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SAND AND GRAVEL SEPARATOR ATTACHMENT FOR PUMPS

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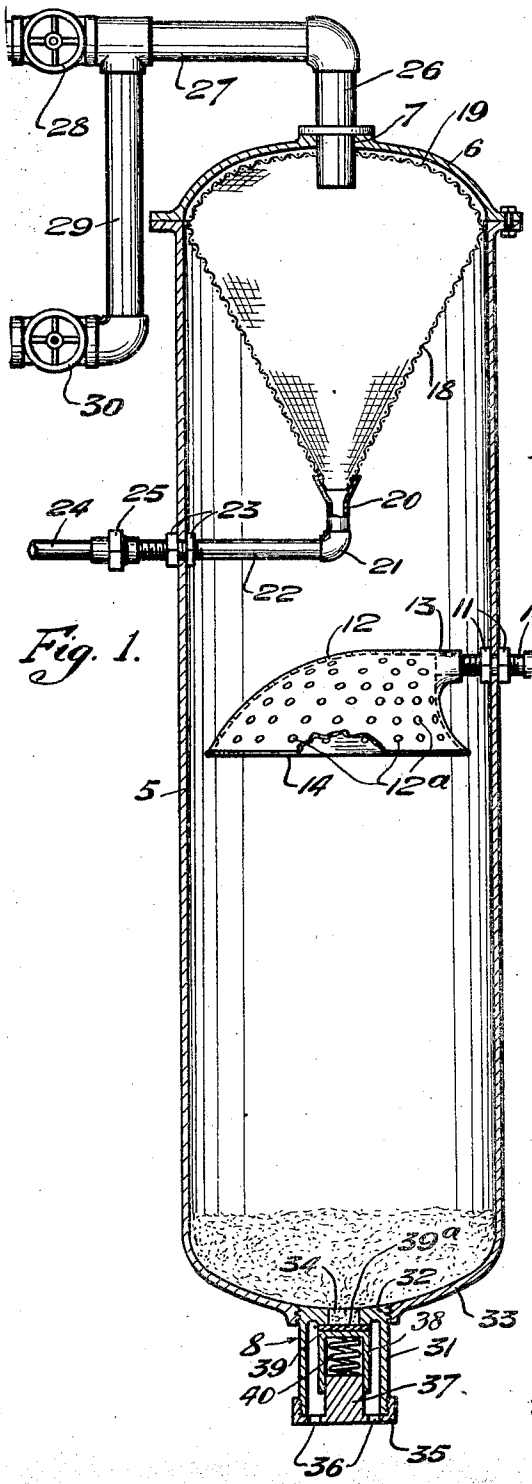


Fig. 1.

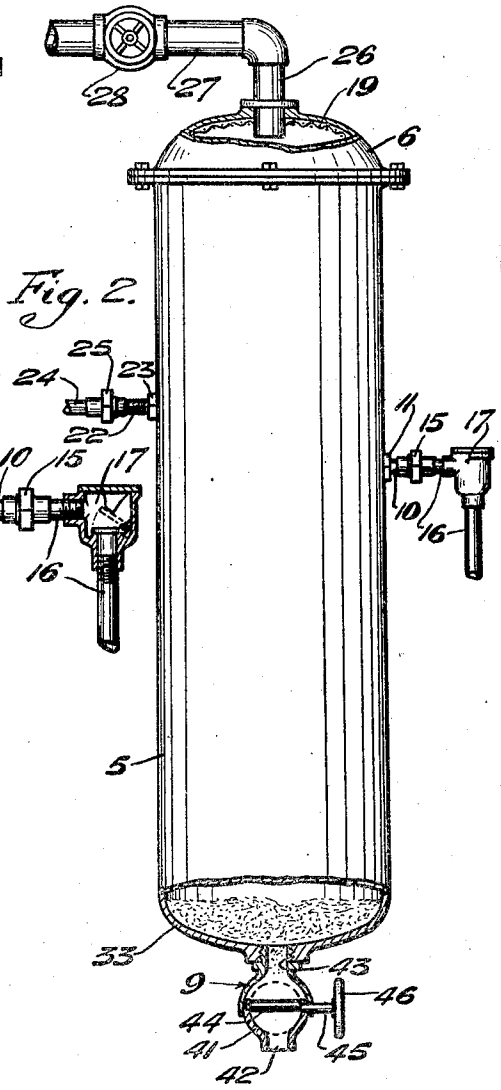


Fig. 2.

