown by the arrow marks S41 and S42, the exhaust apparatus is installed to the first pulverization apparatus 4c1. In the first pulverization apparatus 4c1, the exhaust apparatus is installed at two positions. As shown by the arrow marks S43 and S44, the exhaust apparatus is installed to the second pulverization apparatus 4c2. Further, as shown by the arrow marks S51 and S52, the exhaust apparatus is installed to the pipeline 8 which connects the second pulverization apparatus 4c2 and the classification apparatus 4d. The apparatuses and pipelines where this exhaust apparatus is installed are set under reduced pressure state. In this way, in the embodiment of Fig. 2, the transporting step performed next to the pulverization step is set under reduced pressure state. In this way, the pressure reducing apparatus such as the exhaust

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apparatus may be installed to each apparatus or each pipeline of the production facility. To the pipeline in the step 12, the pressure reducing apparatus may be installed. One unit of the exhaust apparatus may be installed at one exhaust position, or one unit of the exhaust apparatus may be connected to a plurality of exhaust positions. It should be noted that, when the pressure reducing apparatus is installed to the pipeline in the step, it means that the step including the pipeline in the relevant step is set under reduced pressure state.

[0131] Fig. 3 is a drawing showing one example of a schematic configuration of the granule sizing apparatus 4h in the facility 2. The granule sizing apparatus 4h has a hopper 4h1, a pulverizing machine 4h2, a classification apparatus 4h3, a hopper 4h4 and the pipeline in the step 12.

[0132] The particulate water-absorbing agent passed through the cooling step is stored temporarily in the hopper 4h1. Next, the particulate water-absorbing agent is sent from the hopper 4h1 to the pulverizing machine 4h2. The particulate water-absorbing agent crushed by this pulverizing machine 4h2 is sent to the classification apparatus 4h3. Among the substances classified by the classification apparatus 4h3, one having a desired particle diameter is sent to the filling apparatus 4i. In addition, among the classified substances, one having too small particle diameter is sent to the granulation apparatus 4j via the hopper 4h4, as the fine powders. Among the classified substances, one having too large particle diameter is transported again to the pulverizing machine 4h2. This transportation is performed by a conveyer 14. That is, the too large classified substance is returned from the classification apparatus 4h3 to the pulverizing machine 4h2 via the conveyer 14.

[0133] Those shown by the arrow marks in Fig. 3 are positions where the exhaust apparatus is installed. As shown by the arrow mark S141, the exhaust apparatus is installed to the hopper 4h1. As shown by the arrow mark S142, the exhaust apparatus is installed to the pulverization machine 4h2. As shown by the arrow mark S143, the exhaust apparatus is installed to the pipeline in the step 12 which uses the conveyer 14 as the transportation means. As shown by the arrow mark S144, the exhaust apparatus is installed to the hopper 4h4. The hopper 4h4 is a hopper for storing the fine powders. The apparatuses and pipelines where this exhaust apparatus is installed are set under reduced pressure state. In this way, the pressure reducing apparatus such as the exhaust apparatus can be installed to each apparatus or each pipeline of the production facility. One unit of the exhaust apparatus may be installed at one exhaust position, or one unit of the exhaust apparatus may be connected to a plurality of exhaust positions.

[0134] A treatment method for gas exhausted by the exhaust apparatus explained in Fig. 2 and Fig. 3, is not limited. This exhausted gas may be sent to the fine-powder capturing apparatus 6, or may be subjected to other treatment. The exhausted gas may be exhausted only to the outside of the step. By this exhaust, humidity inside the step can be removed effectively.

[0135] By the exhaust apparatus, inside of the step is set under reduced pressure state. In the present application, "inside of the step" is a concept including the following (a) to (c) :

[0136]

(a) inside of the apparatus or pipeline or the like for performing the step thereof.

[0137]

(b) inside of an enclosure covering the apparatus or pipeline or the like for performing the step thereof.

[0138]

(c) inside of a room where the apparatus or pipeline or the like for performing the step thereof is positioned.

[0139] When the apparatus or pipeline or the like has substantially closed space, and reduced pressure in the apparatus is possible, the (a) can be adopted. When reduced pressure in the apparatus itself is difficult, the (b) or (c) may be adopted.

[0140] "A reduced pressure state" means that a pressure is lower state than atmospheric pressure. In addition, "degree of reduced pressure relative to atmospheric pressure" means pressure difference from atmospheric pressure, and when the pressure is lower than atmospheric pressure, it is expressed as a positive (plus) value. For example, when atmospheric pressure is standard atmospheric pressure (101.3 kPa), "the degree of reduced pressure of 10 kPa" means that the pressure is 91.3 kPa. In the present application, "degree of reduced pressure relative to atmospheric pressure" may be called simply "degree of reduced pressure".

[0141] In view of enhancing the effect caused by reduced pressure, the lower limit of the degree of reduced pressure is preferably over 0 kPa, more preferably equal to or higher than 0.01 kPa, and more preferably equal to or higher than 0.05 kPa. In view of suppressing flying of powders in the system, and in view of suppressing excessive cost for the exhaust apparatus, the upper limit value of the degree of reduced pressure is preferably equal to or lower than 10 kPa, more preferably equal to or lower than 8 kPa, further preferably equal to or lower than 5 kPa, and far preferably equal to or lower than 2 kPa. A preferable range of the numerical value of the degree of reduced pressure may be selected

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arbitrarily between the lower limit value and the upper limit value.

[0142] Because the production method relevant to the present invention includes the step under reduced pressure state, the particulate water-absorbing agent can be produced continuously and stably. This production method is superior in trapping efficiency of the fine powders. Such a production method can contribute to stabilization of water absorbing characteristics of a product obtained continuously, in a production scale (the upper limit is 10000 kg/h) of preferably equal to or higher than 500 kg/h, further preferably equal to or higher than 1000 kg/h, and particularly preferably equal to or higher than 1500 kg/h. This production method can become more effective, when the fine powders collected with the trapping material is equal to or lower than 10% by mass of total production amount. This production method can become further effective, when the fine powders collected with the trapping material is equal to or lower than 5% by mass of total production amount. This production method is effective when the fine powders collected with the trapping material is equal to or lower than 3% by mass of total production amount, because quality of the resultant product can be maintained high.

[0143] As described above, in the present invention, because air containing humidity can be removed by reduced pressure state, dehumidification can be performed easily. By dehumidification, stable production is made possible, as well as aggregation or property decrease of the particulate water-absorbing agent can be suppressed. Further, by the reduced pressure state, the leakage from the apparatus or the pipeline or the like can be suppressed effectively. In addition, by these reduced pressure states, recovery of the fine powders in air can be made easy. In addition, by the reduced pressure state, the transporting step can be performed efficiently. By the reduced pressure state, an object of transportation can be transported pneumatically. That is, by pneumatic transportation using reduced pressure state, a product such as the polymer gel, the particulate water-absorbing resin, the particulate water-absorbing agent or the like can be transported. By pneumatic transportation using this reduced pressure state, efficient continuous production can be performed.

[0144] Each of the steps may be performed in batch by the same or different apparatus, but, preferably continuous production is performed by connecting each of the steps. Treatment time in each of the steps is determined as appropriate. Treatment time in each of the steps is, for example, as follows. Treatment time of the polymerization step is, for example, from 0.1 minute to 10 hours, and further from 1 minute to 1 hour. Treatment time of the drying step is, for example, from 0.1 minute to 10 hours, and further from 1 minute to 1 hour. Treatment time of the pulverization step is, for example, from 0.01 second to 1 hour, and further from 0.1 second to 0.5 hour. Treatment time of the classification step is, for example, from 0.01 second to 1 hour, and further from 0.1 second to 0.5 hour. Treatment time of the transporting step is, for example, from 0.01 second to 1 hour, and further from 0.1 second to 0.5 hour. Treatment time of the surface cross-linking step is, for example, from 0.1 minute to 5 hours, and further from 1 minute to 1 hour. Treatment time of the cooling step is, for example, from 1 minute to 2 hours, and further from 0.1 hour to 1 hour. Treatment time of the granule sizing step is, for example, from 1 minute to 2 hours, and further from 0.1 hour to 1 hour. Preferably two or more positions, further three or more positions, further four or more positions, and further five or more positions in all of the steps are set under reduced pressure state. In view of property enhancement of particulate water-absorbing agent, rate Rd occupied by time of reduced pressure state, in treatment time including and subsequent to the pulverization step, is preferably equal to or larger than 40%, more preferably equal to or larger than 50%, further preferably equal to or larger than 60%, far preferably equal to or larger than 70%, far preferably equal to or larger than 80%, and particularly preferably equal to or larger than 90%. The upper limit of Rd is not especially limited, and equal to or smaller than 100% is preferable. It should be noted that, time (total required time) required from the start point of the pulverization step to the end of the final step (the packaging step or the like), is T1. For example, when the packaging step is present, the T1 is time required from the pulverization step to the packaging step. When among the time T1, time, when a production object (the water-absorbing resin or the like) in the step is set under reduced pressure state, is T2, the ratio Rd (%) is calculated by the following expression.

[0145]

[Expression 2]

$$Rd = [T2/T1] \times 100$$

[0146] It should be noted that, the T1 is not limited. Usually, the T1 is from 0.5 hour to 24 hours, and further from 1 hour to 20 hours.

[0147] Conventionally, it has been known in the field of the water-absorbing resin to perform reduced pressure polymerization or reduced pressure drying in order to prevent thermal deterioration. On the other hand, in the present invention, as described above, the steps including and subsequent to the pulverization step are set under reduced pressure state, with completely different object (enhancement of liquid permeation or the like).

[0148] In view of attaining enhancement of property such as liquid permeation, the preferable production method for

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the particulate water-absorbing agent relevant to the present invention includes essentially the polymerization step for obtaining the polymer gel, the drying step for drying the polymer gel to obtain a dried substance, the pulverization step for pulverizing the dried substance, the classification step for sieving the particulate water-absorbing resin, the surface cross-linking step for cross-linking the neighborhood of the surface of the particulate water-absorbing resin to obtain the
 5 particulate water-absorbing agent, the packaging step for filling a packaging material container with the particulate water-absorbing agent for packaging, the transporting step for transporting the products produced in each of the steps to other steps, and further includes 0 to 2 steps selected from a group consisting of the cooling step for cooling the particulate water-absorbing agent performed the surface cross-linking step, and the granule sizing step for sizing the particulate
 10 water-absorbing agent, and is the production method for the particulate water-absorbing agent, where time of equal to or more than 50% in treatment time from the pulverization step to the packaging step is set under reduced pressure state. Preferably, this production method includes 1 to 2 steps selected from a group consisting of the cooling step and the granule sizing step.

[0149] It should be noted that, in the present invention, pressure in the polymerization step and the drying step is not especially limited, but, in view of property of the particulate water-absorbing agent, it is preferable that these steps are
 15 set in normal pressure (atmospheric pressure).

[0150] It is preferable that the transporting step is set under reduced pressure state, but, the transporting step by pressurization is also preferable. That is, it is preferable that the transporting step is set under reduced pressure state or under pressurized state. As the transporting step by pressurization, pneumatic transportation is exemplified. That is,
 20 it is preferable that transportation by pressurization and transportation by reduced pressure are used in combination, and which of the transportation by pressurization and the transportation by reduced pressure is adopted is not especially limited, and an arbitrarily transportation method can be selected.

[0151] The pneumatic transportation has many merits as compared with mechanical transportation. As merits of the pneumatic transportation, less mechanical parts, less mechanical troubles, superiority in durability, one way, where a return line is not necessary different from a belt conveyor, less commingling of foreign materials and the like are included.
 25 By suction of air from a transportation destination by the reduced pressure apparatus, pneumatic transportation by reduced pressure can be attained. That is, by suction of air from the transportation destination by the reduced pressure apparatus, while the transporting step is set under reduced pressure state, pneumatic transportation from a transportation origin to the transportation destination can be attained. In this way, the transporting step relevant to the present invention may be set pneumatic transportation. The transporting step relevant to the present invention may be pneumatic transportation by reduced pressure. In addition, the transporting step by pressurization may be adopted. The transporting
 30 step relevant to the present invention may be pneumatic transportation by pressurization. As merits of the pneumatic transportation by pressurization, reducing of pipeline size, suppressing of dew condensation in the pipeline by using dry air in pressurization, and the like are included.

[0152] In the present invention, pressure in all steps other than the polymerization step, the drying step and the transporting step may be set under pressurized state. By setting a pressurized state, intrusion of grit and dust or the like
 35 into the apparatus, the pipeline or the like can be prevented, and commingling of foreign materials to the particulate water-absorbing resin or the particulate water-absorbing agent can be decreased, and therefore the particulate water-absorbing agent with high quality can be obtained. In addition, in the production method of the present invention, whether the steps other than the polymerization step, the drying step and the transporting step are set under reduced pressure state or set under pressurized state is not especially limited, and an arbitrary state may be selected.

[0153] It should be noted that, "A pressurized state" means a higher pressure state than atmospheric pressure. In addition, "degree of pressurization relative to atmospheric pressure" means pressure difference from atmospheric pressure, and when the pressure is higher than atmospheric pressure, it is expressed as a positive (plus) value. For example,
 40 when atmospheric pressure is standard atmospheric pressure (101.3 kPa), "the degree of pressurization of 10 kPa" means that pressure is 111.3 kPa. In the present application, "degree of pressurization relative to atmospheric pressure" may be called simply "degree of pressurization". It should be noted that, the degree of pressurization is preferably 0 to 1 MPa.

[0154] In view of suppressing moisture absorption or dew condensation inside the step, at least inside one step, preferable air temperature Ta inside the relevant step is set at equal to or higher than 25°C, more preferably equal to
 50 or higher than 30°C, and further preferably equal to or higher than 50°C. Because the too high temperature may provide the case where properties of the particulate water-absorbing agent decrease in an opposing way, this temperature Ta is preferably equal to or lower than 150°C. From the viewpoint of production stabilization, it is particularly preferable that this preferable temperature Ta is adopted in the pulverization step, the classification step and the granule sizing step. When moisture absorption or dew condensation generates in these steps, stable production may be obstructed easily.
 55 In addition, because a storage part such as a hopper present in the production facility stores a large quantity of the particulate water-absorbing resin for a relatively long period, absorption of humidity tends to generate. In addition, when aggregation generates in the storage part such as a hopper, discharge of the particulate water-absorbing resin from a discharge port of the storage part becomes difficult, and therefore stable production tends to be obstructed. From this

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viewpoint, it is preferable that inner air in N units (N is an integer of equal to or more than 1) of the storage parts among the storage parts present in the production facility is set at the preferable temperature Ta. From the viewpoint of stable production, the N is preferably equal to or more than 1, more preferably equal to or more than 2, and more preferably equal to or more than 3. From the viewpoint of economic performance, the N is preferably equal to or less than 15, and more preferably equal to or less than 10. In addition, when aggregation generates in the pipeline, clogging of the pipeline tends to generate, and therefore stable production tends to be obstructed. It is preferable that a heating member is arranged at the outside of the hopper or pipeline or the like, in order to heat inner air of the storage part (hopper) or the pipeline. As this heating member, an electric heater such as a band heater, a pipe or a jacket or the like, which can pass through high temperature steam or heated liquid, may be adopted. In view of easy handling, the liquid is preferably water. From the viewpoint of heat conductivity, it is preferable that a material of the heating member (a pipe or the like) is preferably a metal, and more preferably copper or a copper-type alloy. It is preferable that this heating member is wound at the outer surface of the storage part such as the hopper.

EXAMPLES

[0155] Effect of the present invention will be clarified below with reference to Examples, but, the present invention should not be construed restrictively, based on description of these Examples. It should be noted that, in the present description, "parts by mass" and "% by mass" are synonymous to "parts by weight" and "% by weight", respectively.

