March 22, 1955 R. W. BOWMAN 2,704,582

DRY POWDER DISPENSING APPARATUS

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Fig. 1.

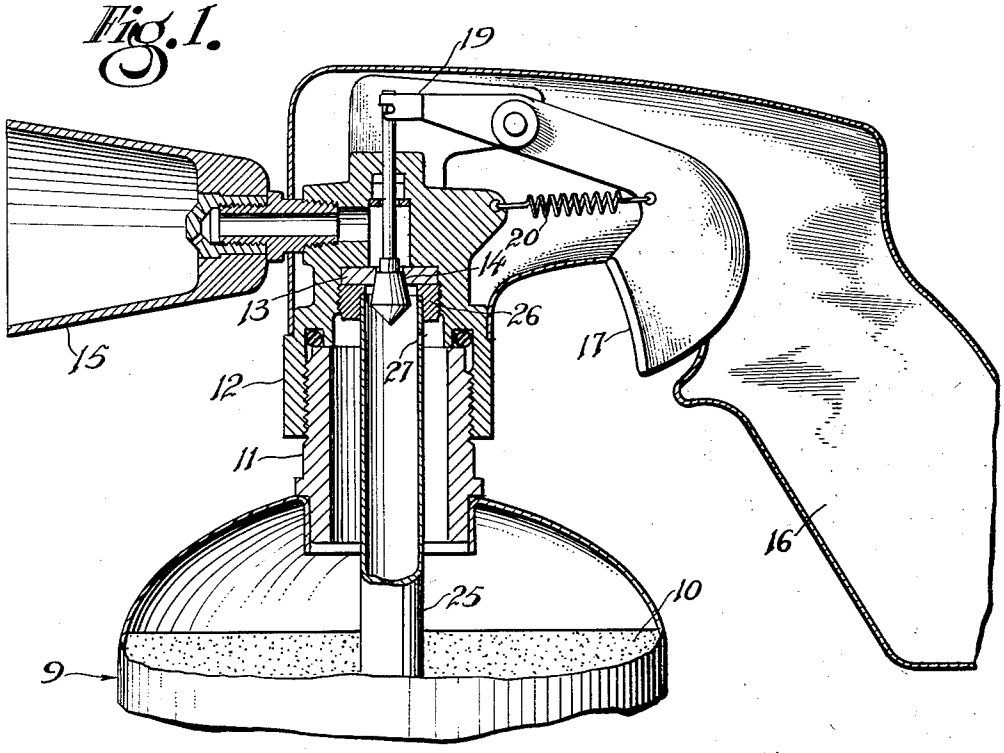


Fig. 2.

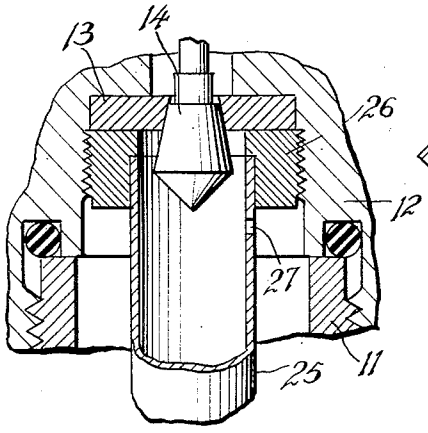
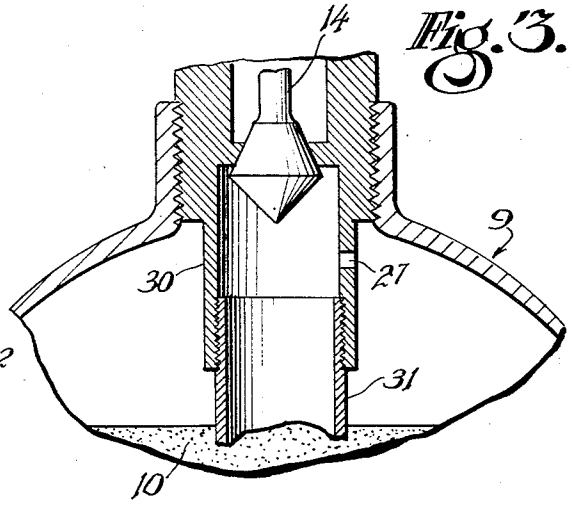


Fig. 3.



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DRY POWDER DISPENSING APPARATUS

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The present invention relates to apparatus for dispensing a fluid stream of a pressurized charge of dry powder, such as dry powder fire extinguishers, insecticide and fungicide dispensers and the like, and, more particularly, to an improved syphon tube assembly for such apparatus.

One type of fire extinguisher of the foregoing character, which has been used extensively, generally includes a receptacle for containing a charge of a dry powder composition consisting essentially of pulverized sodium bicarbonate or the like maintained under fluid pressure by means of compressed air or nitrogen, for example. The receptacle has an outlet at its upper end to which a discharge control valve is attached. The valve comprises a discharge port surrounded or established by a downwardly facing valve seat, a valve member for the seat and mechanism for moving the valve member downwardly to unseat the same. In this form of apparatus, a syphon tube assembly, including a syphon tube extending to adjacent the bottom of the receptacle, has its upper end in fluid flow communication with the valve port, whereby, upon unseating of the valve member, the pressurizing medium causes the powder to flow upwardly through the syphon tube and be discharged.

