Feb. 8, 1927. 1,617,048

G. P. GREGORY

STRAINER

Filed June 5, 1926 2 Sheets-Sheet 1

Fig. 1

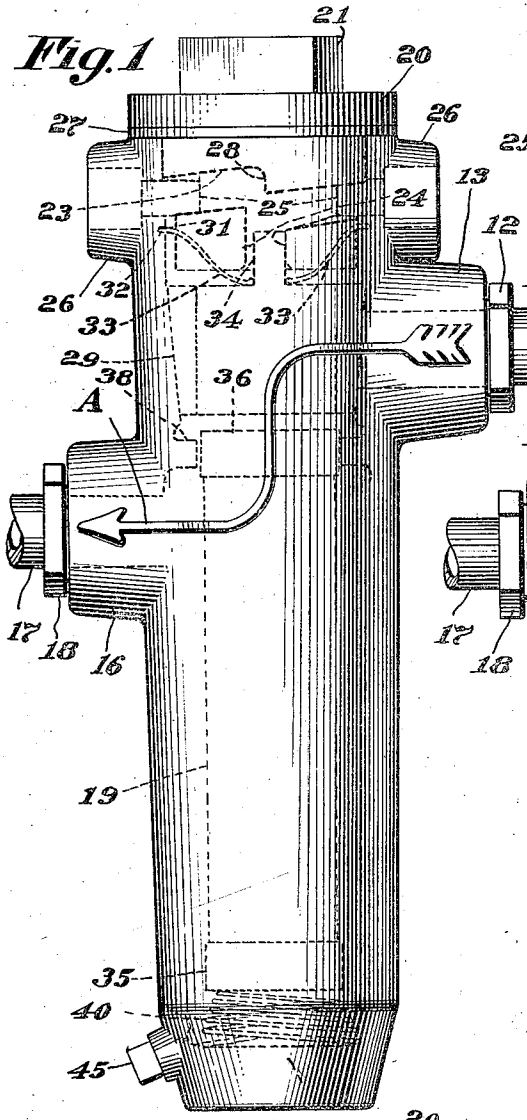


Fig. 2

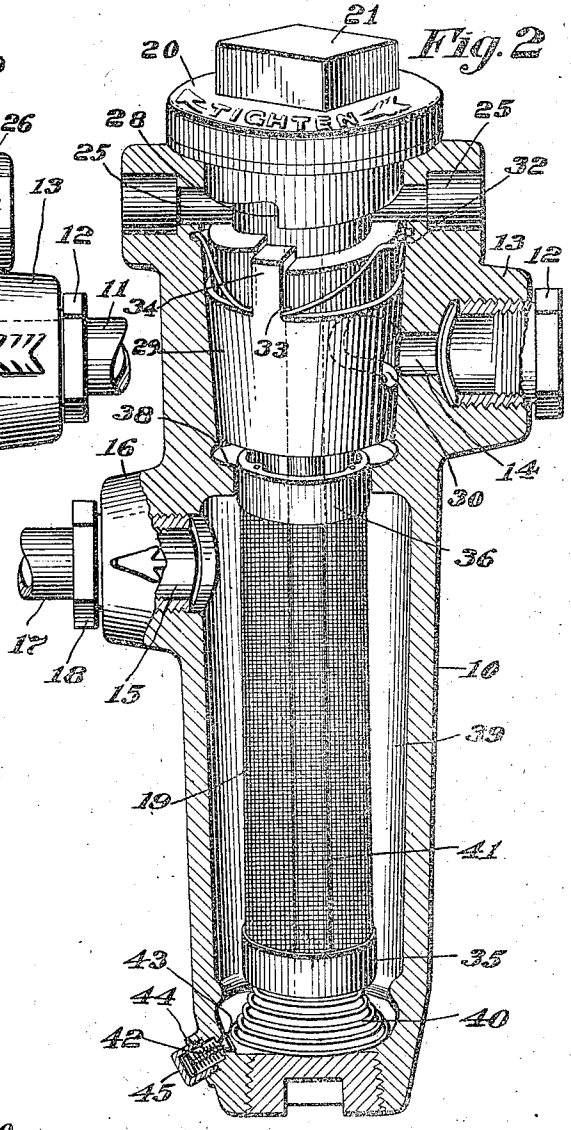
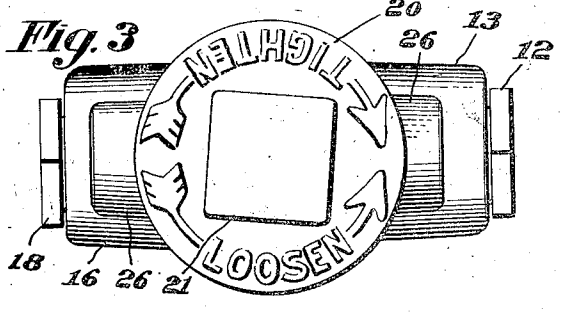