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SAND AND GRAVEL SEPARATOR ATTACHMENT FOR PUMPS.

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To all whom it may concern:

Be it known that I, CHARLES H. PERRY, a citizen of the United States, residing at Miami, in the county of Dade and State of Florida, have invented new and useful Improvements in Sand and Gravel Separator Attachments for Pumps, of which the following is a specification.

This invention relates to a sand and gravel screen attachment for pumps adapted to separate sand, gravel and other matter from water and interposed between a source of water supply or well and a pump.

Devices of this character as heretofore constructed have been generally plain screens that soon load up or choke and cut off the supply of water from the pump, thereby causing the latter to stop working. In order to clean the form of screens usually employed the services of a mechanic are required to open the screen container and clean the screen.

The primary object of the present invention is to provide a comparatively simple form of sand and gravel screen attachment for pumps that will effectively operate to separate sand, gravel and other matter from the water passing through the attachment and also provide for a self or automatic cleaning operation within the attachment to maintain the screen element free of sand or clogging accumulations.

A further object of the invention is to provide a device of the class set forth that may be readily installed in operative position between a pump and a source of water supply and from which the accumulated sediment or sand, gravel and other matter may be easily liberated.

With these and other objects and advantages in view, the invention consists in the construction and arrangement of the several parts which will be more fully hereinafter described and claimed.

In the drawing:

Fig. 1 is a transverse vertical section of a sand and gravel screen attachment embodying the features of the invention, parts of the connections for the attachment being shown in elevation.

Fig. 2 is a side elevation of the improved attachment on a small scale and broken away in parts and illustrating a slight modification in the form of the bottom outlet valve.

The improved device comprises a container or cylindrical receptacle 5, which may be of any dimensions, having at the top a removable cap 6 with a central inlet opening 7, and at the bottom an outlet valve organization 8, which, as shown by Fig. 1, is automatic in its operation and differs from the outlet valve 9 shown by Fig. 2. At an intermediate point a screw-threaded inlet pipe 10 extends horizontally through the container or receptacle 5 and is held in fixed position by jamb nuts or analogous devices 11. On the inner end of the inlet pipe 10 is a perforated straining spreader 12 having an upper reduced tubular neck 13, which is screw-threaded and attached to the inner threaded end of the pipe 10. The spreader 12 is hollow and diverges towards a lower horizontal outlet 14 of maximum extent. The spreader 12 is held in fixed position within the container or receptacle 5 and by its divergent structure and spreading action is materially advantageous in primarily effecting a gravitation or settlement of the sand, gravel or other matter carried by the incoming water. Coupled to the pipe 10 by a suitable union 15 is a suction pipe 16 leading into a well or other source of water supply and having interposed therein a check valve 17, which may be of any form. It will be understood that the suction pipe 16 coupled to the inlet pipe 10 as well as the latter pipe may be of any length and disposed in any convenient manner relatively to a well or other source of water supply, and moreover, the check valve 17 may be varied at will, the only object in using this valve being to provide means which will prevent back flow of the water from the improved attachment into the well or other source of water supply. In the upper or top portion of the container or receptacle 5 is a separating screen 18 which is of conical form and has a dome-shaped top closure 19 continuous therewith and conforming to the contour of the cap 6. The lower reduced extremity of the separating screen 18 has a downwardly tapered coupling member 20 of suitable material secured thereto and also to an elbow or union 21 at the inner terminal of an outlet pipe 22, which is held in the side or side wall of the container 5 by nuts 23 and has a pump connecting pipe 24 attached thereto by a union 25 corresponding to the union 16 heretofore described. Extending through the central opening 7 of the cap 6 and also through the center of the dome-shaped cap 19 of the sep-

arating screen 18 is a cleaning or back-wash pipe 26 connected by a pipe 27 to a pressure tank or to any other source of water supply having sufficient fall or pressure to cause the water to forcefully flow into the upper portion of the attachment. The pipe 27 is provided with a controlling valve 28, which is adapted to be closed when the cleaning attachment is not in use. Attached to the pipe 27 is a branch connection or pipe 29, which is adapted to be connected to the pressure relief valve of the pump and has therein a cutoff valve 30, which may be opened or closed in accordance with the operation desired.

