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SEWER OPENER APPARATUS

Filed July 27, 1959

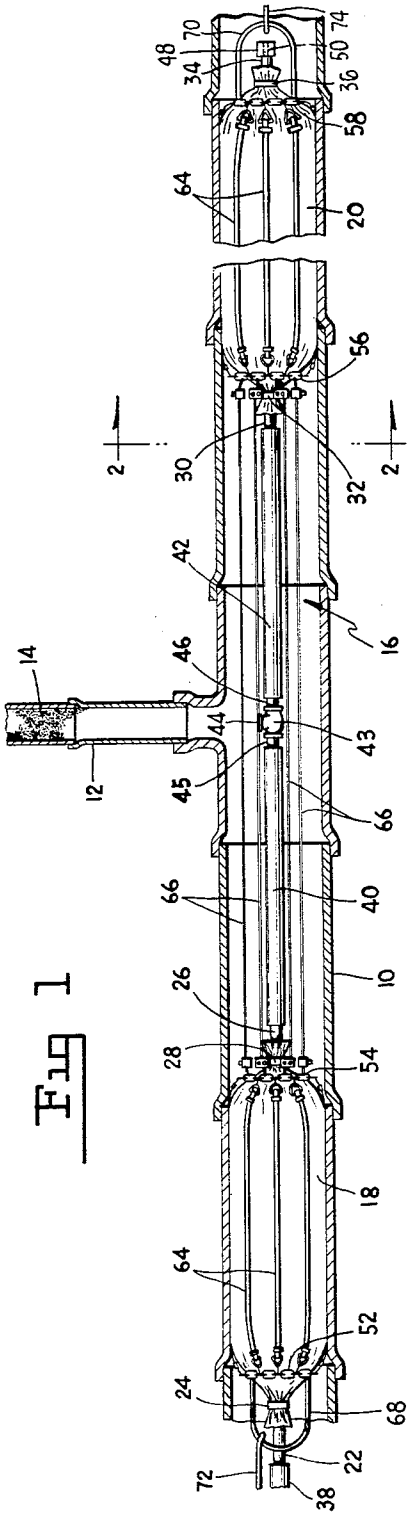


Fig 1

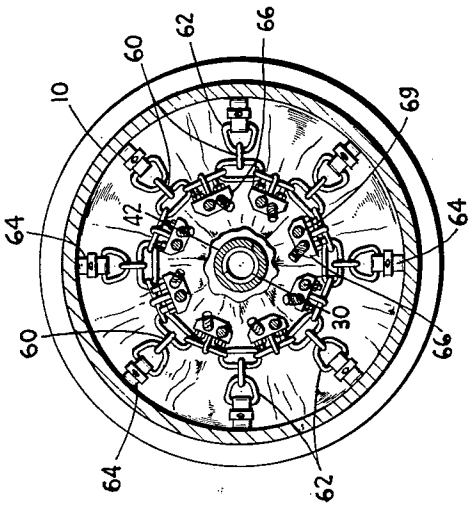


Fig 2

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SEWER OPENER APPARATUS

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This invention relates generally to sewer opening apparatus and pertains more particularly to apparatus of this type that is positioned in the main sewer line adjacent the private service line that requires unblocking.

Various flushing arrangements have been devised for opening sewers. Some of these have involved the use of an expansible bag which is inserted in the private or service line. Air or water is then introduced under pressure which is intended to dislodge the accumulated waste. The prior art devices with which I am familiar force the obstructing matter in the direction of sewage flow. While previous arrangements have met with varying degrees of success in situations where the obstruction can be moved on, oftentimes there are roots, collapsed tile, and the like in the way and offer positive interference. The end result is that the matter is merely compacted more tightly within the service line. Therefore, forcing the blocking matter in a reverse direction possesses a considerable advantage with respect to facility of removal.

Accordingly, one important object is to provide sewer opening apparatus which can be placed in the main sewer line, and which will force fluid under pressure against the blocking matter so that the obstruction is dislodged in a direction opposite the normal sewage flow.