(Measurement of CRC)

[0156] Absorbency against non-pressure (CRC) for a normal saline solution can be obtained as follows. Firstly, about 0.2 g of the particulate water-absorbing agent was weighed correctly (this weight becomes "mass of the particulate water-absorbing agent" of the following expression), which was put uniformly in a bag made of nonwoven fabric (60 mm × 85 mm). This bag was immersed in a normal saline solution (about 200 g) with a temperature adjusted at $25 \pm 2^\circ\text{C}$. After 30 minutes, this bag was pulled up, and subjected to water draining for 3 minutes, by use of a centrifugal separation apparatus (a compact-type centrifugal separation apparatus, model-type: H-122, manufactured by Kokusan Co., Ltd.) under a condition of 250 G ($250 \times 9.81 \text{ m/s}^2$). Then, mass W4 (g) of the bag after performing the water draining was measured. In addition, similar operation was performed on the bag made of nonwoven fabric without containing the particulate water-absorbing agent, and mass W3 (g) of this bag was measured. Then absorbency against non-pressure was calculated according to the following expression, by using these masses W4 and W3.

[0157]

[Expression 3]

$$\text{CRC (g/g)} = [(W4 - W3) / \text{mass of the particulate}$$

water-absorbing agent] - 1

(Measurement of AAP)

[0158] Absorbency against pressure for a normal saline solution under pressurization of 4.8 kPa (AAP4.8 kPa) can be obtained as follows. Firstly, a supporting cylinder made of plastic, having an inner diameter of 60 mm, having a metal mesh (a sieve mesh size of $38 \mu\text{m}$) made of stainless steel welded at the bottom thereof, was prepared. Then, 0.900 g of the water-absorbing agent was spread uniformly on this metal mesh, and a piston (cover plate), having an outer diameter of a little smaller than 60 mm, having no clearance between the wall surface of the supporting cylinder and itself, and being able to slide up and down, was mounted on the metal mesh. Next, mass W6 (g) of the supporting cylinder, the particulate water-absorbing agent and the piston was measured. Then, by mounting a weight on this piston, it was adjusted so that a pressure of 4.8 kPa was uniformly loaded to the water-absorbing agent. Such an adjusted state is a measurement apparatus of this absorbency against pressure. Next, inside a Petri dish with a diameter of 150 mm, a glass filter with a diameter of 90 mm, and a thickness of 5 mm was put, and a normal saline solution, whose temperature was adjusted to $25 \pm 2^\circ\text{C}$, was poured, so as to become the same level as the upper surface of the glass filter. On the upper surface of this glass filter, a sheet of a filter paper (No. 2, manufactured by Toyo Roshi Kaisha, Ltd.) with a diameter of 9 cm was put, so that whole surface was wet, and then excess saline solution was removed. Next, the measurement

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apparatus was put on the filter paper so that the normal saline solution was absorbed under pressure. When water surface of the saline solution became lower than the upper surface of the glass filter, the saline solution was replenished to maintain the water surface level constant. After one hour, the measurement apparatus was picked out to measure mass W5 (g) excluding the weight. This mass W5 (g) is the total mass of the supporting cylinder, the swollen water-absorbing agent and the piston. Then absorbency against pressure under pressurization of 4.8 kPa, AAP (4.8 kPa) (g/g), was calculated according to the following expression, by using these masses W5 and W6. It should be noted that, Ws in the expression represents mass (g) of the water-absorbing agent.

[0159]

10

[Expression 4]

$$\text{AAP (4.8 kPa) (g/g)} = (\text{W6} - \text{W5}) / \text{Ws}$$

[0160] Absorbent articles, which are made by using the particulate water-absorbing agent obtained by the production method of the present invention, can be obtained, for example, by forming the particulate water-absorbing agent and, as needed, a hydrophilic fiber in a sheet-like shape. When the hydrophilic fiber is not used, the absorbent articles can be obtained by fixing the particulate water-absorbing agent in paper or nonwoven fabric. Content (core concentration) of the particulate water-absorbing agent in such absorbent articles is, for example, 10 to 100% by weight, preferably 30 to 100% by weight, and more preferably 50 to 100% by weight. In addition, it is desirable that the absorbent articles are adjusted to have a density in a range of 0.06 to 0.5 g/cc, and a basis mass is in a range of 0.01 to 0.2 g/cm². It should be noted that, as a fiber substrate 34 to be used, for example, hydrophilic fiber such as pulverized wood pulp, cotton linter or cross-linked cellulose fiber, rayon, cotton, wool, acetate fiber, vinylon fiber or the like may be exemplified, and the airlaid one is preferable.

[0161] Amount of the fine powders contained in the particulate water-absorbing agent obtained by the production method of the present invention is low. In such a particulate water-absorbing agent, obstruction of liquid permeation caused by the fine powders is suppressed. Such a particulate water-absorbing agent is superior in liquid permeation. Therefore, the production method of the present invention is desirable as a production method for the particulate water-absorbing agent for which, in particular, high liquid permeation (SFC) is required.

30

(Measurement of SFC)

[0162] In measurement of saline flow conductivity (SFC), 0.900 g of the water-absorbing agent is put uniformly in a container. This water-absorbing agent is pressurized at 2.07 kPa, while being immersed into artificial urine. After 60 minutes, height of the swollen water-absorbing agent (gel layer) is recorded. In a state that the water-absorbing agent is pressurized at 2.07 kPa, a 0.69% by weight normal saline solution is passed through the gel layer. Room temperature in this case is adjusted at 20°C to 25°C. By use of a computer and a balance, fluid amount passing through the gel layer is recorded in an interval of 20 seconds to calculate flow velocity Fs (T) of the fluid passing. Flow velocity Fs (T) is calculated by dividing increased mass (g) by increased time (s). Time when hydrostatic pressure of the saline solution became constant and stable flow velocity is obtained, is adopted as Ts, and only data measured for 10 minutes from the Ts is used in flow velocity calculation. From flow velocity measured for 10 minutes from the Ts, value of Fs (T=0) is obtained. This value is initial flow velocity for passing through the gel layer. Fs (T) is plotted against time, and Fs (T=0) is calculated based on the result obtained by the least square method. Saline flow conductivity (SFC) is calculated according to the following expression.

45 [0163]

[Expression 5]

50

$$\text{SFC} = (\text{Fs (t=0)} \cdot \text{L0}) / (\rho \cdot \text{A} \cdot \Delta \text{P})$$

[0164] In this expression, L0 is height (cm) of the gel layer, ρ is density (g/cm³) of the saline solution, A is cross-sectional area A (cm²) of the gel layer and ΔP is hydrostatic pressure (dyne/cm²) loaded on the gel layer. The artificial urine is obtained by mixing 0.25 g of a dehydrate of calcium chloride, 2.0 g of potassium chloride, 0.50 g of a heptahydrate of magnesium chloride, 2.0 g of sodium sulfate, 0.85 g of ammonium dihydrogen phosphate, 0.15 g of diammonium hydrogen phosphate, and 994.25 g of pure water. Such an evaluation is performed in accordance with the SFC test described in USP No. 5849405.

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Example 1

[0165] By using a production facility shown by Fig. 1, the particulate water-absorbing agent was produced continuously. This production facility has capacity of producing 1500 kg/hr of the particulate water-absorbing agent. The fine powders generated in this production facility are collected with the fine-powder capturing apparatus 6 via the pipelines S4 to S20 and the pipeline 8a. Further, the fine powders collected with the fine-powder capturing apparatus 6 are supplied to the granulation apparatus 4j via the pipeline 8b. It should be noted that, as the trapping material, a bag filter was used, which is a membrane filter composed of a membrane (material: polytetrafluoroethylene, pore diameter: 2.5 μ m, a thickness: 0.02 mm, trapping efficiency: 99.9%) and a substrate (material: polyester, average pore diameter: 50 μ m, thickness: 2.3 mm, trapping efficiency: 50%). The fine powders collected with the trapping material was equal to or less than 2% by mass, based on total production mass.

[0166] In addition, the fine powders separated by the classification step and the fine powders separated by the granule sizing step are also supplied to the granulation apparatus 4j via each pipeline 8. In the granulation apparatus 4j, the fine powders collected in the fine-powder capturing apparatus 6, the fine powders separated by the classification step and the fine powders separated by the granule sizing step are mixed and granulated. It should be noted that, in the granulation step, warm water was used as the aqueous liquid in 110 parts by weight, relative to 100 parts by weight of the fine powders, and temperature of the fine powders was set at 60°C and temperature of aqueous liquid was set at 70°C to mix continuously in high speed for 0.3 second by use of a mixing apparatus, Turbulizer^{RT}. Granulated particles (average particle diameter: 0.5 to 3 mm, water content: 55% by mass) are supplied to a transportation pipeline between the polymerization step and the drying step via the pipeline 8.

[0167] Because the pressure reducing apparatus (a suction apparatus) is provided in the fine-powder capturing apparatus 6, the apparatuses and the pipelines connected to the fine-powder capturing apparatus 6 via a pipeline, are set under reduced pressure state. However, because pneumatic transportation is performed in the transportation pipeline from the granule sizing step to the packaging step, it is set under pressurized state. It should be noted that, degree of reduced pressure and degree of pressurization of the steps are as follows.

Table 1

[0168] The pulverization step (S4): Reduced pressure, 0.28 to 0.31 kPa; 2 to 3 minutes
 The first pulverization apparatus 4c1: Reduced pressure, 0.28 to 0.30 kPa
 The second pulverization apparatus 4c2: Reduced pressure, 0.30 to 0.31 kPa
 The classification step (S6) 4d: Reduced pressure, 0.08 to 0.10 kPa; 1 to 2 minutes
 The surface cross-linking step: Reduced pressure, 0.10 to 0.65 kPa; 1 hour
 The mixing apparatus (S8) 4e: Reduced pressure, 0.46 to 0.48 kPa
 The transporting step between the mixing apparatus and the Heating apparatus (S9): Reduced pressure, 0.50 to 0.65 kPa
 Heating apparatus (S10) 4f: Reduced pressure, 0.10 to 0.12 kPa
 The cooling step (S12) 4g: Reduced pressure, 0.05 to 0.08 kPa; 1 hour
 The granule sizing step (S14): Reduced pressure, 0.11 to 0.69 kPa; 25 to 30 minutes
 Hopper 4h1: Reduced pressure, 0.21 kPa
 Pulverizing machine 4h2: Reduced pressure, 0.18 kPa Classification apparatus 4h3: Reduced pressure, 0.11 kPa Hopper 4h4: Reduced pressure, 0.69 kPa
 Conveyer 14: Reduced pressure, 0.21 kPa
 The transporting step between the granule sizing step and the packaging step (S15): Pressurization, 0.2 to 0.5 MPa; 1 to 15 minutes
 The packaging step (S16) 4i: Reduced pressure, 0.20 kPa; 5 to 7 minutes
 The transporting step other than the above: Reduced pressure, 0.50 to 0.65 kPa; 0.1 second to 1 minute
 [0169] Into an aqueous solution containing a partial sodium salt of acrylic acid with 75% by mole neutralized (hereafter referred to as "a monomer"), 0.06 % by mole (relative to total mole number of the monomer) of polyethylene glycol diacrylate (average number of $n = 9$) was added, and monomer concentration was made to be 38% by weight. It should be noted that, the "average number of n " means average number of polymerization degree of ethylene oxide in the polyethylene glycol chain.
 [0170] By blowing nitrogen gas into the resultant aqueous solution of the monomer, concentration of dissolved oxygen was adjusted to 0.5 ppm by weight. Next, 0.14 g (relative to 1 mole of the monomer) of sodium persulfate and 0.005 g (relative to 1 mole of the monomer) of L-ascorbic acid were mixed by line mixing.
 [0171] A mixture obtained by this line mixing was supplied to a flat surface steel belt having weirs at both ends, so as to attain a thickness of 25 mm, to perform static aqueous solution polymerization continuously for 30 minutes at 95°C and then the polymer gel in a water-containing state was obtained (the polymerization step).
 [0172] This polymer gel was segmentalized to about 1 mm by use of a meat chopper with a pore diameter of 7 mm.

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This segmentalized polymer gel was mounted on the porous plate of a band dryer, to attain a thickness of 50 mm, and subjected to hot air drying at 180°C for 30 minutes, to obtain the particulate water-absorbing resin (the drying step).

[0173] The resultant particulate water-absorbing resin was supplied to a three-stage roll mill (roll gap configuration: from the top, 1.0 mm / 0.55 mm / 0.42 mm) to be pulverized (the pulverization step). Then, this pulverized substance was classified by using a classification apparatus having a metal meshes with a sieve mesh size of 850 μm and 150 μm to obtain the particulate water-absorbing resin, where particles with a particle diameter of 150 μm to 850 μm were 98% by weight (the classification step). It should be noted that, absorbency against non-pressure (CRC) of this particulate water-absorbing resin was 35 (g/g).

[0174] Next, a surface cross-linking agent solution adjusted to contain 0.30 part by weight of 1,4-butanediol, 0.50 part by weight propylene glycol and 2.70 part by weight pure water, relative to 100 parts by weight of the particulate water-absorbing resin, and the particulate water-absorbing resin were supplied to a high speed continuous mixing machine (Turbulizer™ / 1000 rpm) and mixed. Then the mixture was heated for 40 minutes with a paddle dryer (a groove-type stirring-type drier) adjusted at 200°C (the surface cross-linking step).

[0175] After this, it was cooled to 60°C by using the paddle dryer (a groove-type stirring-type dryer) (the cooling step), and classified by using the metal meshes with a sieve mesh size of 850 μm and 150 μm to obtain the particulate water-absorbing agent 1 as a product having a particle diameter of 150 μm to 850 μm (the granule sizing step). Further, this particulate water-absorbing agent was packed in the packaging material container (the packaging step) to be shipped as a product.

[0176] In the present Example 1, required time T1 of from the start point of the pulverization step to the end of the packaging step was 3 hours. In addition, time T2 where a production object in the steps was set under reduced pressure state was 2.8 hours (Rd value = about 93%).

Comparative Example 1

[0177] The particulate water-absorbing agent was produced by performing a similar operation as in Example 1, except that the pipelines S4 to S20 and the pipeline 8a were not connected. Therefore, only the transporting step between the granule sizing step and the packaging step, where pneumatic transportation is performed, was set under pressurized state, and other steps were set under normal pressure condition.

Example 2

[0178] By using the production facility shown in Fig. 1, the particulate water-absorbing agent was produced continuously. This production facility has capacity of producing the particulate water-absorbing agent in 1500 kg/hr. The pipelines S4, S5 and S14 are connected to the fine-powder capturing apparatus 6 via the pipeline 8a to collect the fine powders which generate in the pulverization step, the transporting step between the pulverization step and the classification step, and the granule sizing step. Further, the fine powders collected in the fine-powder capturing apparatus 6 are supplied to the granulation apparatus 4j via the pipeline 8b. It should be noted that, as the trapping material, a bag filter, which is a membrane filter composed of a membrane (material: polytetrafluoroethylene, pore diameter: 2.5 μm , a thickness: 0.02 mm, trapping efficiency: 99.9%) and a substrate (material: polyester, average pore diameter: 50 μm , thickness: 2.3mm, trapping efficiency: 50%), was used.

[0179] In addition, the fine powders separated by the classification step and the fine powders separated by the granule sizing step are also supplied to the granulation apparatus 4j via each pipeline 8. In the granulation apparatus 4j, the fine powders collected in the fine-powder capturing apparatus 6, the fine powders separated by the classification step and the fine powders separated by the granule sizing step are mixed and granulated. It should be noted that in the granulation step, warm water was used as the aqueous liquid in 110 parts by weight, relative to 100 parts by weight of the fine powders, where temperature of the fine powders was set 60°C and temperature of aqueous liquid was set 70°C to mix continuously in high speed for 0.3 second using a mixing apparatus, Turbulizer^{RT}. Granulated particles (average particle diameter: 0.5 to 3 mm, water content: 55% by mass) are supplied to a transportation pipeline between the polymerization step and the drying step via the pipeline 8.

