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PACKING ASSEMBLY FOR WATER PISTOLS

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FIG. 1.

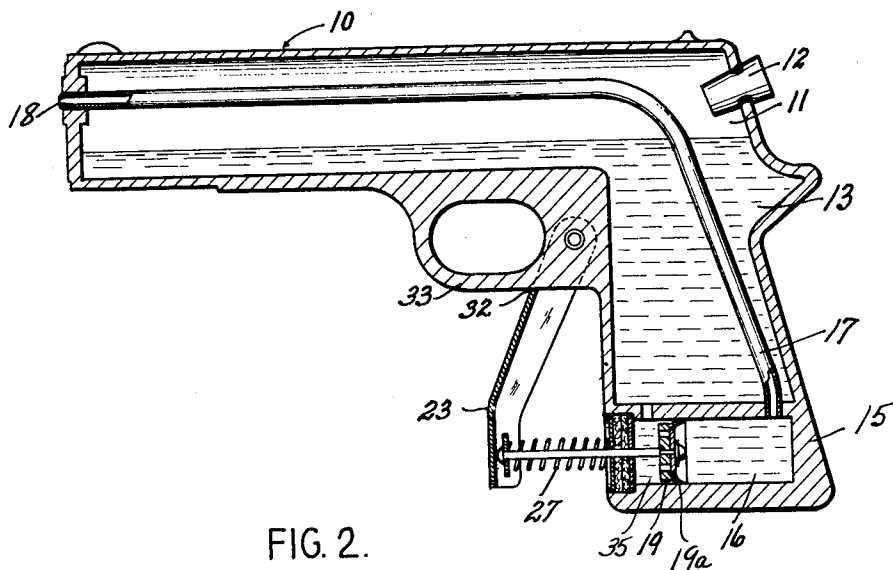


FIG. 2.

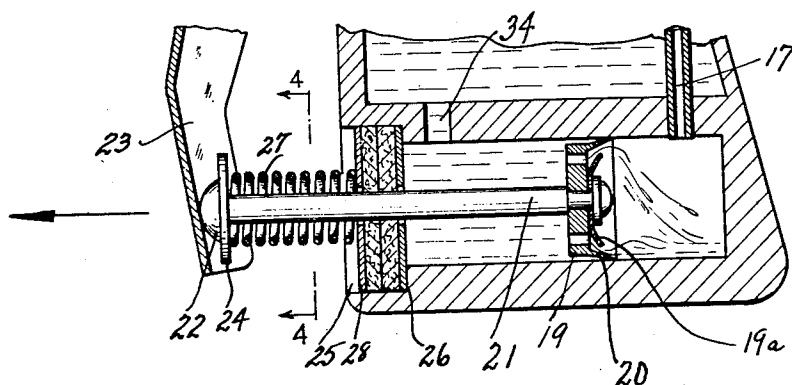
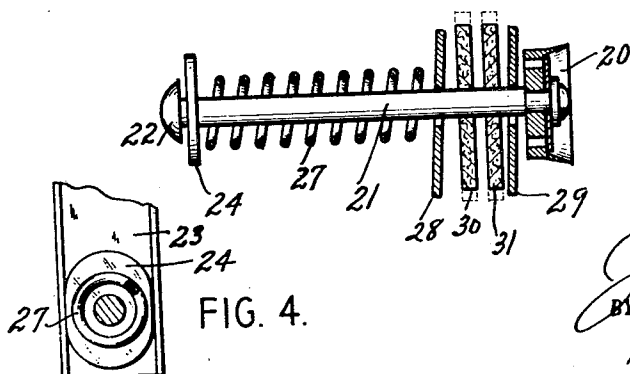


FIG. 3.



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PACKING ASSEMBLY FOR WATER PISTOLS

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8 Claims. (Cl. 222-79)

1

This invention relates to a toy pistol for ejecting water of the type generally referred to as a water pistol. The present application is a continuation in part of my prior and pending application Serial No. 752,366 and is specifically directed to an external trigger arrangement which effectively enters a water holding cylinder of the pistol and is movable therein without permitting water to escape from the cylinder.

My prior application disclosed a multi-shot water pistol having simplified means of assembly and manufacture and wherein was provided a cylinder and a piston operatively connected to the trigger of the pistol. It is an object of the invention to provide a packing whereby the piston is permitted to reciprocate therethrough in order to effect the water charging action. The piston is formed with a valve permitting recharging of the cylinder and the packing and valved piston are arranged to be assembled as a sub-unit so as to facilitate construction of the device. There is further provided a spring acting upon the trigger so as to maintain it in a normally outward or reset position, the spring also serving to maintain constant pressure or tension on the packing so as to insure against leaking of the water there-through. Other than the spring, no packing enclosing means is necessary and the spring performs its function effectively regardless of changes in form of the packing through absorption of water or the like. Accordingly, it is possible to achieve a simple and easily assembled unit which is moreover of superior performance because any physical changes in the packing elements are automatically compensated for by the same spring that resets the trigger.

Other objects of my invention will be apparent from the following description, it being understood that the above general statements of the objects of my invention are intended to describe and not limit it in any manner.