Another object is to provide sewer opening apparatus that can be operated on water pressure coming from an ordinary hydrant, thereby obviating the need for special pumping equipment.

A further object is to provide apparatus of the foregoing character that can be easily inserted and removed from a sewer.

Still another object is to provide apparatus for opening sewers that will be inexpensive to manufacture, simple to use, and of such rugged construction that it will require little or no attention over relatively long periods of use. More specifically, it is an aim of the invention to reinforce in a flexible manner the apparatus so that it can withstand appreciable towing forces when being moved within the sewer.

Another object is to provide a sewer opener that can be put in the sewer from either end, sewage being allowed to pass until the apparatus has been properly positioned and conditioned within the sewer for operation.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application which will be indicated in the appended claims.

In the drawing:

FIGURE 1 is a longitudinal sectional view of a section of main sewer together with a portion of a sewer service line leading therefrom, the apparatus illustrating the present invention being depicted within the main sewer as it would be during actual use, and

FIGURE 2 is a sectional view taken in the direction of line 2—2 of FIGURE 1.

Referring now in detail to the drawing, it will be observed that the main sewer line which is of conventional construction is denoted by the reference numeral 10. Connecting with the main sewer line 10 is a private or service sewer line 12. It will be understood that the service line 12 leads from a private building or home.

Within the private sewer line 12 is an obstruction 14 which is blocking discharge of sewage via the line 12 into the main sewer line 10. It is the obstruction 14 that requires removal.

The sewer opening apparatus exemplifying the instant invention has been designated in its entirety by the reference numeral 16. The apparatus 16 is comprised of a pair of expansible bags 18 and 20, which may be of rubber, plastic or canvas construction. All that is necessary is that the bags 18 and 20 withstand pressures of the magnitude to which they will be subjected in opening the line 12. These bags 18 and 20 are open at each end. Into the left end of the bag 18 extends a pipe nipple 22 which is retained within the left end of this bag by means of a suitable pipe clamp 24. A similar pipe nipple 26 is received in the right end of the bag 18 and is retained in place by the pipe clamp 28. Likewise a nipple 30 extends into the left end of the bag 20 and is retained within this end of the bag by reason of another pipe clamp 32. At the right end of the bag 20 is still another pipe nipple which bears the reference numeral 34, it being held in place by a pipe clamp 36. From the preceding information it will be apparent that each of the bags 18 and 20 is provided with a pipe nipple at each end thereof. It might be explained that the bags 18, 20 will normally be the same size, a small central portion of the bag 20 having been removed.

In the illustrated situation the apparatus 16 is equipped with a flexible hose 38 which is intended to be connected to an appropriate source of fluid pressure such as an ordinary water hydrant. It will be appreciated that a pipe clamp such as one of the clamps 24, 28, 32 or 36 may be utilized in retaining the hose 38 in place on the nipple 22. For the purpose of simplifying the drawing as much as possible it will here be assumed that an appropriate type of cement has been employed in connecting the hose 38 to the pipe nipple 22. Likewise it will be assumed that cement has been employed in connecting a relatively short length of flexible hose 40 to the pipe nipple 26. A second length of flexible hose 42 is connected to the pipe nipple 30 belonging to the bag 20. Intermediate the hose length 40 and 42 is interposed a T fitting 43 having an outlet 44. The T fitting 43 is actually connected to the hose length 40 and 42 through the medium of a short pipe nipple 45 at one end and a similar short pipe nipple 46 at the other end thereof. Disposed on the projecting end of the nipple 34 at the right of the bag 20 is a threaded cap 48 having a small opening or passage 50 extending therethrough. By reason of the passage 50 which is of smaller cross section than the outlet 44 it will be appreciated that only a comparatively small amount of fluid will be permitted to escape via this particular discharge route. More will be said hereinafter concerning the specific role played by the passage 50.