[0180] Because the pressure reducing apparatus (a suction apparatus) is provide in the fine-powder capturing apparatus 6, the apparatuses connected to the fine-powder capturing apparatus 6 via a pipeline, and the pipelines are set under reduced pressure state. It should be noted that, degree of reduced pressure and degree of pressurization of the steps are as follows.

Table 2

[0181] The pulverization step (S4): Reduced pressure, 0.28 to 0.31 kPa
The first pulverization apparatus 4c1: Reduced pressure, 0.28 to 0.30 kPa

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The second pulverization apparatus 4c2: Reduced pressure, 0.30 to 0.31 kPa

The transporting step between the pulverization step and the classification step (S5) : Reduced pressure, 0.50 to 0.65 kPa The granule sizing step (S14) : Reduced pressure, 0.11 to 0.69 kPa

Hopper 4h1: Reduced pressure, 0.21 kPa

5 Pulverizing machine 4h2: Reduced pressure, 0.18 kPa

Classification apparatus 4h3: Reduced pressure, 0.11 kPa

Hopper 4h4: Reduced pressure, 0.69 kPa

Conveyer 14: Reduced pressure, 0.21 kPa

The transporting step between the granule sizing step and the packaging step (S15): Pressurization, 0.2 to 0.5 MPa

10 The steps other than above: Normal pressure

[0182] Into an aqueous solution containing a partial sodium salt of acrylic acid with 75% by mole neutralized (hereafter referred to as "a monomer"), 0.06 % by mole (relative to total mole number of the monomer) of polyethylene glycol diacrylate (average number of $n = 9$) was added to attain a concentration of the monomer of 38% by weight.

15 [0183] By blowing nitrogen gas into the resultant aqueous solution of the monomer, concentration of dissolved oxygen was adjusted to 0.5 ppm by weight. Next, 0.14 g (relative to 1 mole of the monomer) of sodium persulfate and 0.005 g (relative to 1 mole of the monomer) of L-ascorbic acid were mixed, by line mixing.

[0184] A mixture obtained by this line mixing was supplied to a flat surface steel belt having weirs at both ends, so as to attain a thickness of 25 mm, to perform static aqueous solution polymerization continuously for 30 minutes at 95°C and then the polymer gel in a water-containing state was obtained (the polymerization step).

20 [0185] This polymer gel was segmentalized to about 1 mm by use of a meat chopper with a pore diameter of 7 mm. This segmentalized polymer gel was mounted on the porous plate of a band dryer, to attain a thickness of 50 mm, and subjected to hot air drying at 180°C for 30 minutes, to obtain the particulate water-absorbing resin (the drying step).

25 [0186] The resultant particulate water-absorbing resin was supplied to a three-stage roll mill (roll gap configuration: from the top, 1.0 mm / 0.55 mm / 0.42 mm) to be pulverized (the pulverization step). After this, this pulverized substance was classified by using a classification apparatus having a metal meshes with a sieve mesh size of 850 μm and 150 μm to obtain the particulate water-absorbing resin, where particles with a particle diameter of 150 μm to 850 μm were 98% by weight (the classification step). It should be noted that, absorbency against non-pressure (CRC) of this particulate water-absorbing resin was 35 (g/g).

30 [0187] Next, a surface cross-linking agent solution adjusted to be composed of 0.30 part by weight of 1,4-butanediol, 0.50 part by weight of propylene glycol and 2.70 part by weight of pure water, relative to 100 parts by weight of the particulate water-absorbing resin, and the particulate water-absorbing resin were supplied to a high speed continuous mixing machine (Turbulizer / 1000 rpm) and mixed. Then the mixture was heated for 40 minutes with a paddle dryer (a groove-type stirring-type drier) adjusted at 200°C (the surface cross-linking step).

35 [0188] After this, it was cooled to 60°C by using the paddle dryer (a groove-type stirring-type dryer) (the cooling step), and classified by using the metal meshes with a sieve mesh size of 850 μm and 150 μm to obtain the particulate water-absorbing agent as a product having a particle diameter of 150 μm to 850 μm (the granule sizing step). Further, this particulate water-absorbing agent was packed in the packaging material container (the packaging step) to be shipped as a product.

40 [0189] In the present Example 2, required time T1 of from the start point of the pulverization step to the end of the packaging step was 3 hours. In addition, time T2 where a production object in the steps was set under reduced pressure state was 1.5 hours (Rd value = 50%).

Comparative Example 2

45 [0190] The particulate water-absorbing agent was produced by performing a similar operation as in Example 2, except that the pipelines S4, S5 and S14, and the pipeline 8a were not connected. Therefore, all steps were set under normal pressure state.

Example 3

50 [0191] By using the production facility shown in Fig. 1, Fig. 2 and Fig. 3, the particulate water-absorbing agent (150000 kg) was produced continuously. This production facility has capacity of producing the particulate water-absorbing agent in 1500 kg/hr. The first pipeline 8a, which is jointed to the fine-powder capturing apparatus, is connected to positions shown by S4 (the pulverization apparatus 4c), S5 (a transportation pipeline between the pulverization apparatus 4c and the classification apparatus 4d) and S14 (the granule sizing apparatus 4h), among the positions shown by the arrow lines S1 to S20 in Fig. 1, and these connected positions were set under reduced pressure state. The connected positions of the first pipeline 8a in S4 (the pulverization apparatus 4c) was set as four positions from S41 to S44 shown in Fig. 2. The connected positions of the first pipeline 8a in S5 (the transportation pipeline between the pulverization apparatus

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4c and the classification apparatus 4d) was set as two positions, S51 and S52 shown in Fig. 2. The connected positions of the first pipeline 8a in S14 (the granule sizing apparatus 4h) was set as four positions, from S141 to S144 shown in Fig. 3. The positions where the first pipeline 8a was connected were set under reduced pressure state by the pressure reducing apparatus (a suction apparatus) included in the fine-powder capturing apparatus 6. Further, in this Example 3, a degree of reduced pressure of each position in Fig. 1 was set under follows. That is, the degree of reduced pressure inside the first pulverization apparatus 4c1 was set at 0.28 kPa to 0.30 kPa, the degree of reduced pressure of the second pulverization apparatus 4c2 was set at 0.30 kPa to 0.31 kPa, the degree of reduced pressure in the pipeline (the transporting step) between the second pulverization apparatus 4c2 and the classification apparatus 4d was set at 0.50 kPa to 0.65 kPa, the degree of reduced pressure inside the hopper 4h1 was set 0.21 kPa, the degree of reduced pressure inside the pulverizing machine 4h2 was set 0.18 kPa, the degree of reduced pressure inside the classification apparatus 4h3 was set 0.11 kPa, the degree of reduced pressure inside the hopper 4h4 was set 0.69 kPa, and the degree of reduced pressure inside space covering the conveyer 14 was set 0.21 kPa.

Table 3

[0192] The pulverization step (S4): Reduced pressure, 0.28 to 0.31 kPa
 The first pulverization apparatus 4c1: Reduced pressure, 0.28 to 0.30 kPa
 The second pulverization apparatus 4c2: Reduced pressure, 0.30 to 0.31 kPa
 The transporting step between the pulverization step and the classification step (S5): Reduced pressure, 0.50 to 0.65 kPa
 The granule sizing step (S14): Reduced pressure, 0.11 to 0.69 kPa
 Hopper 4h1: Reduced pressure, 0.21 kPa
 Pulverizing machine 4h2: Reduced pressure, 0.18 kPa
 Classification apparatus 4h3: Reduced pressure, 0.11 kPa
 Hopper 4h4: Reduced pressure, 0.69 kPa
 Conveyer 14: Reduced pressure, 0.21 kPa
 The steps other than above: Normal pressure

[0193] The second pipeline 8b, which is jointed to the fine-powder capturing apparatus, was jointed to the granulation apparatus 4j. This granulation apparatus was jointed to the pipeline 8 connecting the polymerization apparatus 4a and the drying apparatus 4b. The fine powders contained in gas suctioned accompanying with reduced pressure were collected with this fine-powder capturing apparatus 6 through the first pipeline 8a (the collection step). For this collection, as the trapping material, a bag filter was used. The fine powders thus collected were put in the granulation apparatus 4j through the second pipeline 8b. In this production method, the classification apparatus 4d and the granulation apparatus 4j are jointed by the pipeline 8, and the fine powders classified with this classification apparatus 4d were put in the granulation apparatus 4j via this pipeline and the hopper. In addition, the granule sizing apparatus 4h and the granulation apparatus 4j are jointed by the pipeline 8, and the fine powders classified with this granule sizing apparatus were charged into the granulation apparatus 4j via this pipeline and the hopper. In this granulation apparatus 4j, granulated particles obtained from the fine powders were charged in the drying step (the drying apparatus 4b).

[0194] In this Example 3, firstly an aqueous solution containing a partial sodium salt of acrylic acid with 75% by mole neutralized, as a monomer, and polyethylene glycol diacrylate (average number of $n = 9$) of an internal cross-linking agent, was prepared as a monomer solution. In this monomer solution, monomer concentration was adjusted to 38% by mass. Concentration of the internal cross-linking agent was adjusted to 0.06 % by mole, relative to the monomer.

[0195] Next, while this monomer solution was fed continuously with a metering pump, by blowing nitrogen gas continuously, oxygen concentration of this monomer solution was adjusted to equal to or lower than 0.5 ppm. Next, sodium persulfate and L-ascorbic acid were mixed to the monomer solution with line mixing, so that mass of sodium persulfate/L-ascorbic acid became 0.14 g/0.005 g, relative to 1 mole of the monomer. Next, the monomer solution was supplied to a flat surface steel belt having weirs at both sides thereof, so that thickness thereof became about 25 mm, to perform aqueous solution polymerization at 95°C for 30 minutes and then polymer gel in a water-containing state was obtained (the polymerization step).

[0196] Next, this polymer gel was pulverized, and further this pulverized polymer gel was segmentalized to about 1 mm by use of a meat chopper with a pore diameter of 7 mm. This was spread thinly and mounted on the porous plate of a band dryer, to be subjected to hot air drying at 180°C for 30 minutes, to obtain the particulate water-absorbing resin as a dried substance of the polymer gel (the drying step).

[0197] Next, this dried substance was pulverized to obtain a particulate dried substance. Whole mass of this particulate dried substance was continuously supplied to a three-stage roll mill (roll gap configuration: from the top, 1.0 mm / 0.55 mm / 0.42 mm) to be pulverized further (the pulverization step). The first pulverization apparatus 4c1 and the second pulverization apparatus 4c2 were used as this three-stage roll mill.

[0198] Next, it was classified by using a classification apparatus having a metal mesh with a sieve mesh size of 850 μm , and a metal mesh with a sieve mesh size of 150 μm (the classification step) to obtain the particulate water-absorbing resin. About 98% by mass of this particulate water-absorbing resin was the particulate water-absorbing resin with particle

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diameter thereof of 150 μm to 850 μm . It should be noted that, absorbency against non-pressure (CRC) of this particulate water-absorbing resin was 35 g/g.

[0199] Next, a surface cross-linking agent solution was prepared. This surface cross-linking agent solution was composed of 1,4-butanediol, propylene glycol and pure water, and 1,4-butanediol, propylene glycol and pure water were adjusted to be 0.30 part by mass, 0.50 part by mass and 2.70 part by mass, respectively, relative to 100 parts by mass of the particulate water-absorbing resin. Next, this particulate water-absorbing resin was continuously supplied in 1000 kg/hr to a high speed continuous mixing machine (Turbulizer / 1000 rpm), and the surface cross-linking agent solution was sprayed with a sprayer to mix this surface cross-linking agent solution and the particulate water-absorbing resin. Next, the particulate water-absorbing resin mixed with this surface cross-linking agent solution was heated for 40 minutes with a paddle dryer adjusted at 200°C (the surface cross-linking step).

[0200] After that, it was cooled to 60°C (the cooling step).

[0201] After cooling (the cooling step), it was classified by using the metal mesh with a sieve mesh size of 850 μm , and the metal mesh with a sieve mesh size of 150 μm to obtain the particulate water-absorbing agent as a product having a particle diameter of 150 μm to 850 μm (the granule sizing step). A configuration of the granule sizing apparatus 4h, which performed the granule sizing step, is as shown in Fig. 3.

[0202] Then, this particulate water-absorbing agent was packed into a packaging material container (the packaging step).

[0203] In this Example 3, required time T1 from the start point of the pulverization step to the end of the packaging step was 3 hours, and among the time T1, time T2 where a production object in the steps was set under reduced pressure state was 2.8 hours (Rd value = about 93%).

Comparative Example 3

[0204] The particulate water-absorbing agent was produced similarly as in Example 3, except that the first pipeline 8a was not connected to any of the apparatuses and pipelines of Fig. 1. In this Comparative Example 1, a part which was set under reduced pressure state was not installed. In addition, in this Comparative Example 1, collection of the fine powders by reduced pressure was not performed (Rd value = 0%). It should be noted that, in this Comparative Example 1, the fine powders having passed through the 150 μm metal mesh, obtained in the classification step and the granule sizing step were put in the granulation apparatus.

Example 4

[0205] The particulate water-absorbing agent was produced similarly as in Example 3, except that 1% by mass of a 50% aqueous solution of aluminum sulfate was added, relative to the water-absorbing resin, in the cooling step.

Comparative Example 4

[0206] The particulate water-absorbing agent was produced similarly as in Comparative Example 3, except that 1% by mass of a 50% aqueous solution of aluminum sulfate was added, relative to the water-absorbing resin, in the cooling step.

[Performance evaluation of the particulate water-absorbing agent]

[0207] On the particulate water-absorbing agent, amount of dust (AD), content rate of the fine powders, absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC) were measured. Measurement methods for absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC) were as described above. Results thereof are shown in the following Table 1.

[Evaluation of amount of dust]

[0208] Amount of dust was measured using "Heubach DUSTMETER" (trade name), manufactured by Heubach Engineering GmbH (Germany). This amount of dust was obtained by measuring mass captured on a glass fiber filter paper by suction for a predetermined period. A measurement mode was set at Type I. This measurement was performed in atmosphere with a temperature of 25°C $\pm$ 2°C, a relative humidity of 20 to 40% and under atmospheric pressure. In detail, firstly, the particulate water-absorbing agent produced (100.00 g) was put in a rotating drum. Next, mass Da of the glass fiber filter paper having a holding particle diameter (JIS P3801) of 0.5 μm , and a diameter of 50 nm (for example, a trade name "GLASS FIBER GC-90" manufactured by ADVANTEC Co. Ltd., or an equivalent product thereof) was measured in a unit of down to 0.00001 g. Next, a filter case mounted with the glass fiber filter paper was attached to the

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rotating drum. Next, the dust meter was operated for 30 minutes under condition of a drum rotation number of 30 rpm, and a suction air volume of 20 L/min. Next, mass Db of the glass fiber filter paper, after passing a predetermined period, was measured in a unit of down to 0.00001 g. By using these masses Da and Db, amount of dust, AD, was calculated according to the following expression. The result thereof is shown in the following Table 1.

[0209]

[Expression 6]

$$AD \text{ (ppm)} = (Db - Da) / 100.00 \times 1000000$$

[Evaluation of content of fine powders]

[0210] The particulate water-absorbing agent (100.00 g) was classified with a metal mesh with a sieve mesh size thereof of 150 μm to measure mass ratio of the fine powders (below 150 μm) contained in this particulate water-absorbing agent. The result thereof is shown in the following Table 1.

[Performance evaluation of the particulate water-absorbing agent]

[0211] On the particulate water-absorbing agent, absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC) were measured. Measurement methods for absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC) were as described above. Results thereof are shown in the following Table.