Referring to the drawings:

Fig. 1 is a longitudinal section of a water pistol embodying the instant invention.

Fig. 2 is an enlarged fragmentary view illustrating the filling action of the cylinder.

Fig. 3 is a separate view of the discharge piston and packing assembly.

Fig. 4 is a cross sectional, fragmentary view along the lines 4-4 of Fig. 2.

The pistol may be of generally conventional design and includes a body 10 which may be made of plastic material or any other suitable material. Body 10 is hollow so as to define a chamber 11 which serves as a reservoir for the water which is

2

to be discharged. The butt of the pistol is provided with a plug 12. Thus, the chamber 11 may be filled with water 13 by removing the plug 12 and pouring or otherwise applying the water through the opening in the butt of the pistol.

Within the handle 15 of the pistol is formed a cylinder 16 which may be round in cross section. Communicating with cylinder 16 is a conduit 17 through which the water streams under pressure when discharged from the cylinder. Conduit 17 directs the discharge and is of small diameter so that the water may be discharged in a forceful stream through nozzle 18 which may be reduced to increase the force of discharge.

The cylinder 16 is operative to prepare a charge of water for discharge through the conduit and to replenish the charge as the water is being ejected. A perforated plate 19 and sealing member 19a serve as a piston in applying the required pressure to the water charge. Plate or piston 19 is circular and includes an integral, feather-edged crown 20 which is of such flexibility as to form a water seal within the cylinder. Plate 19 is of somewhat smaller diameter than that of cylinder 16 while crown 20 is of larger diameter so that when the piston is assembled into the cylinder, the crown 20 is constricted or forced inwardly by the walls of the cylinder so as to form an effective water seal due to the inherent spring action of the feather-edge. Plate 19 may be fabricated of thermoplastic material such as polyethylene, polystyrene or the like so as to embody such flexibility. Piston 19 is maintained on a reduced portion of piston rod 21, the other end 22 of which is enlarged and bears against trigger 23. A washer 24 is disposed adjacent to enlarged end 22.

The body of the pistol is formed with an annular opening 25 terminating in an inwardly depending shoulder 26 at the entrance of the cylinder 16. Such opening 25 serves as a seat or abutment for the packing which closes the open end of the cylinder and permits the piston rod 21 to reciprocate within the cylinder and extend therefrom so as to co-act with the trigger 23. A spring 27 is supported on the external portion of rod 21, the spring serving to both maintain the trigger in its normally outward position and to maintain a continuous pressure on the packing so as to prevent displacement thereof and of the piston itself. The function of the spring is most important, therefore, in that it inherently compensates for any change in shape of the packing assembly which may be brought about through moisture absorption or deformation from any cause.

The packing comprises a pair of rigid discs 28 and 29 which may be of metal or plastic. Maintained between the discs are the washers 30 and 31 which may be of felt or any similar fibrous, porous or other soft material. The function of washers 30 and 31 is the conventional one as found in packing arrangements, i. e. to prevent the escape of water while discs 28 and 29 provide both end supports therefor and a terminal for the spring 27. The discs and washers are loosely mounted on rod 21, as illustrated in Fig. 3, but when the device is assembled, they are compacted by the spring 27, as illustrated in Fig. 2. Channel or U-shaped trigger 23 is limited in its outward position when its upper, cut-away end 32 meets the simulated trigger portion 33 and, as illustrated in Fig. 1, the spring 27 is compressed in this position so as to maintain pressure on the packing even when the trigger is in its outward position and the pistol is not in operation.

The operation of the pistol may be briefly described as follows:

On the firing stroke, the trigger 23 is pressed inwardly against the action of spring 27. Sealing member 19a is then acted upon by the water charge in the forepart of the cylinder so that it is maintained planar, covering the perforations of plate 19. As the plate 19, thus covered, is forced forward, considerable pressure is exerted on the water charge in the forepart of the cylinder so as to force the charge upwardly through the conduit 17. At the same time that the water charge is ejected, water from chamber 11 is sucked in through opening 34 into the rear part 35 of cylinder 16 so as to fill such rear part. After the termination of the firing stroke, pressure on the trigger is released, the spring is permitted to return to its normal position, and plate 19 is brought rearwardly. During this action, the water in portion 35 flows through the perforations of the plate 19 and, by virtue of the flexibility of sealing member 19a, it is bent forward as illustrated in Fig. 2 so as to fill the forepart of the cylinder with the next charge to be ejected.

A particular advantage in providing the packing arrangement above described is that the rod 21, spring 27, washers and pressure plate may be assembled as a sub-unit, as illustrated in Fig. 3, and merely inserted in place as illustrated in Fig. 2, the enlargement 22 being inserted through the bottom end of the channel-shaped trigger 23. It is wholly unnecessary to swage the outer edges of the opening 25 or otherwise provide enclosing means for the packing because the spring 27 maintains the packing against displacement while automatically compensating for changes in the physical shape thereof. Thus, the simple arrangement described is superior to a packing enclosing member while avoiding the necessity of specially forming the opening 25 or providing additional enclosing means to effectively maintain the packing in position. The spring 27 further maintains continuous pressure on the packing so that water will not leak there-through whether or not the pistol is being used. The assembly of the packing, spring and pressure member as a sub-unit reduces the complexity of assembly to a minimum and effects considerable economies in the manufacture of the pistol.