Encircling the left end of the bag 18 is a first ring means 52 and at the other end of the bag 18 is a second ring means 54. Similarly a first ring means 56 encircles the left end of the bag 20 whereas a ring means 58 encircles the right end of this particular bag. While the ring means 52, 54, 56 and 58 have been depicted as a plurality of endless chains, this type of construction being most easily seen from an inspection of FIGURE 2 where the ring means 56 is set forth in detail, it will be of course understood that the ring means in each instance might constitute a solid ring member. Also, as the description progresses it will become apparent that each ring means 52, 54, 56 and 58 should form a relatively small circle in comparison to the diameter of the two bags 18 and 20. This is a desirable aim inasmuch as these ring means are intended to be subjected to a fair amount of pressure and

should not slip over the outer surface of the bags 18 and 20. However, owing to the scale of the apparatus 16 as it appears in FIGURE 1, it is difficult to show with any degree of clarity the preferred relationship as far as the size of these respective ring means 52–58 to the size of the bags 18 and 20. However, FIGURE 2 depicts the relationship in a more practical manner.

As best seen in FIGURE 2, the various ring means 52–58 are provided with radially extending links 60, these links 60 being attached to certain links constituting the ring means 52–58. Looped through the links 60 are additional links 62. In this way provision is made for the attachment of the opposite ends of a group of flexible metal straps 64. From FIGURE 1 it will be discerned that the flexible straps 64 are arranged in two separate and distinct groups. One group of these straps 64 is associated with the bag 18 and extends at angularly spaced locations from the ring means 52 to the ring means 54. In an identical manner a second group of flexible straps 64 extend from the ring means to the ring means 58 of the expansible bag 20.

A somewhat different construction is utilized in reinforcing the region of the apparatus 16 residing between the ring means 54 and the ring means 56. In this situation a group of flexible cables 66 have their ends attached in one instance to the ring means 54 and in the second instance to the ring means 56. The mode of attachment may vary and in the illustrated embodiment it will be perceived that a plurality of cable clamps 69 is utilized, the opposite ends of the cables 66 being reversely bent for a firm anchorage within the respective cable clamps 69.

In addition to serving as anchoring means for the straps 64 the ring means 52 and 58 also have anchored thereto a pair of clevis members 68 and 70. The clevis member 68 which is attached to certain links of the ring means 52 has connected thereto a flexible cable 72 whereas the clevis member 70 which is attached to certain links of the ring means 58 has connected thereto a cable 74. While not illustrated, the cables 72 and 74 extend to winches at opposite ends of the sewer. Stated somewhat differently, the cable 72 would lead to a winch located in one manhole and the cable 74 would lead to a winch situated in a second manhole. At least one of the cables 72 or 74 would be of sufficient length so as to reach from manhole to manhole in order to permit the sewer opener 16 to be initially pulled into the main sewer line 10. It might be explained that the sewer opener 16 can be put into the main sewer line 10 from either end; it makes no difference as to whether the apparatus is moved upstream or downstream, as the bags when not inflated will allow the sewage water to pass by until the apparatus has been properly positioned and inflated in a manner now to be described.

In use the apparatus 16 would be pulled into position in a manner described in the preceding paragraph. In locating the particular service line 12 which is plugged it will be understood that the amount of cable payed out would be determinative of the particular position that the apparatus 16 has been pulled into within the main sewer line 10. Thus, if the blocked service line 12 happens to be a certain distance from one manhole the amount of say cable 72 will determine the particular distance that the apparatus happens to be from that particular service line. It should be pointed out at the outset that an exact positioning such as pictured in FIGURE 1 is not necessary for the hose lengths 40 and 42 will permit considerable leeway. All that is necessary is that one flexible bag 18 reside at one side of the line 12 and that the other flexible bag 20 reside at the other side. In other words, the ring means 54 belonging to the bag 18 may reside subjacent the service line 12, thereby positioning the T fitting 43 a considerable distance to the right of the position in which it appears in FIGURE 1.

