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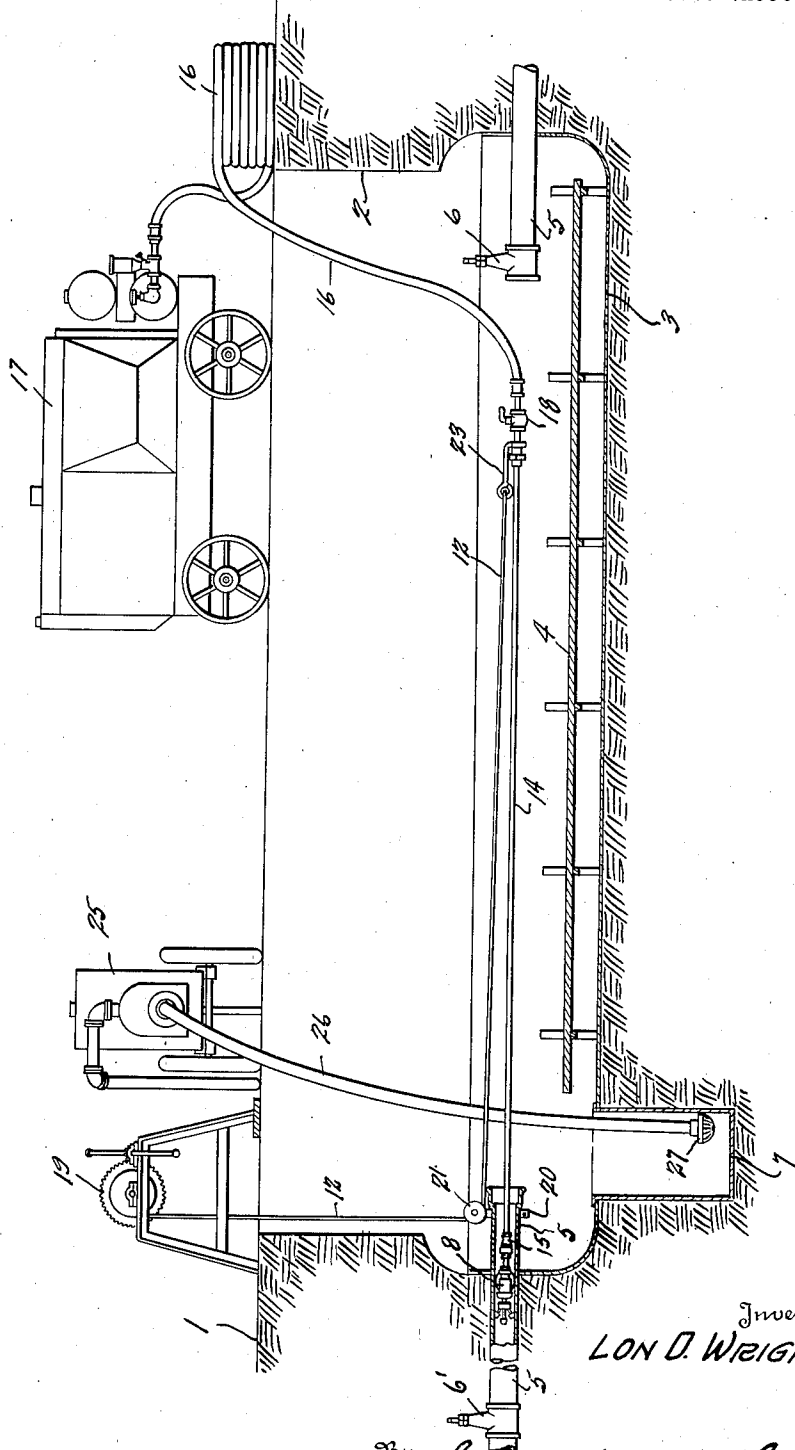
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SAFETY DEVICE FOR AN APPARATUS FOR CLEANING WATER MAINS

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2 Sheets-Sheet 1

FIG. 1.



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SAFETY DEVICE FOR AN APPARATUS FOR
CLEANING WATER MAINS

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4 Claims. (Cl. 15—104.12)

This invention relates to an apparatus for removing deposits or incrustations from the interior of water mains, and more particularly to an apparatus having a valve arrangement which will prevent foreign matter from entering the interior of the apparatus.

The present invention is generally similar to the invention disclosed in my copending application Serial Number 91,752, filed July 21, 1936, but constitutes an improvement thereover.

An object of my invention is to provide a safety device for water main cleaning apparatus which will prevent injury to the apparatus.

Another object of my invention is to provide an air driven motor for a cutting tool which is provided with means for preventing injury to the air motor.

A still further object of my invention is to provide an air driven cutting tool for cleaning water mains which is provided with a valve for preventing foreign matter from entering the air motor.