Fig. 3



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Filed June 5, 1926 2 Sheets-Sheet 2

Fig. 4

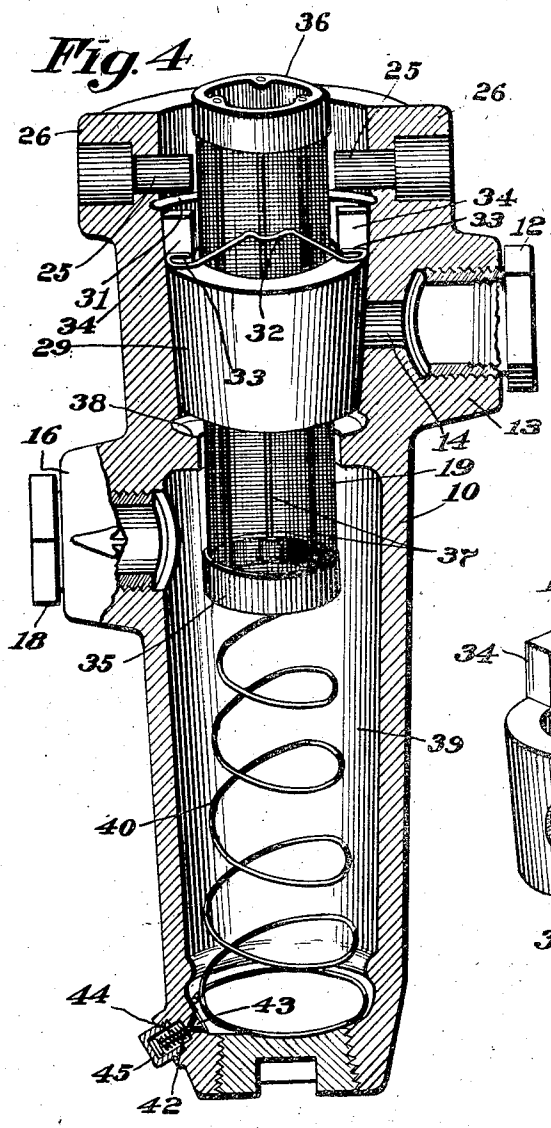


Fig. 5

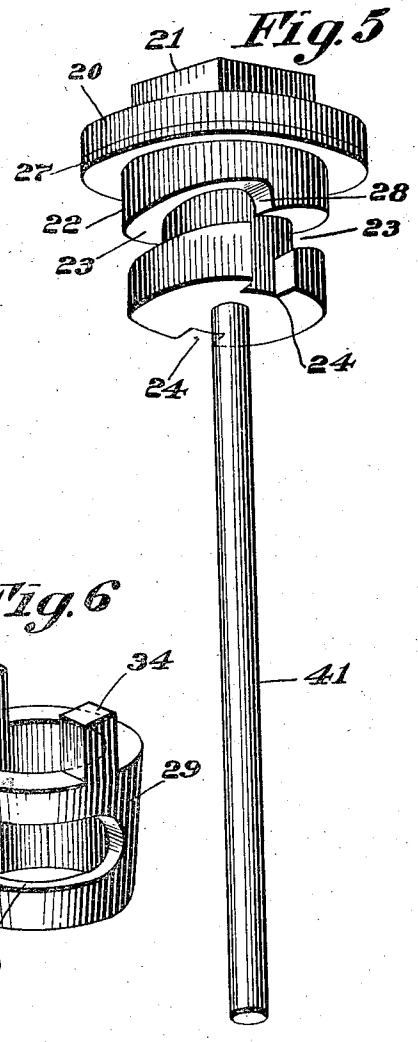
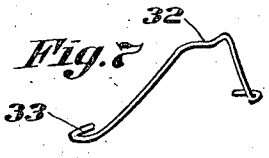


Fig. 6

Fig. 7



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UNITED STATES PATENT OFFICE.