Having properly positioned the apparatus 16 within the main sewer line 10, then fluid under pressure is delivered to the bag 18 via the hose 38. As hereinbefore suggested this fluid may constitute water derived from an ordinary hydrant. Owing to the small size of the opening 50 in the cap 48, it will be understood that a relatively small amount of water will escape via this particular route. In other words, the opening 50 offers a passage for the escape of water or fluid but does so in a restricted sense. Consequently, the water will begin to build up within the intermediate region between the bags 18 and 20 inasmuch as the outlet 44 and the T fitting 43 enables the water to pass from the hose 40 directly into the region adjacent the service line 12. What takes place is that any air or gas which is between the T fitting 43 and the obstruction 14 will be compressed. In many situations it is the gaseous pressure acting against the obstruction that loosens it sufficiently so that the service line 12 is quickly unblocked. However, if enough pressure is not built up by the compression of gases within the service line 12, ultimately the full pressure of the liquid arriving through the hose 38 will be applied to the underside of the obstruction 14 and it will be urged upwardly with considerable force. In many instances the waste material that has accumulated will be applied to the underside of the obstruction 14 and it will be urged upwardly with considerable force. In many instances the waste material taht has accumulated will be broken up and dispersed within the fluid so that it does not actually exit via the inlet to the service line 12. However, if the waste material that has accumulated is sufficiently matted it may be ejected out of the entrance to the service line in a ball-like form. It is believed manifest from what has been said herein that should there be roots or tile offering a positive interference with the downward movement of the material 14 that the application of pressure in an upward direction that is opposite to the normal flow of sewage will be considerably more effective in producing the desired dislodgement of the obstruction. Also, it will be obvious that the obstruction 14 may not reside in the vertical portion of the service line 12 but may be farther removed from the main line 10 and actually might be located in a horizontal run of the sewer line 12. It makes no difference where the obstruction is located as the pressure will act on the obstruction 14 wherever it might be located.

In closing it should be emphasized that the foregoing sewer opener 16 is exceedingly durable by reason of the reinforcing members 64 and 66. Due to the employment of these reinforcing members together with their associated anchoring devices, exceedingly high or large forces can be applied to the cables 72 and 74 without damage to the apparatus. By the same taken the pressure exerted by water discharge via the opening 44 into the sewer line 12 will react back on the bags 18 and 20. However, the cables 66 extending between the ring means 54 and 56 assure that the pressural forces so developed by the introduction of liquid into the service line 12 will be properly reacted to. Stated somewhat differently, the hose sections 40 and 42 do not have to withstand the reactive forces developed by the introduction of liquid into the service line 12 through the T fitting 43, for these forces are adequately resisted by reason of the cables 66 as hereinbefore described with greater particularity.

As many changes could be made in the above construction and many apparently widely different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed:

1. Sewer opening apparatus comprising a pair of spaced expansible bags for insertion into a main sewer line, flexible hose means interconnecting the nearer ends of said bags with each other, said hose means having an outlet

intermediate its ends, and means for introducing fluid under pressure into the other end of one of said bags, whereby when said bags have been positioned in said main sewer line to either side of a blocked service sewer line fluid under pressure will exit via said outlet into the service sewer line to unblock said service line.

2. Sewer opening apparatus comprising a pair of spaced expansible bags for insertion into a main sewer line, hose means interconnecting the nearer ends of said bags with each other, said hose means having an outlet intermediate its ends, and means for introducing fluid under pressure into the other end of one of said bags, the other end of the second bag being provided with an outlet of smaller size than said intermediate outlet, whereby when said bags have been positioned in said main sewer line to either side of a blocked service sewer line fluid under pressure will exit via said outlet into the service sewer line to unblock said service line.

3. Sewer opening apparatus comprising a pair of spaced expansible bags for insertion into a main sewer line, hose means interconnecting the nearer ends of said bags with each other, said hose means having an outlet intermediate its ends, means for introducing fluid under pressure into the other end of one of said bags, respective ring means encircling each end of said bags, a first group of flexible reinforcing elements extending between the two ring means of said one bag, a second group of flexible reinforcing elements extending between the two ring means of said second bag, and a third group of flexible reinforcing elements extending between the nearer two ring means of said bags.

4. Sewer opening apparatus in accordance with claim 3 including a pair of clevis members having their respective ends connected to the farther apart ring means of each bag, and a cable attached to each clevis so that said bags may be moved in either direction within the main sewer line.

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