While the apparatus just described has been considered to be highly satisfactory and has met with popular approval, extensive tests have indicated that, when the valve is opened intermittently, proper discharge of the powder may not occur in some instances. This difficulty is believed to be caused by a mass of powder which is compacted in the upper end of the syphon tube assembly after the valve has been opened and closed to dispense a portion of the entire charge in the receptacle. This compacted mass of powder tends to interfere with the downward movement of the valve member and prevents fully unseating the same when an attempt is made to reopen the valve, whereby the mass blocks or jams in the vicinity of the valve member and prevents the flow of powder as a fluid stream through the valve port. Since, in many applications, it is desirable to dispense the powder by on and off operation of the valve rather than by one shot operation, it is required that the foregoing described apparatus provides for proper discharge of powder at all times while a portion of the powder still is in the receptacle.

Accordingly, an object of the present invention is to provide improved apparatus of the foregoing character which is not subject to the foregoing difficulties and disadvantages.

Another object is to provide such apparatus which is improved without increasing the cost thereof or complicating its manufacture and assembly.

Another object is to provide a simple, practical and reliable arrangement for accomplishing the foregoing.

A further object is to provide such an arrangement which is readily applied to newly manufactured apparatus and to apparatus already in use.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the invention, it has been found that the foregoing objects can be accomplished by providing aperture means in the syphon tube assembly for establishing fluid flow communication between the upper interior portion of the receptacle and a zone within the

syphon tube assembly in the vicinity of and adjacently below the valve member where the powder may jam, whereby, upon partial unseating of the valve member, pressurizing medium in the receptacle enters this zone and breaks up any compacted mass of powder adjacent the valve member which might tend to prevent the proper flow of powder through the valve port.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawing, forming a part of the specification, wherein:

Fig. 1 is a view of the upper portion of a dry powder fire extinguisher or similar dry powder dispensing apparatus embodying the present invention, shown partly in elevation and partly in section.

Fig. 2 is an enlarged fragmentary sectional view illustrating the aperture means in detail.

Fig. 3 is a fragmentary sectional view of a modified embodiment of the invention.

Referring to the drawing in detail and more particularly to Fig. 1 thereof, there is shown apparatus for dispensing dry powder which generally comprises a receptacle **9**, containing dry powder **10**, having a closed end wall at the bottom thereof (not shown) and having an outlet such as a spud **11** at the upper end thereof; a valve body **12** secured to the spud having a passageway provided with an inlet, an outlet and a downwardly facing valve seat member **13** formed with a central discharge port or opening intermediate the inlet and outlet of the passageway; a valve member **14** for closing the port of the valve seat adapted to control the discharge of powder from the receptacle through a discharge directing horn or shield **15** connected to the outlet of the passageway; a carrying handle **16** secured to the valve body; and mechanism for moving the valve member **14** downwardly to unseat the same, including an operating lever or trigger **17** partially housed by the handle and pivotally mounted on a lug **19** of the valve body, and a spring **20** for normally biasing the lever into a position to cause the valve member to be seated.

In order to conduct dry powder stored under pressure in the receptacle to the valve inlet and the port of the seat, a syphon tube assembly is provided which, in the embodiment illustrated in Figs. 1 and 2, includes a syphon tube **25** extending to adjacent the bottom of the receptacle and a nut **26** for supporting the upper end of the syphon tube and for securing the same to the valve body. In this embodiment, aperture means, in the form of a hole **27**, are provided in the syphon tube for the purpose described more fully hereinafter.

In Fig. 3, another form of syphon tube assembly is shown which includes a tubular depending portion **30** on the valve body and a syphon tube **31** having its upper end secured to the portion **30** and supported thereby. In this embodiment, the tubular portion **30** is provided with a hole **27**.

The hole **27** provides an opening for fluid flow communication between the upper interior portion of the receptacle and the interior or passageway of the syphon tube assembly. This hole has an area much smaller than the cross-sectional area of the passageway. For example, a hole of a .040 inch diameter in a half inch syphon tube assembly passageway has been found feasible in practicing the present invention. While only one hole **27** is shown as constituting the aperture means, it will be understood that two or more circumferentially or lengthwise spaced holes could be utilized. Preferably, the area of a single hole or the combined area of several holes is such so as to prevent flow of pressurizing medium therethrough at a rate so high that the pressure within the receptacle is rapidly dissipated and reduced below a value at which it can effectively push the powder upwardly through the syphon tube.