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STRAINER.

Application filed June 5, 1926. Serial No. 113,898.

This invention relates to strainers of the type adapted for connection to a pipe line to strain the liquid or gaseous fluid delivered by the pipe line.

Strainers of this general type as constructed heretofore commonly consist of an enclosing casing through which the liquid passes, and a strainer element mounted in the casing serves to catch the dirt and foreign particles within the liquid. The strainer element may become clogged from time to time and it is therefore customary to provide the strainer casing with a closure portion which may be removed when it is desired to take the strainer element out and clean it.

These strainers as constructed heretofore are open to the objection that when a portion of the casing is removed to permit access to the strainer element, the liquid within the casing and feed pipe may escape through the opened portion of the casing, and, even if the source of liquid supply is cut off before the strainer casing is opened up, considerable liquid may remain in the piping to escape through the opening in the casing.

This escapage of liquid, when the strainer casing is opened up to clean the strainer, may not be particularly objectionable in a water pipe line, but is very objectionable in a pipe line conveying fuel oil or other liquids that will soil the floor and other objects with which it may come in contact.

An important feature of the present invention therefore resides in a strainer casing having a valve for cutting off the supply of liquid or gaseous fluid to the casing, and in means for automatically operating the valve to close the same before the cover plate is removed and for opening the valve as the cover plate is secured in place, the arrangement of the parts being such that the cover cannot be removed until the valve is closed, and cannot be secured in place until the valve is opened.

Another feature of the invention resides in the construction whereby rotation of the cover in one direction secures it to the casing, and rotation of the cover in the opposite direction releases it from the casing, and in the connection between the cover and valve whereby rotation of the cover serves to operate the valve.

Another feature of the invention resides in the construction of the parts whereby the strainer element is readily inserted in and removed from the casing, and in yielding means for ejecting the strainer element as the cover is removed.

Still another feature of the invention resides in a drain port in the lower portion of the casing and which is provided with an automatically closing valve to prevent unintentional loss of fluid through the port.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection with the accompanying drawings, which illustrate one good practical form of the invention.

In the drawings:—

Fig. 1 is a side elevation of a strainer constructed in accordance with the present invention;

Fig. 2 is a vertical sectional view through the strainer of Fig. 1, the parts within the strainer casing being shown in perspective;

Fig. 3 is a top plan view of Fig. 1;

Fig. 4 is a view similar to Fig. 2, the cover being removed;

Fig. 5 is a perspective view of the cover for the strainer casing;

Fig. 6 is a perspective view of the rotating valve; and

Fig. 7 is a perspective view of a spring to be described.

The strainer of the present invention may be used in connection with pipe lines to remove dirt and foreign matter from either a liquid or gaseous fluid passing through the pipe line, and the construction of the present invention is particularly well adapted for use in connection with fuel supply pipes for fuel burners, where it will serve to remove dirt and foreign particles which if permitted to remain in the fuel might clog the burner.

The strainer is provided with a casing or receptacle 10 which may be given any de-

sired construction, and is shown as substantially cylindrical in shape, and is conveniently formed of cast metal. The liquid or gaseous fluid to be strained is delivered to the strainer casing by a pipe 11 which is connected by a threaded coupling 12 to the boss 13 of the casing, having the inlet port 14, and the fluid after being strained, leaves the casing 10 through the port 15 formed in the boss 16 that is connected to a pipe 17 by the coupling 18. The direction in which the fluid passes through the strainer casing is preferably indicated by an arrow A which may be cast or otherwise formed upon the exterior of the casing as shown in Fig. 1. This arrow is desirable in order to insure that the inlet and outlet ports will be connected to the proper pipes.