The outlet valve 8 as shown by Fig. 1 consists of a cylindrical casing 31 having a head 32, which is screw-threaded into the lower hopper-like bottom 33 of the container or receptacle 5, the said head 32 being formed with a central outlet opening 34. The lower end of the cylindrical casing 31 is screw-threaded and receives a removable cap 35 with outlet openings 36 around the center thereof and a central upwardly projecting guide 37. Movably mounted on the guide 37 is a cylindrical valve 38 having a closed top 39 and a fully open bottom, the inside diameter of the valve 38 being such as to permit said valve to freely reciprocate vertically on the guide 37, and between the upper end of this guide and the closed top 39 of the valve a spring 40 is interposed and operates to normally close the valve against the outlet opening 34 in the head 32 of the casing 31. The outlet valve 9 as shown by Fig. 2 differs from the valve 8, said valve 9 comprising a globular casing 41 with a lower outlet 42 and an upper neck 43 screw-threaded into the hopper-like bottom 33 of the container or receptacle 5. Within the globular casing is mounted a disk valve 44 similar in construction to a damper and having an outwardly projecting stem 45 with a hand wheel or analogous device 46 connected thereto for opening and closing the same. The disk valve 44 is normally closed as shown in full lines, and when opened the disk will be disposed vertically as illustrated in dotted lines, thereby clearing the passage through the valve 9 or establishing communication between the outlet neck 43 and the lower outlet 42.

The cleaning or back-wash pipe 26 and connections will be of larger diameter than the lower outlet or drain valve heretofore described, or larger than the outlet 34 and the diameter of the outlet neck 43 of the valves 8 and 9 respectively, so that the container or receptacle will remain filled with water when cleaning the same and thereby avoid losing priming of the pump to which the attachment is connected.

The water is drawn through the supply pipe 16 by way of the check valve 17 and the inlet pipe 10 into the spreader 12 and by the latter is distributed over a greater area within the interior of the container or receptacle 5, and a considerable part of the separation of the sand, gravel or other sediment will ensue by gravitation, but to thoroughly and effectively separate all matter from the water that flows into the container or receptacle with the water, the conical separating screen 18 is used, and as the water flows up around the latter and interiorly therethrough, the sand, gravel or other sediment will remain on the exterior of said separating screen and gravitate to the bottom of the container or receptacle 5. The water passing through the separating screen flows down into and through the pipe 22 and thence through the pipe 24 to the pump in a purified condition, with material advantage in the operation of the pump particularly from a standpoint of reduction of wear on the parts thereof. The inflowing of water into the container or receptacle will continue regularly through the action of the pump, or the suction created in the said container or receptacle, and, as just explained, purification of the water will continually ensue. The conical form of the separating screen causes any sand, gravel or other matter that may reach the screen to drop from the said screen and settle at the bottom of the container or receptacle as soon as the operation of the pump ceases. The conical shape of the screen with the larger end uppermost as shown also provides a greater screening surface. The improved attachment is washed at the time the pump to which it is connected is inoperative, and the wash water enters through the pipe 26 into the screen and through the latter, the wash water coming into the container or receptacle by way of the screen either under ordinary gravity pressure or additional forcing pressure applied thereto thoroughly cleansing the interior of the container and the parts thereof. Owing to the interposition of the check valve 17 as hereinbefor explained, the wash water will not flow back into the supply pipe or line 16. The lower outlet valve of either form shown and generally designated by 8 or 9 will be open when the washing operation ensues, the valve 8 being automatically opened by the pressure on the hollow valve 38 overcoming the resistance of the spring 40, and by this means all of the accumulated matter in the container or receptacle will be washed out, or, in the case of the valve 9, the disk valve 44 will be opened by hand. After the washing operation has been effected the valve 38 will automatically close and the disk valve 44 will be manually closed. In the form of the attachment as shown by Fig. 2 the pipe 27 with the valve 28 and inlet pipe 26 are used without any pressure connection, but it will be