The aperture means or holes preferably are located in a section of the syphon tube assembly which serves as a portion of a chamber for the valve member **14**. Excellent results have been attained by locating the aperture means in the vicinity of or closely adjacent the zone of the chamber portion which is occupied by the lower portion of the valve member when fully unseated. Effective results have also been attained by locating the

apertures as far as four inches from this zone, but above the powder level in the receptacle.

In operating the apparatus illustrated herein by opening the valve momentarily to discharge powder and then closing the valve, it was found that in some instances a mass of powder was compacted in the passageway or chamber portion of the syphon tube assembly adjacently below the valve member. Normally, this mass would make it difficult to again open the valve because movement of the valve member to a fully unseated position was resisted. However, by the provision of the aperture means as described herein, pressurizing medium within the under portion of the receptacle passes therethrough upon the slightest unseating of the valve member and attempts to escape through the port of the valve seat. This escaping medium rushes through the compacted powder mass at a rate sufficient to break up, disrupt or disperse the mass whereby unseating movement of the valve member no longer is resisted and the valve member can be unseated fully without substantial effort. Upon fully unseating the valve member, flow of powder through the valve port as a fluid stream is again effected. Tests have indicated that the aperture means are capable of providing for breaking up a series of successive powder jams whereby the valve is fully adapted for on and off operation as many times as desired during the complete discharge of the powder stored in the receptacle.

From the foregoing description, it will be seen that the present invention accomplishes a new and advantageous result in an extremely simple, practical and economical manner. The aperture means are provided simply by drilling a small hole, and thus can be readily applied to syphon tube assemblies in the course of manufacturing the apparatus or when the apparatus is taken apart for inspection or recharging.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. In apparatus for dispensing a pressurized charge of dry powder including a receptacle having an outlet at its upper end; a valve attached to the outlet having a valve port surrounded by a downwardly facing valve seat; a valve member for the valve seat; and means for moving the valve member downwardly to unseat the same: the improvement which comprises a syphon tube assembly in fluid flow communication with the valve port having aperture means in the side wall thereof adjacently below the valve member for establishing fluid flow communication with the upper interior portion of the receptacle.

2. In apparatus according to claim 1, wherein said syphon tube assembly includes a syphon tube having the aperture means formed therein.

3. In apparatus according to claim 2, wherein said aperture means is a lateral opening of much smaller area than the cross-sectional area of the passageway of the syphon tube, and said opening spaced adjacently from the upper end of the syphon tube.

4. In apparatus according to claim 1, wherein said syphon tube assembly includes a tubular depending portion on the valve having the aperture means formed therein and a syphon tube supported by said tubular portion.

5. In apparatus for dispensing a pressurized charge of dry powder including a receptacle having an outlet at its upper end; a valve attached to the outlet having an inlet, and outlet and a downwardly facing valve seat intermediate the inlet and the outlet; a valve member for the valve seat; and means for moving the valve member downwardly to unseat the same: the improvement which comprises a syphon tube having its upper end in fluid flow communication with the valve inlet and having aperture means in the side wall thereof adjacently below the valve inlet for establishing fluid flow communication between the upper interior portion of the receptacle and the syphon tube passageway.

6. In apparatus according to claim 5, wherein the upper end of the syphon tube serves as a portion of a chamber for the valve member and said aperture means is located adjacent the zone of the chamber in which the valve member is positioned when unseated.

7. In apparatus according to claim 5, wherein said aperture means is an opening having an area much smaller than the cross-sectional area of the syphon tube passageway.

8. Apparatus for dispensing a pressurized charge of dry powder comprising a receptacle having an outlet at its upper end; a valve attached to the outlet having an inlet, an outlet and a downwardly facing valve seat intermediate the valve inlet and outlet; a valve member for the valve seat; means for moving the valve member downwardly to unseat the same; and a syphon tube having its upper end attached to the valve inlet and serving as a portion of a chamber for the valve member, said syphon tube having a lateral opening of much smaller area than the cross-sectional area of the passageway of said syphon tube, said opening being located adjacent the zone of the chamber in which the valve member is positioned when unseated to establish fluid flow communication between the upper interior portion of the receptacle and said zone in said syphon tube.

9. In apparatus for dispensing a pressurized charge of dry powder including a receptacle having an outlet at its upper end and being adapted to contain a charge of dry powder and a pressurizing medium for expelling the same; a valve attached to the outlet having an inlet and an outlet, and a valve port surrounded by a downwardly facing valve seat intermediate the valve inlet and outlet; a valve member for the valve seat; and means for moving the valve member downwardly to unseat the same and towards a zone in which the powder may jam: the improvement which comprises a syphon tube assembly formed with a passageway in fluid flow communication with the valve port at the inlet side thereof and the lower end of the receptacle, said assembly having aperture means in the side wall thereof adjacently below the valve member and at the zone where the powder may jam for establishing fluid flow communication with the upper interior portion of the receptacle above the powder level, whereby, upon partial unseating of the valve member, pressurizing medium in the receptacle is adapted to enter said zone and break up powder jams therein to enable the valve member to be fully unseated and the powder to flow freely through the valve port.

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