[0212]

Table 4

	Example 1	Com. Exp. 1	Example 2	Com. Exp. 2	Example 3	Com. Exp. 3	Example 4	Com. Exp. 4
Amount of dust AD [ppm]	30	500	50	700	30	500	50	700
Content of fine powders [% by mass]	0.3	2.8	0.3	2.3	0.3	2.8	0.3	2.3
CRC (g/g)	30.5	30.5	30.5	30.5	30.5	30.5	30.5	30.5
AAP [g/g]	25.1	24.5	24.3	23.5	25.1	29.5	24.3	23.5
SFC [$\times 10^{-7} \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1}$]	32	22	53	40	32	22	53	40

[0213] As shown in Table, Examples have low generation amount of dust, and the low fine powders contained in the particulate water-absorbing agent obtained as a product, as well as superior absorbency against non-pressure (CRC), absorbency against pressure (AAP) and saline flow conductivity (SFC). From these evaluation results, superiority of the present invention is obvious.

INDUSTRIAL APPLICABILITY

[0214] The production method of the particulate water-absorbing agent composed principally of the water-absorbing resin relevant to the present invention can be applied suitably for producing absorbent articles such as hygiene materials and the like containing absorbing bodies, for example, disposable diapers or sanitary napkins, incontinent pads and the like.

Claims

1. A method for producing a particulate water-absorbing agent comprising:

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- a polymerization step for obtaining a polymer gel;
 a drying step for drying the polymer gel to obtain a dried substance;
 a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin;
 5 a classification step for sieving the particulate water-absorbing resin; and
 a transporting step for transporting the products produced in each of the steps to other steps;
 wherein one or more steps selected from the pulverization step, the classification step, and the transporting step after the pulverization step are set under reduced pressure state.
- 10 2. A method for producing a particulate water-absorbing agent comprising:
- a polymerization step for obtaining a polymer gel;
 a drying step for drying the polymer gel to obtain a dried substance;
 a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin;
 15 a classification step for sieving the particulate water-absorbing resin;
 a granule sizing step for granule sizing a particulate water-absorbing agent obtained from the particulate water-absorbing resin obtained in the classification step; and
 a transporting step for transporting the products produced in each of the steps to other steps;
 20 wherein one or more steps selected from the pulverization step, the classification step, the granule sizing step, and the transporting step after the pulverization step are set under reduced pressure state.
3. A method for producing a particulate water-absorbing agent comprising:
- 25 a polymerization step for obtaining a polymer gel;
 a drying step for drying the polymer gel to obtain a dried substance;
 a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin;
 a classification step for sieving the particulate water-absorbing resin;
 30 a surface cross-linking step for cross-linking the neighborhood of the surface of the particulate water-absorbing resin obtained in the classification step to obtain a particulate water-absorbing agent;
 a packaging step for filling a packaging material container with the particulate water-absorbing agent for packaging; and
 a transporting step for transporting the products produced in each of the steps to other steps;
 35 wherein one or more steps selected from the pulverization step, the classification step, the surface cross-linking step, the packaging step, and the transporting step after the pulverization step are set under reduced pressure state.
- 40 4. A method for producing a particulate water-absorbing agent comprising:
- a polymerization step for obtaining a polymer gel;
 a drying step for drying the polymer gel to obtain a dried substance;
 a pulverization step for pulverizing the dried substance or the polymer gel to obtain a particulate water-absorbing resin;
 45 a classification step for sieving the particulate water-absorbing resin;
 a surface cross-linking step for cross-linking the neighborhood of the surface of a particulate water-absorbing resin obtained in the classification step to obtain a particulate water-absorbing agent;
 a granule sizing step for granule sizing the particulate water-absorbing agent;
 a packaging step for filling a packaging material container with the particulate water-absorbing agent, obtained in the granule sizing step for packaging; and
 50 a transporting step for transporting the products produced in each of the steps to other steps;
 wherein one or more steps selected from the pulverization step, the classification step, the surface cross-linking step, the granule sizing step, the packaging step, and the transporting step after the pulverization step are set under reduced pressure state.
- 55 5. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 4, wherein the pulverization step is set under reduced pressure state.

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6. The method for producing the particulate water-absorbing agent according to claim 3 or 4, wherein equal to or more than 50% of the time required from the pulverization step to the packaging step is set under reduced pressure state.
- 5 7. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 5, wherein 50% or more of the total time required for the steps including and subsequent to the pulverization step is set under reduced pressure state.
8. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 7, wherein the transporting step performed next to the pulverization step is set under reduced pressure state.
- 10 9. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 8, wherein all steps including and subsequent to the pulverization step are set under reduced pressure state.
- 15 10. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 8, wherein the transporting step comprises the transporting step by pressurization.
11. The method for producing the particulate water-absorbing agent according to claim 10, wherein all steps including and subsequent to the pulverization step are set under reduced pressure state or a pressurized state.
- 20 12. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 11, further comprising a granulation step.
13. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 12, wherein degree of reduced pressure relative to atmospheric pressure of inside of the step under reduced pressure state is over 0 kPa and equal to or lower than 10 kPa.
- 25 14. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 13, wherein the particulate water-absorbing resin is an irregular pulverized shaped particle of a polyacrylic acid (salt)-based water-absorbing resin.
- 30 15. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 14, wherein the polymerization step is performed by continuous kneader polymerization or continuous belt polymerization.
- 35 16. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 15, wherein the surface cross-linking step is performed using a surface cross-linking agent, having dehydration esterification reactivity of one or more kinds selected from a group consisting of an oxazolidinone compound, an alkylene carbonate compound, a polyvalent alcohol compound, and an oxetane compound, at a temperature in the range of 150 to 250°C.
- 40 17. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 16, wherein absorbency against non-pressure (CRC) of the particulate water-absorbing agent is equal to or higher than 15 g/g, and saline flow conductivity (SFC) thereof is equal to or higher than $30 (\times 10^{-7} \cdot \text{cm}^3 \cdot \text{s} \cdot \text{g}^{-1})$.
- 45 18. The method for producing the particulate water-absorbing agent according to any one of claims 1 to 17, wherein the content of fine powders with a weight average particle diameter of below 150 μm , contained in the particulate water-absorbing agent, is below 1% by weight relative to the total weight of the particulate water-absorbing agent.

FIG.1

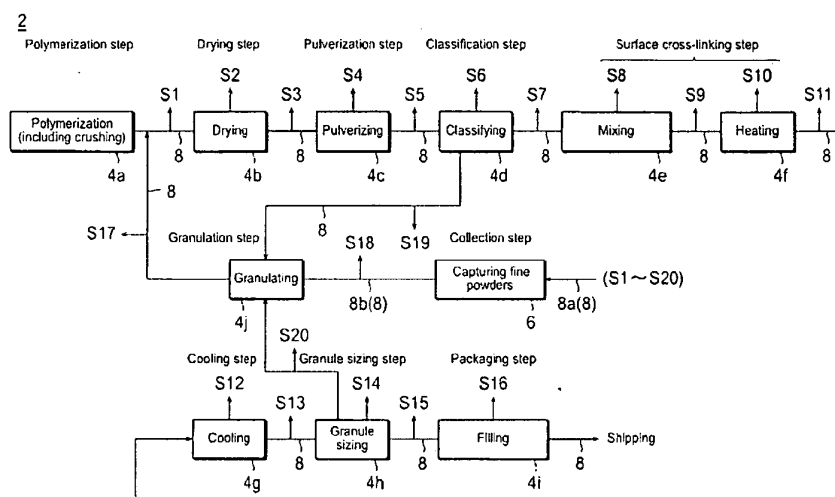
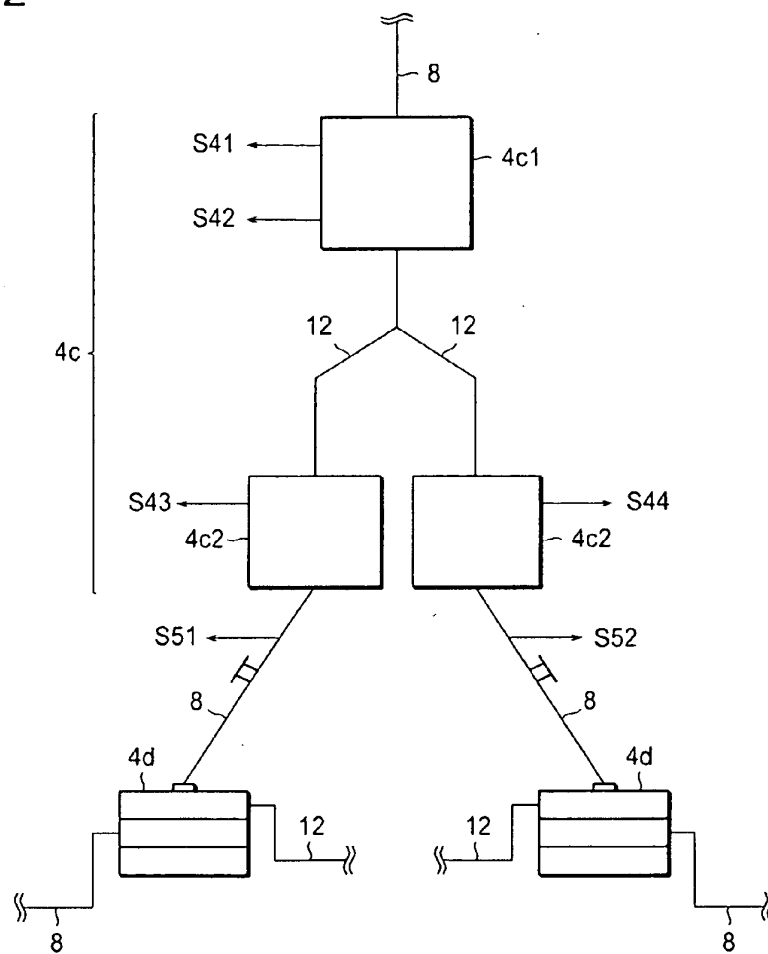


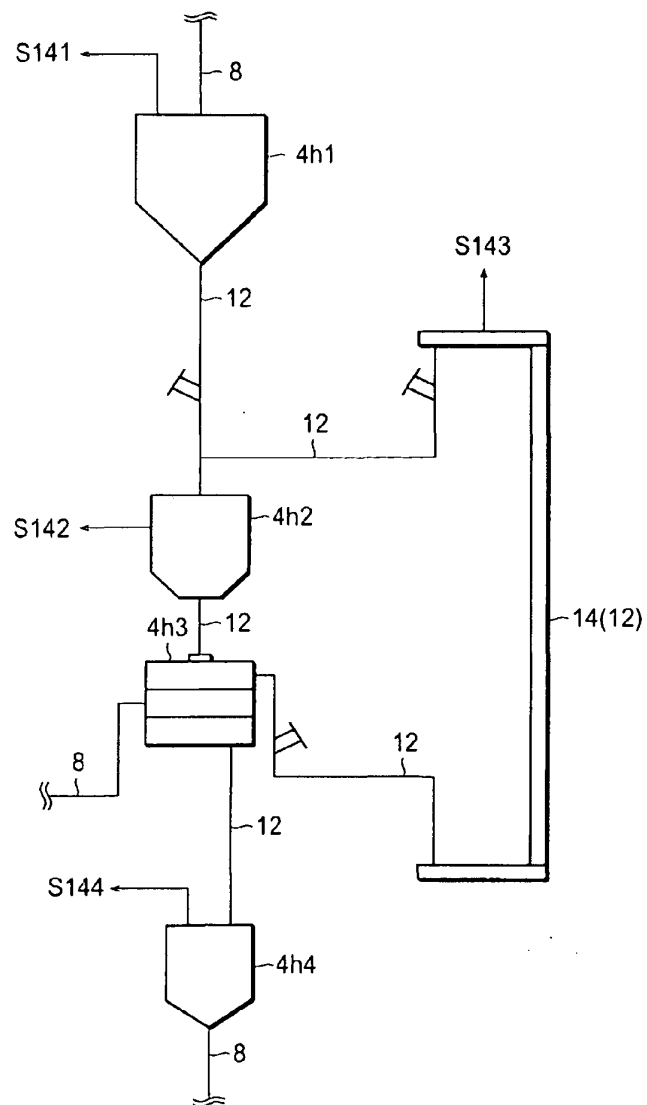
FIG.2



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FIG.3

4h



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INTERNATIONAL SEARCH REPORT		International application No. PCT/JP2009/054913
A. CLASSIFICATION OF SUBJECT MATTER B01J20/30(2006.01)i, B01J20/26(2006.01)i, B65B31/02(2006.01)i, C08J3/12(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) B01J20/00-20/34, B01J2/00-2/30, B29B7/00-11/14, 13/00-15/06, B29C31/00-31/10, 37/00-37/04, 71/00-71/02, B65B31/02, C08J3/00-3/28		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2009 Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/074816 A1 (Bi E Ebu Efu Soshietasu Yoropia).	1-4, 6-8, 12-18
Y	20 July, 2006 (20.07.06),	10
A	Full text & US 2008/0202987 A1 & EP 1838463 A1	5, 9, 11
X	JP 7-232062 A (Nippon Shokubai Co., Ltd.), 05 September, 1995 (05.09.95),	3, 4, 6, 7, 12-18
Y	Claim 1; Par. No. [0011]	10
A	(Family: none)	1, 2, 5, 8, 9, 11
X	JP 9-194598 A (Mitsubishi Chemical Corp.), 29 July, 1997 (29.07.97),	3, 4, 6, 7, 12-18
Y	Claim 1; Par. No. [0019]	10
A	(Family: none)	1, 2, 5, 8, 9, 11
☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
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Date of the actual completion of the international search 08 May, 2009 (08.05.09)		Date of mailing of the international search report 19 May, 2009 (19.05.09)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
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INTERNATIONAL SEARCH REPORT		International application No. PCT/JP2009/054913
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2005-81204 A (Nippon Shokubai Co., Ltd.), 31 March, 2005 (31.03.05), Claims 1, 2; Par. No. {0052} (Family: none)	10

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

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REFERENCES CITED IN THE DESCRIPTION

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PATENT SPECIFICATION



Application Date: May 2, 1928. No. 12,911/28.

316,645

Complete Accepted: Aug. 2, 1929.

COMPLETE SPECIFICATION.

Automatic Firearms.

We, FRITZ HERLACH, a German Citizen, of 3, Zietzenstrasse, Düsseldorf, Germany, and THEODORE RAKULA, a German Citizen, of 110, Collenbachstrasse, Düsseldorf, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to an automatic fire arm, to which the cartridges are fed from the side, and the object of the invention is to enable a large number of shots to be fired uninterruptedly, and to avoid, notwithstanding, the use of the voluminous and heavy magazines hitherto required therefor.

According to the invention, the fire arm is designed to receive simultaneously two separate cartridge magazines, adapted to be exchanged independently of one another and to be brought by suitable means successively into the range of the members of the arm that shift the cartridges in the direction of the bore of the barrel into the cartridge chamber of the latter.

The invention further comprises means for alternately adjusting automatically the one or other of the two magazines for the feed of the cartridges and to cause, when one magazine is empty, the firing to be continued from the other magazine. Means are further provided, by which the feed from a magazine may be interrupted at any time, even if it is not yet emptied, whereupon the other magazine automatically undertakes the further feeding of the cartridges.

Also in order that the firing should not be unduly interrupted on the insertion of fresh charged magazines by restarting the automatic operation of the arm manually, which takes up considerable time, a mechanism is provided, by which the firing of the last present cartridge, after it has been inserted in the cartridge chamber, is automatically prevented by the trigger mechanism of the arm being locked. Continuous firing is only re-established when a full magazine is inserted in the magazine chamber.

[Price 1/-]

A preferred embodiment of the invention is illustrated in the accompanying drawings as applied to an automatic barrel recoil fire arm. In the drawings:—

Fig. 1 is a cross section of the arm seen from the muzzle toward the magazine mechanism, two cartridge magazines being inserted.