A more important function of the composite packing is the action of the planar deformable washers 30 and 31. As illustrated by the dotted

lines of Fig. 3, these washers spread radially under pressure so as to complete their sealing function. Such spread is not only in the outward direction shown where firm contact is made with the wall of opening 25, but inwardly toward the center where its sealing grip on the rod 21 is enhanced. Thus, through the action of spring 27, the disc 28 presses against the washers and spreads them to perfect the seal at the time that the piston is applying high pressure to the water charge and this action is repeated each time a charge is ejected.

While there has been described what at present is considered a preferred embodiment of the invention, it will be evident that many changes and modifications may be made therein without departing from its spirit. It is therefore aimed in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the invention.

I claim:

1. A water ejecting toy pistol comprising a body having a water chamber formed therein, a cylinder for enclosing charges from said water chamber, a manually operated piston including a piston rod for applying pressure to a charge in said cylinder, means to direct the ejection of said charge from the body of the pistol, said body being formed with an opening communicating with said cylinder, a packing mounted on said piston rod and disposed within said opening so as to act against the inner walls thereof, a spring having one end thereof bearing against said packing, and an external trigger effectively connected to the other end of said spring and to said piston rod so as to maintain said spring in a constant state of compression and so as to further compress said spring when the trigger is inwardly moved to operate said piston and eject said water charge, said packing including a planar washer which is radially deformable under the action of said spring whereby said compression of said spring by the inward movement of said trigger produces a radial spread of said washer so as to more effectively seal said washer against the inner walls of said opening and against the piston rod.

2. A water ejecting toy pistol comprising a body having a water chamber formed therein, a cylinder for receiving charges from said water chamber, said cylinder being formed with an open end, a piston including a piston rod for applying pressure to a charge in said cylinder, means to direct the ejection of said charge from the body of the pistol, an external trigger for actuating said piston rod, a packing closing the open end of said cylinder, said piston rod reciprocating through said packing in response to the trigger action, and a spring interposed between said trigger and said packing and serving to maintain continuous pressure on said packing while normally urging said trigger to an outward or re-set position, inward actuation of said trigger so as to apply pressure to said charge operating to compress said spring so as to exert further pressure on said packing, said body being formed with an opening communicating with the open end of said cylinder, said body opening being larger than said open end so as to form a shoulder between said opening and the open end of the cylinder, said packing being disposed within said body opening and being pressed against said shoulder by said spring.

3. A pistol according to claim 2 and wherein said packing comprises a flexible, fibrous center and rigid, planar enclosures for said center.

5

4. A pistol according to claim 3 and wherein said center comprises a planar disc of felt material and said enclosures are a pair of planar metallic discs embracing said felt material, said spring pressing against one of said metallic discs, and the other metallic disc being pressed against said shoulder through the action of said spring.

5. A water ejecting toy pistol comprising a body having a water chamber formed therein, a cylinder for receiving charges from said water chamber, said cylinder being formed with an open end, a piston including a piston rod for applying pressure to a charge in said cylinder, means to direct the ejection of said charge from the body of the pistol, an external trigger for actuating said piston rod and piston, a packing closing the open end of said cylinder, said piston rod reciprocating through said packing in response to the trigger action, and a spring interposed between said trigger and said packing and serving to maintain constant pressure on said packing while normally urging said trigger to an outward or re-set position, said trigger being elongated and being pivoted at one end thereof to said body, the other end thereof serving as a terminal for said spring, inward actuation of said trigger so as to apply pressure to said charge in said cylinder compressing said spring so as to exert greater pressure on said packing.

6. A water ejecting toy pistol comprising a body having a water chamber formed therein, a cylinder for receiving charges from said water chamber, a manually operated piston including a piston rod for applying pressure to a charge in said cylinder, means to direct the ejection of said charge from the body of the pistol, said body being formed with an opening communicating with said cylinder, a shoulder formed between said opening

6

and said cylinder and depending inwardly at the entrance of said cylinder, a packing loosely mounted on said piston rod and disposed within said opening whereby said inwardly depending shoulder serves as an abutment for one side thereof, a spring having one end thereof bearing against the other side of said packing and an external trigger acted upon by the other end of said spring whereby said packing is pressed against said shoulder while said trigger is normally maintained in an outward position relative to said body, and is compressed by said spring when said trigger is inwardly actuated.

7. A pistol according to claim 6 and wherein said packing comprises a plurality of separate planar discs all loosely mounted on said piston rod and compacted through the action of said spring.

8. A pistol according to claim 7 and including at least three discs in said plurality of discs, the outside discs being of rigid material and having at least one felt-like deformable disc between them, said outside discs respectively serving as a terminal for said spring, and as an inner enclosing layer for the packing and pressed against said shoulder through the action of said spring.

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REFERENCES CITED

The following references are of record in the file of this patent:

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