Yet another object of my invention is to provide a method and apparatus for cleaning water mains which greatly reduces the time during which the main must be out of service and which is highly efficient and yet inexpensive.

Still another object of my invention is to provide an apparatus for removing deposits or incrustations from the interior of water mains by accelerating the counter-flow of water so as to expel periodically great quantities of water and sediment with great force.

With the above and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement without departing from the spirit and scope of the annexed claims.

In order to render my invention more clearly understood, there is shown in the accompanying drawings means for carrying the same into practical effect without limiting the improvements in their useful application to the particular constructions, which for the purpose of explanation have been made the subject of illustration.

In the drawings:

Figure 1 is a longitudinal section of a cut showing the location of the various elements constituting my invention.

Figure 2 is an elevational view partly in sec-

tion showing my invention in position within a water main.

Figure 3 is a fragmentary sectional view showing the details of my check valve.

Figure 4 is a view taken along line 4—4 of Figure 3 looking in the direction of the arrows.

Referring to the drawings and more particularly to Figure 1, there is shown a road or street surface 1 having a cut or ditch 2 made at the point where it is desired to open the main. A metallic trough 3 is provided for the floor of the ditch so as to prevent caving or washing in of the ditch and a run-way 4 is suitably supported therein for providing a dry surface for resting additional sections of pipe or other equipment.

The water main to be cleaned is depicted generally by the numeral 5. As clearly shown, a section or sufficient portion of the main is removed so that the cleaning mechanism may be inserted therein and propelled therethrough. Water gate valves 6 of any desired construction are interposed in the main for regulating the flow of water.

A barrel 7 is imbedded below the floor of the ditch and is so positioned as to lie beneath the open end of the main. Manifestly, the barrel will serve as a trap for receiving the sediment and water from the main.

The mechanism which I propose to employ for removing the deposits from the interior of the main is an air driven turbine shown at 8. I have found that better results are obtained if the turbine is of a type which will permit the use of various kinds of cutting heads.

By referring to Figure 2, it can be seen that the turbine 8 is composed of an air motor 9 provided with a cutting mechanism 10 which is driven by the motor through shaft 11. Suitably affixed to the turbine and positioned rearwardly of the cutting mechanism is a cup shaped deflector 12 which is adapted to turn the exhaust air into the direction of the flow of water in the main. This feature is of great importance as it will enable the entire circumference of the main to be thoroughly cleaned.

A plurality of spring-like members 13 are fixed to the turbine so as to hold the same in place within the main so that it will get the proper locations for cutting. I have found that the use of four such members serves adequately for this purpose.

The turbine 8 is moved through the main by the use of sections of rigid hollow pipe shown at 14. The pipe not only permits the pushing

of the turbine through the main, but also provides a suitable duct for the air pressure necessary for the proper operation of the air motor 9.

A check valve construction depicted at 15 is secured to the pipe section 14 immediately in rear of the turbine and a detailed discussion of the valve will be hereinafter gone into.

The manner in which the main is cleaned is best shown in Figure 1. The free end of the pipe 14 is attached to a flexible air hose 16 which in turn is secured to an air compressor 17. The air compressor is of such capacity as to supply continuously pressure to the turbine for properly operating the cutting mechanism.

The end of the hose 16 which is secured to the pipe section 14 is provided with a suitable stop valve 18 which will enable the cutting off of the air hose from the pipe section while another section of pipe is added for permitting the turbine to be pushed further into the main.

The turbine 8 can be best moved through the main by use of the principles of leverage. It is to be understood, however, that I do not restrict myself solely to such means. A winch mechanism 19 is located adjacent the ditch for pushing the pipe sections through the main and this mechanism can be of any desired construction, and it is desirable that the mechanism be operated manually as the person operating the same can, by the feel and sound of the progress of the turbine control it more readily and obtain better results than where it is pushed through at an exactly uniform rate, as would be the case if operated by machinery.

A sheave 20 carrying a pulley 21 is detachably secured to the open end of the main 5. A cable 22 connected to the winch 19 is guided over the pulley 21 and is attached to a pulling hook 23. The pulling hook 23 is so designed as to fit over the end of the pipe section 14. It is believed readily apparent that by turning the winch 19 the air turbine will be impelled through the main by the pipe sections 14.

As hereinbefore set forth, the turbine is moved through the main in counter-direction to the flow of water. By regulation of the gate valve 6' in the main a sufficient amount of water is allowed to pass through the main, to carry off the sediment removed by the cutters.