Fig. 2 is a top view of the magazine mechanism.

Fig. 3 is the lateral view of an empty opened magazine.

Fig. 4 is a similar view of a full magazine.

Fig. 5 is a top view of a full magazine.

Figs. 6 and 7 are a lateral and top view, respectively, of a detail of the magazine chamber.

THE MAGAZINE CHAMBER.

A casing *b* serves as slide for the barrel and for the breech sleeve *a* connected thereto and has, laterally arranged on it, the magazine chamber *c* which is open at its outer end. A horizontal partition *c'* divides the chamber *c* into two compartments each adapted to receive a cartridge magazine. The upper and lower walls of the chamber *c* have pocket-like extensions *c''* to enable parts projecting from the magazines to pass freely.

When the barrel assumes the firing or run out position, the passage, leading to the bore of the casing *b* of the magazine chamber *c*, is closed by the outer wall of the breech sleeve *a* whilst, when the barrel is in the recoil position, an aperture of the sleeve *a* for introducing the cartridge registers with the said chamber passage, both compartments of the magazine chamber opening into the inlet for the cartridges. Two lip-shaped cartridge feeders *d* project, respectively, from the upper and lower chamber wall into the path of the sleeve *a*, the feeders being mounted on these walls and, when the barrel is in firing position, passing into slots *a'* provided in the sleeve *a*.

THE CARTRIDGE MAGAZINES.

The cartridge magazines *e*, shown more particularly in Figs. 3—5, consist of thin-walled sheet metal boxes open on one of their narrow sides and each is provided with a feeder *e'* adapted to be shifted

under the action of a spring e^1 in the direction toward the opening. The cartridges are inserted in the magazine transversely of their longitudinal axis, whereby the feeder e^3 is forced back and the spring e^1 is compressed.

The opening of the magazine box is closed by a lid f that is provided with means for locking it in the open and closed positions. For this purpose locking bolts g^3 are mounted, so as to be displaced vertically, in guide blocks g on the broad sides of the boxes which, after the box has been inserted in the chamber c , abut on the upper and lower wall thereof (see also Fig. 1). The locking bolts g^3 are provided with notches g^1 and are pressed outward by flat springs g^2 arranged below them. In this outer position the bolts g^3 lock the lid f in the closed position against opening by hooks f^1 abutting on the stems of the bolts g^3 . Upon depressing the bolts g^3 , the notches g^1 come opposite the hooks f^1 of the lid f . The latter is then lifted by hand or by the pressure exerted by the cartridges contained in the box, and is secured against automatic closure by its hooks f^1 engaging the notches g^1 . Upon pressure being exerted on the lid f , the hooks f^1 release the notches g^1 , the lid passes to the closing position and is again locked therein by the locking bolts g^3 being lifted under the action of the spring g^2 .

35 MECHANISM FOR ALTERNATELY AND AUTOMATICALLY ADJUSTING THE INTRODUCED MAGAZINE BOXES TO THE FEEDING POSITION.

A full cartridge magazine box e is adjusted to a condition to feed a cartridge into the barrel by opening the lid f by means of a releasing mechanism provided on each magazine compartment. When a magazine box e is inserted in a compartment, its lid f is in the closed position and the upwardly projecting locking bolts g^2 slide without obstruction into the pocket c^3 .

Shafts h are mounted, respectively, on the upper and lower chamber walls (see Figs. 1 and 2), and on each of the shafts is fixed two releasing levers h^1 so that their cam-shaped ends h^2 , which project into recesses of the chamber walls, are opposite the locking bolts g^2 of the magazines boxes e . The shafts h are rocked by the insertion and withdrawal of the magazine boxes.

On the side walls of the compartments are arranged casings i in which rods i^1 are mounted to as to be shifted toward the barrel against the action of springs i^2 . A lever h^3 fixed on each shaft h engages a slot provided in each of the rods i^1 and thus serves to transmit the motion of the

rods i^1 to the shafts h in the one or other direction and to rock the shafts. The shaft h , mounted on the upper compartment and acting by its levers h^1 upon the inserted magazine box, engages with the rod i of the lower compartment and vice versa.

When the compartments are empty, the cam ends h^2 of all releasing levers h^1 project under the action of the springs i^2 into the path of the magazine locking bolts g^3 of the lids f , the bolts assuming their upper position. When a box e is inserted in one of the compartments, e.g. in the upper one, lugs e^3 , projecting from the wall of the box (Figs. 3-5) take with them the rods i , causing the springs i^2 to be tensioned, and thereby rocking the shaft h of the lower compartment and therewith the lower levers h^1 out of their operative positions. At the same time the locking bolts g^3 of the inserted upper box engage if the lower magazine is empty with the cams h^2 of the upper levers h^1 and are depressed by them. The lid f of the upper box is consequently lifted under the pressure exerted upon it by the cartridges and is locked in the open position by the bolts g^3 and hooks f^1 , as above described.

The magazine box e introduced in the upper compartment is thus adjusted for feeding a cartridge, while the releasing mechanism of the lower compartment has been brought into an inoperative position. The lid f of a box introduced later on in the lower compartment remains closed. This lower box, however, rocks out of operation the levers h^1 for releasing the lid f of the upper box e . This lid thus remains unacted upon in the locked open position.

When the upper box is withdrawn, the springs i^2 of the upper compartment are relaxed by the simultaneous withdrawal of the lugs e^3 , while the lid f of the lower box e is automatically opened by the lower levers h^1 being rocked. Only one single box is thus open and adapted to supply cartridges.

In order to fix the boxes in their extreme positions within the compartments against the action of the springs e^1 and i^2 , two locking levers k^1 are rigidly fixed respectively on an upper and lower shaft k , the hook-shaped ends of the levers engaging through suitable slots of the compartment walls with a lug e^4 of the walls of the box. The locking levers k^1 are pressed toward the wall by springs k^2 coiled on the shaft k (see Fig. 1). When a box e is introduced, its lugs e^4 lift the levers k^1 , whereupon the hooked ends of the latter engage behind the lugs e^4 and thus lock the box against the action of

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the springs i^2 and e^1 .

The levers k^1 may be disengaged by hand by means of handles k^3 secured to the shafts h . When the levers k^1 are disengaged by manipulating the handles k^3 , the respective box e is automatically ejected from its compartment by the action of the springs i^2 .

The described release of the magazine locking mechanism can only be effected after the lid f of the respective box has been closed, as otherwise the cartridges still contained in the box would be ejected by the spring e^1 and enter the respective compartment. To prevent this, a lid-closing level l is fixed on each shaft h , the curved end of the lever abutting on the middle part of the open lid f of a box that is in the locked position in the respective compartment. Upon releasing the levers k^1 by means of the handle k^3 the level l depresses the open lid f into the closed position and thereby prevents the engagement of the bolts g^2 and hooks f^1 . When, however, the lid f is in the closed position it is at once locked again by the bolts g^2 . Upon the box then being ejected by the springs i^2 , the lid f of the other box remaining in its compartment is automatically opened.

When a magazine box, e.g. the upper one, has been unlocked and ejected, the levers h^1 of the lower compartment, which now press upon the bolts g^2 of the lower box, due to the upper springs i^2 being relaxed, and open the lid f of this box, will not allow the lower box to be unlocked by the handle k^3 and its lid f to be closed simultaneously. To permit this, however, handles i^3 are provided on the rods i^1 , by means of which the levers h^1 may be temporarily lifted when the lower box can also be unlocked by hand.

In order to close automatically an emptied magazine box and simultaneously open the other full one, the following mechanism is provided. An unlocking lever m fulcrumed at m^1 on the chamber wall is provided symmetrically for each magazine box. The end m^2 of these levers is formed as a stop and projects through a recess of the chamber wall into the path of a lug e^6 on the feeder e^2 , projecting from the side wall of the box and running in a slot e^5 of the latter. After the last cartridge has left the magazine box and entered the breech of the arm, so that the box is empty, the lug e^6 of the feeder e^2 hits the end m^2 of the lever m and rocks the latter about its fulcrum so that the face m^3 of the lever m abuts on the lever k^4 , rocks the magazine mechanism k , k^1 in the unlocking direction, while at the same time the lid f is closed by the corresponding lever l . The empty

closed magazine box is thereupon ejected and may be re-filled and introduced anew, while in the meantime cartridges are supplied from the other magazine box.

AUTOMATIC TRIGGER LOCKING MECHANISM.

An automatic trigger locking mechanism is provided to allow the firing to be stopped after the last cartridge has been fed from a magazine box to the barrel. For this purpose, lugs e^7 provided near the front end of the magazine boxes, strike, when the boxes are inserted in the compartments, against two-armed levers n pivoted on the front wall of the chamber c and rock these levers so that the other ends of the latter, which engage suitable recesses of a displaceable rod o (Figs. 1 and 2), move this rod against the action of a spring p . The spring p is tensioned, as soon as any magazine box e is introduced, and remains tensioned as long as any box is in a locked state in the compartments. A two-armed lever q is fulcrumed on the chamber c , one arm of the lever q engaging in another recess provided on the rod o , while the other arm q^1 is in connection with the trigger mechanism (not shown) and acts as a locking member therefor. When at least one box is in the chamber c , the lever arm q^1 is out of the range of the trigger mechanism. When the single box still in the chamber c is ejected by unlocking it manually or after the last cartridge has been fed to the barrel, the lever n follows, under the action of spring p the lug e^7 that now moves toward the right, rod o is shifted and rocks the locking member (lever arm) q^1 of the lever q into a position in which it locks the trigger mechanism. The last cartridge is still in the cartridge chamber of the barrel, but cannot be fired, before a full box e has been inserted in the chamber c .

A handle q^2 of the interrupting lever q allows the lever arm q^1 to be released by hand from the locking position, so that the trigger is ready to fire the last cartridge that has already been transferred into the barrel.

The mechanism for interrupting the possibility of firing thus operates in dependence upon the ejecting motion of a box e that has been unlocked within the compartment. In order to ensure the prevention of the last cartridge being fired, when the empty box falls to be ejected, as may be the case e.g. due to a damaged box getting jammed in the compartment, a special safety device is provided that operates independently of the ejecting motion of the box e . For this purpose the stop face of the lever n (Figs. 6 and 7) on which the lug e^7 abuts

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in inserting a box, is not rigidly secured to this lever, but is arranged as a bolt *s* which can be displaced transversely of the direction in which the box is inserted against the action of a spring *r*. Toward the box the bolt *s* has an inclined face *s*¹, on which the projecting lug *e*⁶ of the feeder *e*² strikes, when the last cartridge has been supplied from the magazine box to the barrel, shortly before the magazine is unlocked in co-operation with the locking mechanism *m*, *k*, *k*¹. The projection *e*⁶ presses the bolt *s* out of the range of the lug *e*⁷ so that the lever *n* passes past the lug *e*⁷ under the action of the spring *p* and the locking member *q*¹ is rocked into the position to lock the trigger mechanism.

MODE OF OPERATION.

A full magazine box *c* is first inserted in one of the compartments of chamber *c*, e.g. in the upper compartment, and is automatically locked in its feeding position by the levers *k*¹. Its lid *f* is then unlocked automatically and opens under the pressure of the cartridges in the box actuated by the spring *e*¹. The first cartridge abuts on the outer face of the sleeve *a*. The locking member *q*¹ of the trigger locking mechanism is rocked into the inoperative position, so that this mechanism is ready to fire. Another magazine box, that is now inserted in the lower compartment, remains therein with closed lid *f* and in the locked condition, this box, however, rocking the mechanism *h*¹, *h*² of the upper compartment into the inoperative position.

To start the automatic operation of the arm, the barrel is drawn back by hand, while at the same time a closing means (not shown), sliding in the breech sleeve *a*, is opened, whereby the passage in sleeve *a* for admitting the cartridge lies opposite the first cartridge of the upper, open magazine box *c*. This cartridge is moved laterally under the action of the spring *e*¹ into the path of the sleeve *a* and is held in this position by the upper lip *d* and the front edge *c*¹ of the partition *c*¹ of chamber *c* (Fig. 1).

When the barrel is run out, the rear wall of the passage in sleeve *a* moves the cartridge forward out of the range of the lip *d* and of the partition *c*¹. The next cartridge of the upper magazine box presses the first one into the path of the breech piece (not shown), which then effects in known manner the further movement of the first cartridge into the cartridge chamber of the barrel.

The fire arm is now loaded, and for continuous firing only the operation of the trigger and the supply of the charged magazine boxes to replace the empty and

automatically ejected ones are required. When the last cartridge of the upper box has arrived in the path of the sleeve *a*, the unlocking lever *m* of the upper compartment, under the action of the lug *e*⁶ of the feeder *e*², lifts the locking levers *k*¹ from the lugs *e*⁴, while at the same time the lid *f* of the empty upper magazine is closed. The latter is then ejected by the action of the springs *i*², which at the same time unlock the lid *f* of the lower box by the mechanism *h*², *h*¹, *h*³. The lower box thereupon undertakes the further feed of cartridges into the path of the movable parts of the breech without interrupting the firing.

The action of the magazine mechanism is automatically continued, so that the arm fires continuously, until either the trigger is released or no charged magazine box is inserted in due time or is not inserted at all to replace the ejected box. In this case, the firing is interrupted shortly after the last cartridge has been supplied from the box still present in one of the compartments, by means of the trigger locking mechanism *e*¹, *e*², *s*, *n*, *o*, *p*, *q*, *q*¹. The last cartridge is still in the barrel, but remains therein without being fired.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An automatic firearm having two cartridge magazines which can be selectively inserted for feeding cartridges into the barrel, characterised by the firearm being arranged so that both cartridge magazines can be independently inserted and removed at the same time.

2. A firearm according to Claim 1, in which a change over device, controlled in dependence on the condition of the cartridges in the magazines, when one magazine has been emptied, automatically brings into operation the other magazine for feeding the cartridges into the barrel, so that by replacing the emptied by a filled magazine an uninterrupted fire is obtained.

3. A firearm according to either of the preceding claims, in which means are provided for the automatic ejection of an emptied magazine.

4. A cartridge magazine for automatic firearms according to any of the preceding claims, in which a closing lid (*f*) on the outlet passage for the cartridges on the magazine frame retains the inserted cartridges against the action of a feeding spring.

5. A cartridge magazine according to Claim 4, in which a locking device (*f*¹),

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g^2) on the one hand ensures the closed lid (f) against opening and on the other hand ensures the opened lid against closing.

6. An automatic firearm according to any of Claims 1—5, in which an unlocking device (h^1 or h^2) is provided on each magazine compartment and on the insertion of a cartridge magazine (e) into a compartment automatically displaces the locking bolt (g^2) securing the lid (f) of the magazine in the closed position, so that the cartridges are released for feeding into the barrel under the pressure of the feeding springs (c^1).

7. Apparatus according to Claim 6, in which the unlocking devices (h^1 , h^2) provided on the two magazine compartments for opening the lid (f) of the inserted cartridge magazine (e), are so relatively arranged that, on the insertion of a cartridge magazine in the one compartment and on the consequent opening of its lid (f) in order to feed a cartridge by the corresponding unlocking device (h^1 , h^2), the unlocking device of the second magazine compartment is withdrawn from the action of the second inserted cartridge magazine, of which the lid remains closed, and that, conversely, on withdrawing a cartridge magazine from one compartment, the unlocking device of the other compartment acts automatically upon the second magazine in the direction to unlock its closed lid.

8. Apparatus according to Claim 7, in which, on the insertion of a magazine (e) in one of the two magazine compartments, the magazine is displaced against a spring resistance by a lug (e^2) acting on a member (i^1) connected with the device (h^2) for unlocking the lid of a magazine inserted in the second magazine chamber, so that the unlocking member of the second chamber is displaced, while on withdrawing the magazine from the first magazine compartment, the spring loaded member is returned under the action of its spring into its original position and the unlocking member brings the second compartment again into operative position for opening a magazine.