It is desirable that the strainer casing 10 be so constructed that the strainer element 19 therein may be readily removed from time to time to facilitate cleaning of the strainer element. The casing 10 is therefore provided with an opening at its upper end which is closed by the cover 20, and the cover is preferably so constructed that rotation of the same through a relatively small angle will serve to secure the cover tightly to the casing while rotation of the cover in the opposite direction will release it so that it may be removed from the casing. The upper face of the cover 20 is preferably provided with a projection 21 having the opposite sides slabbed off to receive a wrench, and the directions in which the cover should be rotated to tighten or loosen the same is preferably indicated by arrows marked "Tighten", "Loosen", which are cast or otherwise provided upon the upper face of the cover, as best shown in Fig. 3.

In the construction shown the cover 20 is provided with a cylindrical shaped portion 22 which extends into the bore of the casing 10 and this portion is provided with the cam slots 23 each of which extends half way around the cylindrical portion. At the opposite sides of the portion 22 are provided the vertical slots 24. The slots 24 are formed to clear the projecting lugs 25 that extend inwardly into the bore of the casing from the opposite walls thereof, as clearly shown in the drawings. In order that the lugs 25 may possess ample strength to prevent liability of the same being broken they preferably constitute pins which are mounted in drill holes formed in the bosses 26 at the opposite sides of the strainer casing. The pins or lugs 25 may be sweated or otherwise rigidly secured in the bosses 26. The arrangement is such that when it is desired to apply the cover 20 to the casing the same is turned to a position in which the vertical slots 24 will clear the inwardly projecting studs 25, then the annular portion 22 of the cover may be inserted into the casing to bring the studs 25 into engagement with the cam slots 23; whereupon rotation of the cover in the direction indicated by the arrow marked "Tighten" will serve to secure the cover in place. A compressible washer 27 of any suitable material is preferably confined between the upper end of the casing 10 and the under face of the cover, to form a liquid-tight joint when the cover is secured in place. It will be noted that the cam slots 23 serve not only to force the cover into tight engagement with the casing, but that when the cover is rotated in the opposite direction these cam slots serve to force the cover away from the upper end of the casing to facilitate its removal. It should also be noted that the shoulder 28 provided at the end of each cam slot 23 serves as a stop to arrest the rotation of the cover in a position in which the slots 24 will clear the studs 25 as the cover is lifted out of engagement with the casing.

As above stated, one of the important features of the invention resides in the construction whereby the cover cannot be removed from the casing until a valve has been operated to cut off the supply of fuel to the strainer casing. The means provided to this end, in accordance with the present invention, consists of a ring valve 29 which is rotatably mounted within the casing 10, and this valve is preferably given the tapered construction shown, to conform to the corresponding taper formed within the bore of the casing. This tapered construction is desirable because it produces a tight joint and readily compensates for wear between the parts. The valve 29 is provided with an elongated opening 30 formed in a side wall thereof, as best shown in Fig. 6, and the arrangement is such that when it is desired to admit fluid to the strainer casing the ring valve 29 is rotated to a position in which the opening 30 lies opposite the inlet port 14. When it is desired to cut off the supply of fluid to the strainer casing, the valve 29 is rotated to turn the opening 30 out of alignment with the port 14.

It is desirable to maintain a constant downward pressure upon the valve 29 to prevent leakage between the same and its tapered bearing seat formed within the casing 10. This is accomplished, in accordance with the present invention, by forming an annular groove 31 within the bore of the casing, which groove constitutes a seat for the portion 32 of a bowed spring best shown in Fig. 7. The opposite ends 33 of this spring are adapted to rest upon the upper face of the valve 29 and are retained in place by the upstanding lugs 34 formed upon the valve. The strainer casing is preferably provided with a pair of springs such as shown in Fig. 7, one being disposed at each side of the valve casing, and these springs

are so constructed that they exert a continuous downward pressure upon the valve 29 to maintain a tight joint between the same and the inner wall of the casing, and also to take up any wear between the parts. When the valve 29 is rotated the bent portion 32 of each spring will simply slide in the groove 31 without springing out of this groove.