The deflector 12 positioned rearwardly of the cutters 10 will turn the exhaust air into the direction of flow of the water. This exhaust air will greatly speed up the counter-flow of the water behind the turbine which will result in periodic expulsions of large quantities of sediment and water with great force. In other words, the exhaust air will form pockets and from time to time these pockets will build up sufficient pressure to expel all of the water and the sediment from the main. The exhaust in these pockets apparently operates on the principle by which natural geysers accumulate pressure in pockets in their channels and when this pressure reaches a certain point the water is blown out with great force.

The above expulsions of water and sediment have proven of invaluable assistance as the discharge of water in this manner carries all of the sediment with it and has removed all doubt as to the manner in which solid material cut from the mains could be removed.

The water and sediment removed from the main will be discharged into the barrel 4 and any over-flow therefrom will be trapped in the trough

3. A suitable water pumping apparatus 25 hav-

ing the usual hose 26 and strainer 27 is employed for removing the water from the ditch.

Obviously, when the pressure at the rear of the motor is equal to or greater than the pressure in the front of the motor, no foreign matter can enter the interior of the motor. I found that when it became necessary to uncouple the pipe and add additional sections to impel the turbine farther through the main the accumulation of air in front of the motor forces the water, together with the sediment, back through the motor thereby damaging it. Moreover, if there should be any leakage in the pipe couplings, or in the hose connecting the pipe section 14 with the air compressor, this difficulty is also present. To overcome these defects I provide a check valve 15. As clearly shown in Figure 3, the check valve 15 comprises a coupling 28 provided with interior screw threads 29 adapted to be screwed onto the end of a section of pipe 30 affixed to the turbine 8. The opposite end of the coupling 28 is provided with a spider 31 having a bore 32. An extension 33 is adapted to be screwed onto an exteriorly threaded portion 34 of the coupling 28. Suitable securing means, for instance a screw 35, affixes the extension to the valve head. Threaded onto the extension 33 as shown at 36 is a valve casing 37 which is held in proper position with respect to the extension 33 by a screw 38. The threaded end of the rigid pipe 14 is adapted to be screwed into the free end of the casing 37, as shown at 39.

A valve stem 40 provided with a valve 41 is journaled at one end in the bore 32 and at the opposite end in a bore 42 provided in the valve casing 37. It can be seen that the interior of the valve casing 37 is so fabricated as to provide a valve seat 43 for the valve 41. A coil spring 44 fitted around the valve stem 40 has one end thereof bearing against the spider 31 and the other end bearing against the valve 41. Obviously, the spring 44 tends to hold normally the valve 41 against its seat 43. However, when air is directed through the duct 14 the valve 41 would be lifted from its seat 43 against the action of the spring 44 and thus permit the air to enter the turbine 8. When the air pressure in the pipe 14 is relieved, the valve 41 would be forced back against the seat 43 by the action of the spring 44. Therefore, the valve construction 15 will prevent water and foreign matter from being forced back into the motor when the air pressure behind the motor is relieved as would be necessary when it is desired to add another section of pipe to enable the turbine to be impelled further through the main 5.

The advantages of the present invention are believed obvious from the foregoing description. The use of the check valve will positively prevent any injury to the motor. Moreover, the valve can be easily attached to and removed from the cleaning apparatus for the purpose of repair, replacement and cleaning. In addition, it is composed of relatively few working parts and can be easily and cheaply manufactured.

While I have shown and described the preferred embodiment of my invention I wish it to be understood that I do not confine myself to the precise details of construction herein set forth by way of illustration, as it is obvious that many changes and variations will be made therein by those skilled in the art without departing from the spirit of the invention or exceeding the scope of the appended claims.

I claim:

1. An apparatus for removing incrustations and deposits from the interior of water mains comprising a fluid driven motor, a cutting mechanism driven by the motor, a conduit for supplying a fluid to the motor and a check valve in said conduit adapted to prevent a flow of fluid from the motor toward said valve.

2. An apparatus for removing incrustations and deposits from the interior of water mains comprising a fluid operated motor, a cutting mechanism driven by the motor, a conduit for supplying fluid to the motor, means for discharging exhausted fluid from the motor, and means including a check valve tending to prevent the entrance of foreign matter to the motor when the latter is not operating.

3. An apparatus for cleaning pipes and adapted to operate when the pipe contains water, com-

prising an air-operated motor, a cutting element driven by the motor, a conduit for supplying air to the motor, and means in the conduit permitting passage of air toward the motor but preventing passage in the opposite direction.

4. An apparatus for cleaning pipes comprising an air turbine, a cutting element driven by the turbine, a conduit for supplying air to the motor and consisting of a plurality of sections of relatively inflexible pipe, said conduit serving to advance the turbine within the pipe being cleaned, a check valve in the conduit adjacent the turbine, and discharge ports in the motor, said discharge ports together with the check valve, tending to retain air within the motor when the latter is not operating and when the discharge ports are submerged in a liquid.

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