9. Apparatus according to Claim 8, in which the members (i^1) which are spring loaded and control the unlocking apparatus (h^1 , h^2) for opening the cartridge magazine are displaceable in the direction in which the magazines are inserted into the compartments, so that they serve at the same time for ejecting the magazines if they are not locked in their end positions in the magazine chambers.

10. An automatic firearm with cartridge magazines according to any of Claims 1—9, in which a locking device (k , k^1) for holding a cartridge magazine

inserted in the magazine chamber in its end position is connected with a lever (l) which, when the locking gear (k , k^1) is moved to release the cartridge magazine, closes the open lid (f) of the latter.

11. An automatic firearm with cartridge magazines according to any of Claims 1—10, in which handles (k^2) are provided on the operating lever arms of the magazine locking devices (k , k^1) or on the magazine lid closing devices (l) coupled with these, which selectively unlock the magazines and at the same time easily close the lids (f).

12. Automatic firearms with cartridge magazines according to any of Claims 1—10, provided with mechanism, for example a lever (m) on the magazine chamber (c) co-operating with a lug (e^2) of the feeder (e^2), which is positively connected with the magazine locking device (k , k^1) and with the magazine lid closing device (l) connected to the latter, and, after the last cartridge has been fed from a magazine into the breech, automatically moves the magazine locking device (k , k^1) in the direction for unlocking, and at the same time closes the magazine lid (f).

13. Automatic firearms with cartridge magazines according to any of the preceding claims, in which handles (i^2) on the unlocking devices (h^1 , h^2 , h^3) for the magazine lids (f) are adapted to be manually operated in order to displace the unlocking members (h^2) from their operating positions in which the magazine lids (f) are opened.

14. Automatic firearms with cartridge magazines according to any of the preceding claims, characterised by a device (n , o , p , q), which, after the last cartridge has been fed into the barrel from the cartridge magazines, or after a cartridge has been fed before the feeding has been interrupted, is automatically set in movement and by the insertion of a locking member (q^1) into the trigger apparatus prevents the firing of this cartridge.

15. Apparatus according to Claim 14, in which the locking member (q^1) of the interrupting device, with or without the medium of inserted transmission members (n , o), on the insertion of a magazine into a magazine compartment is displaced against the action of a spring (p) by a projection (e^2) on the magazine chamber from the position in which it locks the trigger, and releases the latter until it is released, either automatically or manually, after the unlocking and ejection of both magazines (e), and takes up its locking position again under spring control.

16. Apparatus according to Claim 14 or 15, in which a handle (q^2) is provided

on the interrupting device (q , q^1) which manually ejects the locking members (q^1) which are in the locking position, so that the trigger is released for firing the last 5 cartridge remaining in the barrel.

17. Automatic firearms with trigger locking device according to Claim 15, in which to ensure that the firing is interrupted by preventing the unlocked magazine from being ejected from the magazine 10 chamber, the locking member (q^1) is released, to enable it to assume again its locking position, independently of the

ejection movement of the magazine, while, shortly before the magazine is unlocked 15 the contact surface formed as a bolt of the trigger locking member (q^1) or its actuating means (n) is removed from the action of lugs (e') on the magazines which tend to force it back. 20

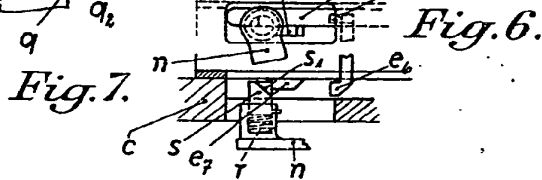
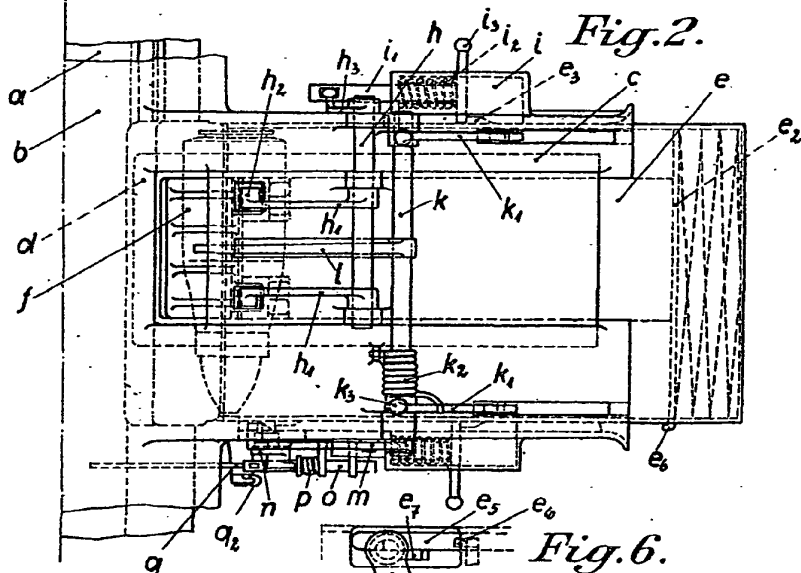
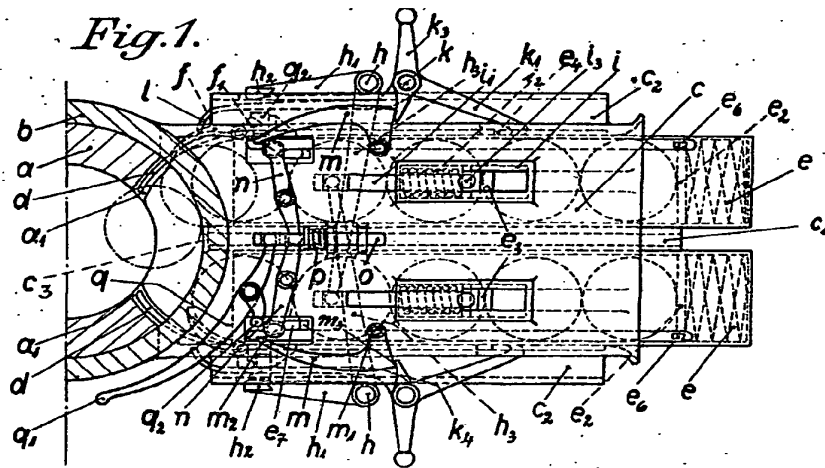
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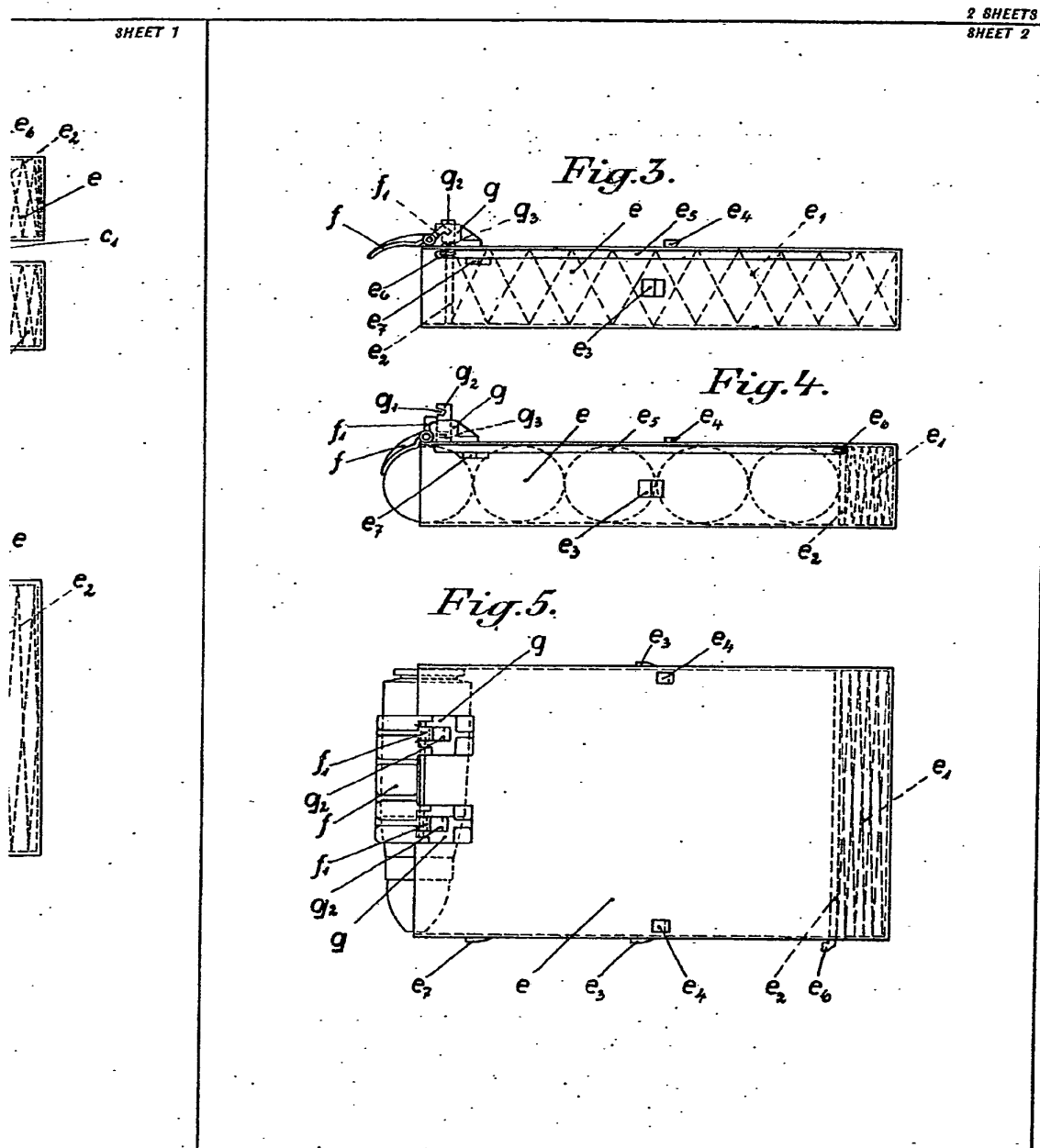
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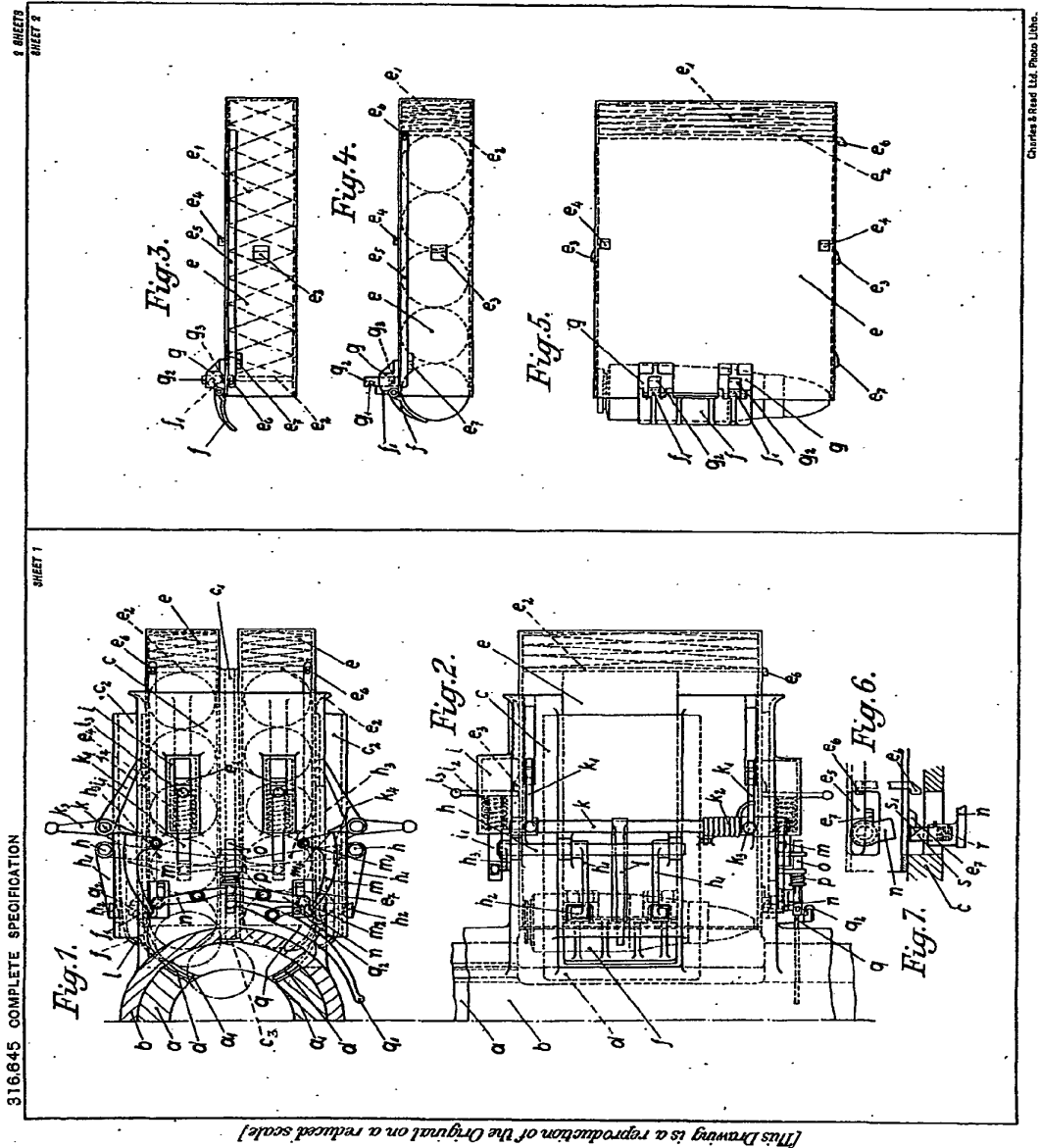
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23. Schadow G and McDonald C] **The Unified Code for Units of Measure** [<http://aurora.rg.iupui.edu/~shadow/units/UCUM/ucum.html>]

Pre-publication history

The pre-publication history for this paper can be accessed here:

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PATENT COOPERATION TREATY

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PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year)	24 APR 2012
Applicant's or agent's file reference H6845.1001-PC-A	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US2011/066307	International filing date (day/month/year) 20 December 2011
Applicant THE MAYA GROUP, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:**

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide, National Chapters*.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference H6845.1001-PC-A	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2011/066307	International filing date (day/month/year) 20 December 2011	(Earliest) Priority Date (day/month/year) 20 December 2010
Applicant THE MAYA GROUP, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☐ the text is approved as submitted by the applicant.
☒ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☐ as suggested by the applicant.
☒ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/066307

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

A device for projecting a soft-projectile made from a super absorbent polymer, the device comprising a holder designed for containing the soft-projectile made from a super absorbent polymer; and a firing mechanism operatively arranged to accelerate the holder from a firing position. In another embodiment the holder of the soft-projectile launching system is slideably contained by the device. In another embodiment, the holder for a soft-projectile translates between the firing position and a launch point for the soft-projectile. In yet another embodiment the soft-projectile launching system further comprises a barrel having an interior in communication with the firing position wherein the holder for a soft-projectile translates down the barrel such that a soft-projectile launches from the barrel with little or no contact with the interior of the barrel.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/066307