It is important that the rotative movement imparted to the cover 20 to secure the cover in place or release it, be imparted to the valve 29, and this is accomplished, in accordance with the present invention, by constructing the lugs 34 upon the valve so that they will project into the slots 24 formed in the opposite faces of the annular portion 22 of the cover. The arrangement is such that when the cover is firmly secured in place the valve 29 will be rotated to the position shown in Fig. 2 wherein it will be seen that the opening 30 of the valve lies opposite the inlet port 14, and when the cover is rotated to its released position the valve 29 will be turned to the position shown in Fig. 4, wherein it will be seen that the lugs 34 lie directly below the studs 25. When the parts are in the position shown in Fig. 4 the opening 30 of the valve is turned away from the inlet port 14. The tension of the springs 32 serves not only to maintain a tight joint between the valve and its bearing seat, but serves also to prevent the valve from being accidentally turned from the position in which it is shown in Fig. 4 while the cover is removed.

The strainer element 19 is preferably given the cylindrical shape shown, and consists of a supporting frame or cage having the cup 35 at its lower end, and the ring 36 at its upper end, which is supported in spaced relation to the cup 35 by the bars 37. The cage thus formed is covered with wire having any desired mesh. It should be noted that the ring valve 29 is so constructed that the strainer element 19 may be moved to and from its operative position by passing the same through the central opening in the ring valve. This construction is desirable because it permits the strainer element to be inserted in the strainer casing and removed therefrom without disturbing the valve 29. When the strainer element is in its operative position as shown in Fig. 2, the ring 36 at the upper end of the strainer element fits closely within the annular space formed by the inwardly extending flange 38, so that dirt and foreign particles are prevented from entering the chamber 39 by passing between the outer wall of the ring 36 and the annular flange 38.

It is desirable that the parts be so constructed that the strainer element 19 may be readily removed from the casing 10 when the cover 20 is removed, and to this end, in accordance with the present invention, the strainer element is continuously urged upwardly by a coiled spring 40 one end of which rests against the bottom of the cup 35 and the other end is seated within the lower portion of the casing 10. The arrangement is such that as soon as the strainer element is released it is forced upwardly by the spring 40 as shown in Fig. 4. The strainer element is normally held in its operative position by the pin 41 which is rigidly secured to the cover and projects downwardly within the strainer casing to engage the cup 35 at the lower end thereof, as will be apparent from Fig. 2. As a result of the construction just described, as long as the cover is in place the strainer element is held in its operative position as shown in Fig. 2, and when the pin 41 is moved out of engagement with the strainer element by the removal of the cover from the casing, the strainer element is automatically forced upwardly to the position shown in Fig. 4 in which it may be readily engaged and lifted out of the casing to be cleaned.

When the strainer forming the subject matter of the present invention is used to remove dirt and foreign particles from oil, water which may be contained in the oil will tend to accumulate in the lower portion of the strainer casing, and it is desirable to provide means for drawing this water off from time to time. This may be done by forming a drain port 42 near the lower end of the chamber 39, but if this port is closed with the ordinary threaded plug, there is a possibility that the person who removes the plug to drain off the water within the strainer casing may neglect to replace the same, in which case the oil within the strainer casing will escape through the port 42. To prevent this unintentional loss of oil or other fluid a valve 43 is preferably mounted within the port 42 and which is so constructed that it is normally held closed by the coiled spring 44, the arrangement being such that water may be drained out of the strainer casing by pressing the valve 43 inwardly, but as soon as this valve is released it will automatically close to prevent the further flow of fluid through the drain port. The projecting end of the valve 43 may be protected by a hollow plug 45 having threads so that it may be screwed into engagement with the casing as shown. This plug should be so constructed that it may be readily removed from the casing when the drain valve 43 is to be opened.

From the foregoing description and accompanying drawings it will be seen that rotation of the cover to remove the same automatically closes the valve to thereby shut off the supply of fuel to the strainer casing, and as a result danger of the fluid flowing into the strainer casing and overflowing at

the upper end thereof while the cover is removed is prevented.