understood that the wash water coming in through this pipe 27 and the inlet pipe 26 may be under pressure from the source of supply. The main feature of the cleaning and washing operation is that it may be automatically carried on by a very simple manual adjustment and control of the parts particularly included in the supply and pressure means as well as the outlet means for the wash water. To render the valve 38 more effective in its closure with relation to the outlet or drain opening 34, it is preferred that a rubber cap or disk be secured on the head 39, as at 39ª. The spreader 12, by the formation of the perforations 12ª therein, as heretofore indicated, operates as a strainer and will to some extent act as a preliminary separating means with relation to the water flowing thereinto and particularly in removing the coarser materials that may be carried into the apparatus with the water, the material thus separated from the water gravitating towards the bottom portion of the container or receptacle 5.

The improved attachment is comparatively simple in its construction and arrangement, and to adapt the same to various applications, changes in the proportions, dimensions and minor details may be adopted without departing from the spirit of the invention.

What is claimed as new is:

1. In a sand and gravel separator attachment for pumps, a cylindrical receptacle having an inlet connection at an intermediate point and an outlet connection above the said inlet connection, a spreader wholly disposed within the receptacle and connected to the inner end of the inlet, the spreader having a fully open bottom to direct the water downwardly towards the bottom of the receptacle and connected to the inner end of the inlet at one side of the top portion thereof, the body of the spreader being perforated and permitting the unfiltered water to pass therethrough and the solids to be directed downwardly through the open bottom thereof in a tangential manner, water supply means connected to the inlet, and an inverted conical screen separator mounted in and filling the top portion of the receptacle above the spreader and having its lower reduced end secured to the outlet connection.

2. In a sand and gravel separator attachment for pumps, a cylindrical receptacle having an upper inverted conical separator therein composed wholly of screen material and having its upper enlarged portion fitted close to and filling the top of the receptacle, an outlet pipe connected to the lower reduced end of the separator and extending outwardly through the side of the receptacle, a spreader within the receptacle below the lower reduced end of the screen separator, said spreader having a perforated body and a fully open lower end, water supply means connected to the side portion of the top of the spreader and holding the latter suspended within the receptacle and also causing the unfiltered water to pass through the body of the receptacle and the solid matter to be directed downwardly therefrom in a tangential manner to the bottom of the receptacle.

3. In an attachment of the class specified, the combination of a receptacle having an inverted conical screen separator mounted in the upper portion thereof, an outlet pipe connected to the lower reduced portion of the separator and passing through the side wall of the receptacle, an inlet pipe having a spreader on the inner end thereof within the receptacle, a water supply pipe connected to the inlet, a valved outlet means at the bottom of the receptacle, and a washing pipe conduit means having an inlet extending into the top of the receptacle and the screen.

4. In an attachment of the class specified, the combination of a receptacle having an inverted conical screen separator mounted in the upper portion thereof, an outlet pipe connected to the lower reduced portion of the separator and passing through the side wall of the receptacle, an inlet pipe having a spreader on the inner end thereof within the receptacle, a water supply pipe connected to the inlet, a valved outlet means at the bottom of the receptacle, and a washing pipe conduit means having an inlet extending into the top of the receptacle and the screen, the washing pipe conduit means having pressure means connected thereto.

5. In an attachment of the class specified, the combination of a receptacle having a lower outlet valve means and inlet and outlet pipes extending thereinto at different elevations, a separating screen mounted in the upper part of the receptacle and secured to the outlet pipe, a spreader below the separating screen located within the receptacle and secured to the inlet pipe, a water supply pipe connected to the inlet pipe and having a check valve therein, and pipe means for supplying wash water to the receptacle and having an inlet member extending into the top of the receptacle and the separating screen.

In testimony whereof I have hereunto set my hand.

CHARLES H. PERRY.