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - F41B 11/02 (2012.01) USPC - 124/56 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(8) - B23P 11/00; F41B 11/00, 11/02, 11/12, 11/14, 15/00; F42B 12/34, 12/72, 12/74, 30/00 (2012.01) USPC - 29/428; 124/1, 16, 17, 31, 45, 56, 63, 65, 79, 80 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) PatBase		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7,004,813 B2 (ZULOFF) 28 February 2006 (28.02.2006) entire document	1-4, 6-9, 15-17
Y	US 6,386,293 B1 (BARTLETT) 14 May 2002 (14.05.2002) entire document	1-4, 6-9, 15-17
Y	US 5,697,179 A (VANMOOR) 16 December 1997 (16.12.1997) entire document	1-4
Y	US 4,834,059 A (MOORHOUSE et al) 30 May 1989 (30.05.1989) entire document	1-4, 6-9
Y	US 5,285,765 A (LEE) 15 February 1994 (15.02.1994) entire document	3-4
Y	EP 2 253 375 A1 (MATSUMOTO et al) 24 November 2010 (24.11.2010) entire document	15-17
A	US 3,631,555 A (HURST et al) 04 January 1972 (04.01.1972) entire document	1-17
☐ Further documents are listed in the continuation of Box C. ☐		
* 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 05 April 2012		Date of mailing of the international search report 24 APR 2012
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: DAVID RANDALL
DICKSTEIN SHAPIRO LLP
2049 CENTURY PARK EAST SUITE 700
LOS ANGELES, CA 90067-3109

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing (day/month/year) 19 OCT 2011	
Applicant's or agent's file reference H6845.1001-PC	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US2011/035801	International filing date (day/month/year) 09 May 2011
Applicant HOBEEZONE, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 -- 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until **30 months** from the priority date (in some Offices even later); otherwise, the applicant must, within **20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774 Telephone No.
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Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference H6845.1001-PC	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2011/035801	International filing date (day/month/year) 09 May 2011	(Earliest) Priority Date (day/month/year) 10 May 2010	
Applicant HOBEEZONE, INC.			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

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6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/035801

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

A device for projecting a soft-projectile made from a super absorbent polymer, the device comprising a holder designed for containing the soft- projectile made from a super absorbent polymer; and a firing mechanism operatively arranged to accelerate the holder from a firing position, wherein the holder for the soft-projectile may translate between a firing position and a launch point for the soft-projectile.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/035801

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F41B 11/14 (2011.01)

USPC - 124/16

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)

IPC(8) - : F41B 11/00, 11/14; F42B 12/34, 12/72, 30/00 (2011.01)

USPC - 124/1, 16, 17, 63, 79

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)

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 71,162 A (HALL) 19 November 1867 (19.11.1867) entire document	1-12, 27
Y	US 7,004,813 B2 (ZULOFF) 28 February 2006 (28.02.2006) entire document	1-12, 18-20, 22-23, 27
Y	US 6,386,293 B1 (BARTLETT) 14 May 2002 (14.05.2002) entire document	1-20, 22-27
Y	US 3,408,997 A (RUYMBECKE et al) 05 November 1968 (05.11.1968) entire document	4, 10
Y	US 3,631,555 A (HURST et al) 04 January 1972 (04.01.1972) entire document	13-20, 22-26
Y	GB 316,645 A (HERLACH et al) 02 August 1929 (02.08.1929) entire document	13-17, 23
Y	US 5,622,159 A (LIU et al) 22 April 1997 (22.04.1997) entire document	22-23
Y	US 3,472,218 A (LA MERS) 14 October 1969 (14.10.1969) entire document	24-25
Y	US 2009/0145412 A1 (BARISH) 11 June 2009 (11.06.2009) entire document	25

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

* 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

07 October 2011

Date of mailing of the international search report

19 OCT 2011

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Electronic Acknowledgement Receipt	
EFS ID:	13946711
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	David A. Randall./Rosa Bugarin
Filer Authorized By:	David A. Randall.
Attorney Docket Number:	H6845.1001-US
Receipt Date:	10-OCT-2012
Filing Date:	10-MAY-2010
Time Stamp:	00:01:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	H6845_1001_US_IDS_Transmittal.pdf	112686 ad2f3a66e8b310bf028e82d877b158f5b5fa7f06	no	4

Warnings:

Information:

2	Information Disclosure Statement (IDS) Form (SB08)	H6845_1001_US_SB_08.pdf	89754 43ac071058c63189bf8d746d0c7f67aeed357dbc	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	EP_ForeignRef.pdf	5247464 eb0fb1a452784c8d42105ce746cf80ee04eca3b9	no	42
Warnings:					
Information:					
4	Foreign Reference	GB_Reference.pdf	1201189 9496cf1bdd1957ec3c73451458c8c856bb26bcd2	no	10
Warnings:					
Information:					
5	Non Patent Literature	H6845-1001_US_Search_Rpt_A.pdf	177929 7cc427894ab68131d76663d9a32325bb6fbee77a1	no	4
Warnings:					
Information:					
6	Non Patent Literature	H6845-1001_US_Search_Rpt.pdf	182778 36612586d924f5b72f895e592d578c658e7dac51	no	4
Warnings:					
Information:					
Total Files Size (in bytes):			7011800		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: October 9, 2012
Electronic Signature for Rosa Bugarin: /Rosa Bugarin/

Docket No.: H6845.1001-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Keith G. Meggs et al.

Application No.: 12/777,134

Group Art Unit: 3641

Filed: May 10, 2010

Examiner: M. D. David

For: SOFT-PROJECTILE LAUNCHING DEVICE

INFORMATION DISCLOSURE STATEMENT (IDS)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Pursuant to 37 CFR 1.56, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

Timing of Filing of the Information Disclosure Statement:

☒

This IDS is believed to be timely in that it is being submitted under 37 CFR § 1.97(b), that is before the mailing of a first Office Action on the merits. Thus, no fee

¹ The IDS should, where possible, include a certification under 37 CFR § 1.97(e).

☐ This IDS is being filed after the issuance of the First Office Action but before the issuance of a Final Office Action².

☐ This IDS is being filed after the issuance of a Final Office Action but before the payment of the Final Fee³.

Certifications:

If checked, the undersigned makes the following statement(s):

☐ Statement under 37 CFR 1.97(e):

Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement; and/or

No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 1.56(c) more than three months prior to the filing of the information disclosure statement.

☐ Statement under 37 CFR 1.704(d):

² The IDS *must* include *either* a certification under 37 CFR § 1.97(e) *or* the fee set forth in 37 CFR § 1.17(p).

³ The IDS must include both a certification under 37 C.F.R. §1.97(e) *and* the fee set forth in 37 C.F.R. §1.17(p).

Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

Fee Required by 37 CFR 1.97(c)(2) or 1.97(d)(2):

☐

If checked, the fee of \$180.00 set forth in 37 CFR 1.17(p) is attached.

Materiality:

While the information and references disclosed in this Information Disclosure Statement may be “material” pursuant to 37 CFR 1.56, this submission is not intended to constitute an admission that any patent, publication or other information referred to therein is “prior art” for this invention unless specifically designated as such.

In accordance with 37 CFR 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 CFR 1.56(a) exists. It is submitted that the Information Disclosure Statement is in compliance with 37 CFR 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No., under Order No. H6845.1001-US.

Dated: October 9, 2012

Respectfully submitted,

Electronic signature: /David A. Randall/
David A. Randall

Registration No.: 37,217
DICKSTEIN SHAPIRO LLP
2049 Century Park East Suite 700
Los Angeles, California 90067-3109

Application No.: 12/777,134

Docket No.: H6845.1001-US

(310) 772-8300
Attorney for Applicant



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

NOTICE OF ALLOWANCE AND FEE(S) DUE

91477 7590 10/11/2012
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

EXAMINER

DAVID, MICHAEL D

ART UNIT

PAPER NUMBER

3641

DATE MAILED: 10/11/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713

TITLE OF INVENTION: SOFT-PROJECTILE LAUNCHING DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$885	\$300	\$0	\$1185	01/11/2013

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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 and an extra copy of the form should be submitted. 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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (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)

91477 7590 10/11/2012
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713

TITLE OF INVENTION: SOFT-PROJECTILE LAUNCHING DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$885	\$300	\$0	\$1185	01/11/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
DAVID, MICHAEL D	3641	124-056000

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 03-02 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, 1 _____
(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. 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 has been filed for recordation as set forth in 37 CFR 3.11. 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. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____

This collection of information 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 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, 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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713
91477	7590	10/11/2012	EXAMINER	
Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067			DAVID, MICHAEL D	
			ART UNIT	PAPER NUMBER
			3641	

DATE MAILED: 10/11/2012

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 64 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 64 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

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.

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.	Applicant(s)	
	12/777,134	MEGGS ET AL.	
	Examiner	Art Unit	
	MICHAEL DAVID	3641	

-- 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 phone communication on 10/8/2012.
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 31-51.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - 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. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ 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).**
7. ☐ 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) | 5. ☐ Notice of Informal Patent Application |
| 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date ____. |
| 3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ | 7. ☒ Examiner's Amendment/Comment |
| 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. ☐ Examiner's Statement of Reasons for Allowance |
| | 9. ☐ Other ____. |

/Michael David/
Primary Examiner, Art Unit 3641

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David Randall on 10/8/2012.

Claims 31-51 are allowable.

This application is in condition for allowance except for the presence of claims 13-17, 28-30, and 52-65 directed to other inventions non-elected without traverse. Accordingly, claims 13-17, 28-30, and 52-65 have been cancelled.

The claims have been amended as follows:

31. Ammunition configured for use with a projectile launcher comprising:

a plurality of soft-projectiles having the same shape, each soft projectile being formed from hydrated super absorbent polymer.

32. The ammunition of claim 31, wherein the ammunition is disposed within a feed chamber of ~~a~~ the projectile launcher.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL D. DAVID whose telephone number is (571)270-3737. The examiner can normally be reached on Monday-Friday, 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Carone can be reached on 571-272-6873. 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.

/Michael David/
Primary Examiner, Art Unit 3641

Notice of References Cited	Application/Control No. 12/777,134	Applicant(s)/Patent Under Reexamination MEGGS ET AL.	
	Examiner MICHAEL DAVID	Art Unit 3641	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-1,202,227 A	10-1916	SANDIFUR	474/81
*	B	US-3,408,997 A	11-1968	DE RUYMBECKE GASTON et al.	124/27
*	C	US-3,472,218 A	10-1969	MERS HERBERT LA	124/67
*	D	US-3,631,555 A	01-1972	Hurst et al.	15/3.5
*	E	US-5,622,159 A	04-1997	Liu et al.	124/66
*	F	US-5,885,912 A	03-1999	Bumbarger, Thomas H.	442/239
*	G	US-6,386,293 B1	05-2002	Bartlett, John B.	169/47
*	H	US-2004/0104533 A1	06-2004	Larson et al.	273/404
*	I	US-2004/0212151 A1	10-2004	Peiten et al.	273/404
*	J	US-7,004,813 B2	02-2006	Zuloff, Steve	446/175
*	K	US-2010/0059237 A1	03-2010	Cordani, Peter	169/54
*	L	US-7,992,647 B2	08-2011	Cordani, Peter	169/30
*	M	US-2011/0271941 A1	11-2011	Meggs, Keith G.	124/65

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 12/777,134	Applicant(s)/Patent Under Reexamination MEGGS ET AL.	
	Examiner MICHAEL DAVID	Art Unit 3641	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2011/0271940 A1	11-2011	Meggs et al.	124/56
*	B	US-2012/0152221 A1	06-2012	Meggs, Keith G.	124/41.1
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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BIB DATA SHEET

CONFIRMATION NO. 3713

SERIAL NUMBER 12/777,134	FILING or 371(c) DATE 05/10/2010 RULE	CLASS 124	GROUP ART UNIT 3641	ATTORNEY DOCKET NO. H6845.1001-US		
APPLICANTS Keith G. Meggs, Rancho Palos Verdes, CA; Ronald Brawer, Manhattan Beach, CA; Michael G. Hoeting, Cincinnati, OH; Neil Hamilton, Covington, KY; ** CONTINUING DATA ***** ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** * SMALL ENTITY ** 05/19/2010						
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/MICHAEL D DAVID/</u> Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY CA	SHEETS DRAWINGS 3	TOTAL CLAIMS 27	INDEPENDENT CLAIMS 7
ADDRESS Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067 UNITED STATES						
TITLE SOFT-PROJECTILE LAUNCHING DEVICE						
FILING FEE RECEIVED 1929	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

Issue Classification 	Application/Control No. 12777134	Applicant(s)/Patent Under Reexamination MEGGS ET AL.
	Examiner MICHAEL DAVID	Art Unit 3641

ORIGINAL						INTERNATIONAL CLASSIFICATION												
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED							
124		56				F	4	1	B	11 / 00 (2006.01.01)								
CROSS REFERENCE(S)																		
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																	
124	45																	

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	17	3	33	19	49	-	65						
-	2	-	18	4	34	20	50								
-	3	-	19	5	35	21	51								
-	4	-	20	6	36	-	52								
-	5	-	21	7	37	-	53								
-	6	-	22	8	38	-	54								
-	7	-	23	9	39	-	55								
-	8	-	24	10	40	-	56								
-	9	-	25	11	41	-	57								
-	10	-	26	12	42	-	58								
-	11	-	27	13	43	-	59								
-	12	-	28	14	44	-	60								
-	13	-	29	15	45	-	61								
-	14	-	30	16	46	-	62								
-	15	1	31	17	47	-	63								
-	16	2	32	18	48	-	64								

NONE		Total Claims Allowed:	
		21	
(Assistant Examiner)	(Date)		
/MICHAEL DAVID/ Primary Examiner. Art Unit 3641	10/08/2012	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	1956	(124/ 1,17,63,79,16,56).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/10/08 18:09
L9	2155	(124/ 1,17,63,79,16,56,45).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/10/08 18:13
S1	910	(124/ 1,17,63,79).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:25
S2	1614	(124/ 1,17,63,79,16).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:25
S3	13	US-7004813-\$.DID. OR US-6386293-\$.DID. OR US-1202227-\$.DID. OR US-3408997-\$.DID. OR US-3631555-\$.DID. OR US-5622159-\$.DID. OR US-3472218-\$.DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:26
S4	30	(projectile or projectiles) and (super with absorbent with polymer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:27
S5	5	((KEITH) near2 (MEGGS)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S6	1	((RONALD) near2 (BRAWER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S7	43	((MICHAEL) near2 (HOETING)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S8	161	((NEIL) near2 (HAMILTON)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S9	51	(S5 or S6 or S7 or S8) and (ammunition	US-PGPUB;	OR	OFF	2012/10/05

EAST Search History

		or polymer)	USPAT; USOCR; FPRS; EPO; JPO; DERWENT			11:11
S10	13	(S5 or S6 or S7 or S8) and (ammunition or (absorbent polymer))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	AND	OFF	2012/10/05 11:11

10/ 8/ 2012 6:20:07 PM

C:\Users\mdavid\Documents\EAST\Workspaces\12777134 soft projectile launching
device.wsp

<i>Search Notes</i> 	Application/Control No. 12777134	Applicant(s)/Patent Under Reexamination MEGGS ET AL.
	Examiner MICHAEL DAVID	Art Unit 3641

SEARCHED			
Class	Subclass	Date	Examiner
124		October 2012	mdd

SEARCH NOTES		
Search Notes	Date	Examiner
EAST Class/Subclass and Text Search	October 2012	mdd

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
124	see search notes	October 2012	mdd

	/MICHAEL DAVID/ Primary Examiner.Art Unit 3641
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	15	("20090145412" "3408997" "3472218" "3631555" "4834059" "5285765" "5622159" "5697179" "6386293" "7004813" "0071162").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2012/11/20 15:28
L2	1	L1 and (super absorbent polymer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	AND	OFF	2012/11/20 15:28
S1	910	(124/1,17,63,79).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:25
S2	1614	(124/1,17,63,79,16).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:25
S3	13	US-7004813-\$.DID. OR US-6386293-\$.DID. OR US-1202227-\$.DID. OR US-3408997-\$.DID. OR US-3631555-\$.DID. OR US-5622159-\$.DID. OR US-3472218-\$.DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:26
S4	30	(projectile or projectiles) and (super with absorbent with polymer)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/07/11 11:27
S5	5	((KEITH) near2 (MEGGS)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S6	1	((RONALD) near2 (BRAWER)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S7	43	((MICHAEL) near2 (HOETING)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S8	161	((NEIL) near2 (HAMILTON)).INV.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/05 11:10
S9	51	(S5 or S6 or S7 or S8) and (ammunition or polymer)	US-PGPUB; USPAT; USOCR;	OR	OFF	2012/10/05 11:11