What is claimed is:

1. A strainer comprising in combination, a casing, a removable cover for one end of the casing and adapted to be rotated relatively to the casing in applying and removing the same, a strainer element mounted in the casing, a rotating valve for controlling the supply of fluid to the casing, a spring for yieldingly holding the valve in engagement with its bearing seat and operable to maintain a fluid tight joint between the valve and its seat by continuously urging the valve against its seat, and a driving connection between the cover and valve and adapted to impart the rotative movement of the cover to the valve.

2. A strainer comprising in combination, a casing, a removable cover for one end of the casing and adapted to be rotated relatively to the casing in applying and removing the same, a strainer element mounted in the casing, a rotating valve for controlling the supply of fluid to the casing and having a tapered bearing surface that engages a correspondingly shaped bearing seat, means for continuously urging the valve against its tapered seat to automatically take up wear, and a connection between the cover and valve for imparting the rotative movement of the cover to the valve.

3. A strainer comprising in combination, a casing having a spring receiving groove in its inner wall, a removable cover for one end of the casing and adapted to be rotated relatively to the casing, a rotating valve mounted within the casing to control the supply of fluid to the casing, a spring having a portion seated in said groove and another portion pressing on said valve with a tension that urges the valve against its bearing seat, a strainer element within the casing, and a connection between the cover and valve for imparting the rotative movement of the cover to the valve.

4. A strainer comprising in combination, a casing, a removable cover for one end of the casing and provided with a projecting portion that extends into the casing, cooperating camming elements upon said projection and upon the inner wall of the casing for securing the cover to the casing and adapted to release the cover upon rotation of the same through less than a complete revolution from its tight position, a strainer element in the casing, a rotating valve for controlling the supply of fluid to the casing, and means for imparting the rotative movement of the cover to the valve to turn the latter to and from its closed position.

5. A strainer comprising in combination, a casing, a removable cover for one end of the casing and adapted to be rotated in one direction through less than a complete rotation to secure it to the casing and in the opposite direction through less than a complete rotation to release it from the casing, a strainer element removably mounted within the casing, a rotating valve for controlling the supply of fluid to the casing and positioned between the strainer element and cover, means for imparting the rotative movement of the cover to the valve to actuate the latter, and a spring which is held under tension as long as the strainer element is in place in the casing and which is adapted to eject the strainer element past said valve upon removal of the cover.

6. A strainer comprising in combination, a casing, a removable cover for one end of the casing and adapted to be rotated in one direction to secure it to the casing and in the opposite direction to release it from the casing, a cup-shaped strainer element mounted within the casing, a valve for controlling the supply of fluid to the casing and adapted to be moved to and from its closed position by the rotative movement of the cover, and a post extending from the inner face of the cover into engagement with the lower end of the strainer to hold the latter in place within the casing.

7. A strainer comprising in combination, a casing, a strainer element removably mounted in the casing, a rotating valve for controlling the supply of fluid to the casing, a cover for the casing constructed to be rotated in one direction to secure it to the casing and in the opposite direction to release it from the casing, means for imparting the rotative movement of the cover to the valve to rotate the latter to and from its closed position, and a compressed spring for ejecting the strainer from the casing as the cover is removed and constructed and arranged to impart an initial movement to the strainer as the valve is rotated to its closed position.

8. A strainer comprising in combination, a casing, a removable cover for one end of the casing, camming means cooperating with the cover and casing and adapted upon rotation in one direction to force the cover into tight engagement with the casing and upon rotation in the opposite direction to force the cover away from the casing and adapted to effect both operations upon rotation through an angle of less than a complete revolution, a strainer element in the casing, a valve for controlling the supply of fluid to the casing, means for imparting the rotative movement of the cover to the valve to actuate the latter, and said camming means being arranged so that it is completely housed by the casing when the removable cover is in place.

9. A strainer comprising in combination, a casing having an opening at one end and lugs projecting inwardly from the inner walls of the casing, a removable cover for

said casing rotatable relatively to the casing and having cam slots and vertical slots leading from an end of the cover to the cam slots and constructed to clear the lugs as they are engaged with the cam slots, a valve within the casing for controlling the supply of fluid to the casing and having a projection that extends into one of said vertical slots to effect rotation of the valve upon rotation of the cover, and a strainer element within said casing.

In testimony whereof, I have signed my name to this specification.

GEORGE P. GREGORY.