EAST Search History

			FPRS; EPO; JPO; DERWENT			
S10	13	(S5 or S6 or S7 or S8) and (ammunition or (absorbent polymer))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	AND	OFF	2012/10/05 11:11
S11	1956	(124/1,17,63,79,16,56).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/10/08 18:09
S12	2155	(124/1,17,63,79,16,56,45).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2012/10/08 18:13
S13	15	("20090145412" "3408997" "3472218" "3631555" "4834059" "5285765" "5622159" "5697179" "6386293" "7004813" "0071162").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2012/11/20 11:48

11/ 20/ 2012 3:48:50 PM

C:\Users\mdavid\Documents\EAST\Workspaces\12777134 soft projectile launching device.wsp

Receipt date: 10/10/2012

12777134 - GAU: 3641

Used in Lieu of PTO/SB/08A/B
(Based on PTO 10-07 version)

Substitute for form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(Use as many sheets as necessary)</i>				Complete if Known	
				Application Number	12/777,134-Conf. #3713
				Filing Date	May 10, 2010
				First Named Inventor	Keith G. Meggs
				Art Unit	3641
				Examiner Name	M. D. David
Sheet	1	of	1	Attorney Docket Number	H6845.1001-US

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
	AA*	3,408,997	11-05-1968	Ruymbecke	
	AB*	3,472,218	10-14-1969	La Mers	
	AC*	3,631,555	01-04-1972	Hurst et al.	
	AD*	4,834,059	05-30-1989	Moorhouse et al.	
	AE*	5,697,179	12-16-1997	Vanmoor	
	AF*	6,386,293	05-14-2002	Bartlett	
	AG*	5,285,765	02-15-1994	Lee	
	AH*	5,622,159	04-22-1997	Liu et al.	
	AI*	7,004,813	02-28-2006	Zuloff	
	AJ*	2009-0145412	06-11-2009	Barish	
	AK	71,162	11-19-1867	Hall	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T ⁶
		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)	MM-DD-YYYY			
	BA	EP-2253375-A1	11-24-2010	Nippon Catalytic Chem Ind		
	BB	GB-316,645	01-04-1972	Herlach et al.		

*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
	CA	International Search Report and Written Opinion for Corresponding PCT Application No. PCT/US2011/066307 dated April 24, 2012	
	CB	International Search Report and Written Opinion for Corresponding PCT Application No. PCT/US2011/035801 dated October 19, 2011	

*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.

¹ Applicant's unique citation designation number (optional). ² Applicant is to place a check mark here if English language Translation is attached.

Examiner Signature	/Michael David/	Date Considered	11/20/2012
--------------------	-----------------	-----------------	------------

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.D./

DOCSLA-101504v1



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713
91477	7590	11/30/2012	EXAMINER	
Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067			DAVID, MICHAEL D	
			ART UNIT	PAPER NUMBER
			3641	
			MAIL DATE	DELIVERY MODE
			11/30/2012	PAPER

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.



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U.S. Patent and Trademark Office

Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
12/777,134	10 May, 2010	MEGGS ET AL.	H6845.1001-US

Dickstein Shapiro LLP 2049 Century Park East Suite 700 Los Angeles, CA 90067		EXAMINER	
		MICHAEL DAVID	
		ART UNIT	PAPER
		3641	20121120

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The 10/10/2012 IDS has now been considered.

/Michael David/
Primary Examiner, Art Unit 3641

PTO-90C (Rev.04-03)

PART B -FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

**Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450**

or Fax (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)

DICKSTEIN SHAPIRO LLP
2049 Century Park East Suite 700
Los Angeles, California 90067-3109

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US	3713

TITLE OF INVENTION: SOFT-PROJECTILE LAUNCHING DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	yes	\$885.00	\$300.00		\$1185	01/11/2013
EXAMINER		ART UNIT	CLASS-SUBCLASS			
Michael D. David		3641	124-056000			

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 03-02 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 Dickstein Shapiro LLP

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 has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

The Maya Group, Inc.

Huntington Beach, California

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☒ Advance Order - # of Copies 3

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)

- ☐ A check is enclosed.
- ☒ Payment by credit card..
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 04-1073 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /David A. Randall/

Date January 9, 2013

Typed or printed name David A. Randall

Registration No. 37,217

Certificate of Electronic Filing Under 37 C.F.R. § 1.8

I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with 37 C.F.R. § 1.6(a)(4):

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

on January 9, 2013
Date

Rosa Bugarin

Signature

Rosa Bugarin

Typed or printed name of person signing Certificate

Registration Number, if applicable

(310) 772-8327

Telephone Number

Note: Each paper must have its own certificate of mailing.

Issue Fee Transmittal (1 page)
Charge \$1,185.00 to credit card

Electronic Patent Application Fee Transmittal				
Application Number:		12777134		
Filing Date:		10-May-2010		
Title of Invention:		SOFT-PROJECTILE LAUNCHING DEVICE		
First Named Inventor/Applicant Name:		Keith G. Meggs		
Filer:		David A. Randall./Rosa Bugarin		
Attorney Docket Number:		H6845.1001-US		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
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:				
Utility Appl issue fee	2501	1	885	885
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Printed copy of patent - no color	8001	3	3	9
Total in USD (\$)				1194

Electronic Acknowledgement Receipt

EFS ID:	14659844
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	David A. Randall./Rosa Bugarin
Filer Authorized By:	David A. Randall.
Attorney Docket Number:	H6845.1001-US
Receipt Date:	09-JAN-2013
Filing Date:	10-MAY-2010
Time Stamp:	20:34:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1194
RAM confirmation Number	9453
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Issue Fee Payment (PTO-85B)	H6845_1001_US_Part_B_Transmittal.pdf	137241 8875828c912234d6d8582a178785ba2f24b8058f	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	33754 fa8faa1b3bb4b883ef7fe6aa786bea036dc1eb12	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			170995		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/777,134	02/12/2013	8371282	H6845.1001-US	3713

91477 7590 01/23/2013
Dickstein Shapiro LLP
2049 Century Park East
Suite 700
Los Angeles, CA 90067

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 64 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

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 Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Keith G. Meggs, Rancho Palos Verdes, CA;
Ronald Brawer, Manhattan Beach, CA;
Michael G. Hoeting, Cincinnati, OH;
Neil Hamilton, Covington, KY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	12/777,134
Filing Date	May 10, 2010
First Named Inventor	KEITH G. MEGGS
Title	SOFT-PROJECTILE LAUNCHING DEVICE
Art Unit	3641
Examiner Name	DAVID, MICHAEL D.
Attorney Docket Number	MAYA-6845.1001-US

SIGNATURE of Applicant or Patent Practitioner

Signature	/Paul G. Novak/	Date (Optional)	
Name	Paul G. Novak	Registration Number	55,504
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number:

137888

OR

☐ Practitioners named below ("If more than ten patent practitioners are to be named, then a customer number must be used.")

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application, identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number:

137888

OR

☐ Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

Assignee Name and Address: THE MAYA GROUP, INC.
 10741 Walker Street
 Cypress, California 90630

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/86 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	<i>Odessa Ben-Eli</i>	Date	9/20/16
Name	Odessa Ben-Eli	Telephone	
Title	CEO		

This collection of information is required by 37 CFR 3.73(c) and 37 CFR 3.73(d). The information is required to obtain or retain a benefit by the public which is to be used by the USPTO to prosecute an application. Confidentiality is given by 37 U.S.C. 182 and 37 CFR 1.11 and 1.14. This collection is estimated to take 7 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual data. Any comments on the amount of time you require to complete a response to this collection of information 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 COMPLETION AGREES TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1480, Alexandria, VA 22313-1480.

If you need assistance in completing this form, call 1-800-PTO-0199 and select option 2.

Electronic Acknowledgement Receipt	
EFS ID:	25914687
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	91477
Filer:	Paul Graham Novak/Pia Murphy
Filer Authorized By:	Paul Graham Novak
Attorney Docket Number:	H6845.1001-US
Receipt Date:	27-MAY-2016
Filing Date:	10-MAY-2010
Time Stamp:	21:51:13
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	Assignee showing of ownership per 37 CFR 3.73	MAYA_H6845_1001_Statement_under_373b.pdf	186393 73f42680e02bf788ea5260e72e145e5338524f71	no	3

Warnings:

Information:

2	Power of Attorney	MAYA_H6845_1001_US_Transmittal_for_POA.pdf	100431 a52a729b3f3a01ca808aff0cd5e71b0f4c362ef7	no	1
Warnings:					
Information:					
3	Power of Attorney	MAYA_H6845_POA1.pdf	1879487 a65607c43e05b073f29e671bc0cac83890d019bb	no	1
Warnings:					
Information:					
Total Files Size (in bytes):			2166311		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: The Maya Group, Inc.

Application No./Patent No.: 8,371,282

Filed/Issue Date: February 12, 2013

Titled: SOFT-PROJECTILE LAUNCHING DEVICE

The Maya Group, Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: THE MAYA GROUP, INC. To: EAST WEST BANK

The document was recorded in the United States Patent and Trademark Office at
Reel 032342, Frame 0461, or for which a copy thereof is attached.

2. From: HOBEEZONE, INC. To: THE MAYA GROUP, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 029120, Frame 0721, or for which a copy thereof is attached.

3. From: KEITH G. MEGGS To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 026239, Frame 0939, or for which a copy thereof is attached.

☒ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/PAUL G. NOVAK/

Signature

May 27, 2016

Date

PAUL G. NOVAK, Reg. No.: 55,504

Printed or Typed Name

Attorney of Record

Title

This collection of information is required by 37 CFR 3.73(b). 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. 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.

Petitioner Gel Blaster, Inc. - Ex. 1002, 0196

Supplemental Sheet

Additional Documents in the Chain of Title

4. From: MICHAEL G. HOETING To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at Reel 025541, Frame 0606, or for which a copy thereof is attached.

5. From: NEIL R. HAMILTON To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at Reel 025534, Frame 0295, or for which a copy thereof is attached.

6. From: RONALD BRAWER To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at Reel 026239, Frame 0942, or for which a copy thereof is attached.

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.



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/777,134	05/10/2010	Keith G. Meggs	MAYA-6845.1001-US

CONFIRMATION NO. 3713

POA ACCEPTANCE LETTER



137888
Hackler Daghighian & Martino
433 North Camden Drive
Fourth Floor
Beverly Hills, CA 90210

Date Mailed: 06/03/2016

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/27/2016.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dtvernon/



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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12/777,134	05/10/2010	Keith G. Meggs	H6845.1001-US

CONFIRMATION NO. 3713

POWER OF ATTORNEY NOTICE

91477
Blank Rome LLP
1825 Eye Street NW
Washington, DC 20006



Date Mailed: 06/03/2016

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/27/2016.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dtvernon/

PTO/AIA/81A (02-15)

Approved for use through 03/31/2021. OMB 0651-0035

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 - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Patent Number	8371282
	Issue Date	2013-02-12
	First Named Inventor	Meggs et al.
	Title	SOFT-PROJECTILE LAUNCHING DEVICE
	Attorney Docket No.	SPI-781

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

103843

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the:

☐ Applicant.

OR

☒ Patent owner.

Statement under 37 CFR 1.56(a) Form PTO/AIA/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Patent Owner

Signature

Date

Name

Telephone

Title and Company

Chris Harris
Company Secretary, SPIN MASTER, INC.

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☐ A total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 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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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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: SPIN MASTER, INC.

Application No./Patent No.: 8371282 Filed/Issue Date: 02/12/2013

Titled: SOFT-PROJECTILE LAUNCHING DEVICE

SPIN MASTER, INC., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is ____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: BRAWER, RONALD To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 026239, Frame 0942, or for which a copy thereof is attached.

2. From: HAMILTON, NEIL R. To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 025534, Frame 0295, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). 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. 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.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: HOETING, MICHAEL G. To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 025541, Frame 0606, or for which a copy thereof is attached.

4. From: MEGGS, KEITH G. To: HOBEEZONE, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 026239, Frame 0939, or for which a copy thereof is attached.

5. From: HOBEEZONE, INC. To: THE MAYA GROUP, INC.

The document was recorded in the United States Patent and Trademark Office at
Reel 029120, Frame 0721, or for which a copy thereof is attached.

6. From: MAYA GROUP, INC., THE To: EAST WEST BANK

The document was recorded in the United States Patent and Trademark Office at
Reel 032342, Frame 0461, or for which a copy thereof is attached.

☒ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Axel Nix/

Signature

Bernd Axel Nix

Printed or Typed Name

2020-07-24

Date

59184

Title or Registration 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.

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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.

STATEMENT UNDER 37 CFR 3.73(c) – SUPPLEMENTAL SHEET

7. From: EAST WEST BANK To: THEMAYA GROUP, INC.
The document was recorded in the United States Patent and Trademark Office at
Reel 046816, Frame 0510, or for which a copy thereof is attached.
8. From: THE MAYA GROUP, INC. To: SPIN MASTER, INC.
The document was recorded in the United States Patent and Trademark Office at
Reel 051983, Frame 0201, or for which a copy thereof is attached.
9. From: THE MAYA GROUP, INC. To: SPIN MASTER INC.
The document was recorded in the United States Patent and Trademark Office at
Reel 052070, Frame 0534, or for which a copy thereof is attached.

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

☐ [NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Axel Nix/

Signature

Bernd Axel Nix

Printed or Typed Name

2020-07-24

Date

59184

Title or Registration Number

Electronic Acknowledgement Receipt	
EFS ID:	40095005
Application Number:	12777134
International Application Number:	
Confirmation Number:	3713
Title of Invention:	SOFT-PROJECTILE LAUNCHING DEVICE
First Named Inventor/Applicant Name:	Keith G. Meggs
Customer Number:	137888
Filer:	Bernd Axel Nix
Filer Authorized By:	
Attorney Docket Number:	MAYA1001UA
Receipt Date:	24-JUL-2020
Filing Date:	10-MAY-2010
Time Stamp:	10:50:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	SPI-781_Executed_POA.pdf	265869	no	2
			9ec679ff0c9d821f7e5cb0b296311ea2b0170dac		

Warnings:

The PDF file has been signed with a digital signature and the legal effect of the document will be based on the contents of the file not the digital signature.

Information:

2	Assignee showing of ownership per 37 CFR 3.73	SPI-781_37_CFR_373c.pdf	125049	no	3
			be25e2e2e6557e63f544a944d1caade7d76e5f92		

Warnings:

Information:

3	Assignee showing of ownership per 37 CFR 3.73	SPI-781_37_CFR_373c_-_cont.pdf	90609	no	1
			8b86f837fd86f14ed75e5dca06c9f9673fd468c4		

Warnings:

Information:

Total Files Size (in bytes):			481527
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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.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/777,134	05/10/2010	Keith G. Meggs	SPI-781

CONFIRMATION NO. 3713

POA ACCEPTANCE LETTER



103843
MILLMAN IP Inc.
401 Bay St., Suite 2108
Box 60
Toronto, ON M5H 2Y4
CANADA

Date Mailed: 07/29/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

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/agizaw/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/777,134	05/10/2010	Keith G. Meggs	MAYA1001UA

CONFIRMATION NO. 3713

POWER OF ATTORNEY NOTICE

137888
HACKLER DAGHIGHIAN MARTINO & NOVAK
10900 WILSHIRE BLVD.
SUITE 300
LOS ANGELES, CA 90024



Date Mailed: 07/29/2020

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/agizaw/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
12/777,134	05/10/2010	Keith G. Meggs	SPI-781	117734

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 07/29/2020 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

☒ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Jay M. Millman/
Name:	Jay M. Millman
Registration Number:	52520