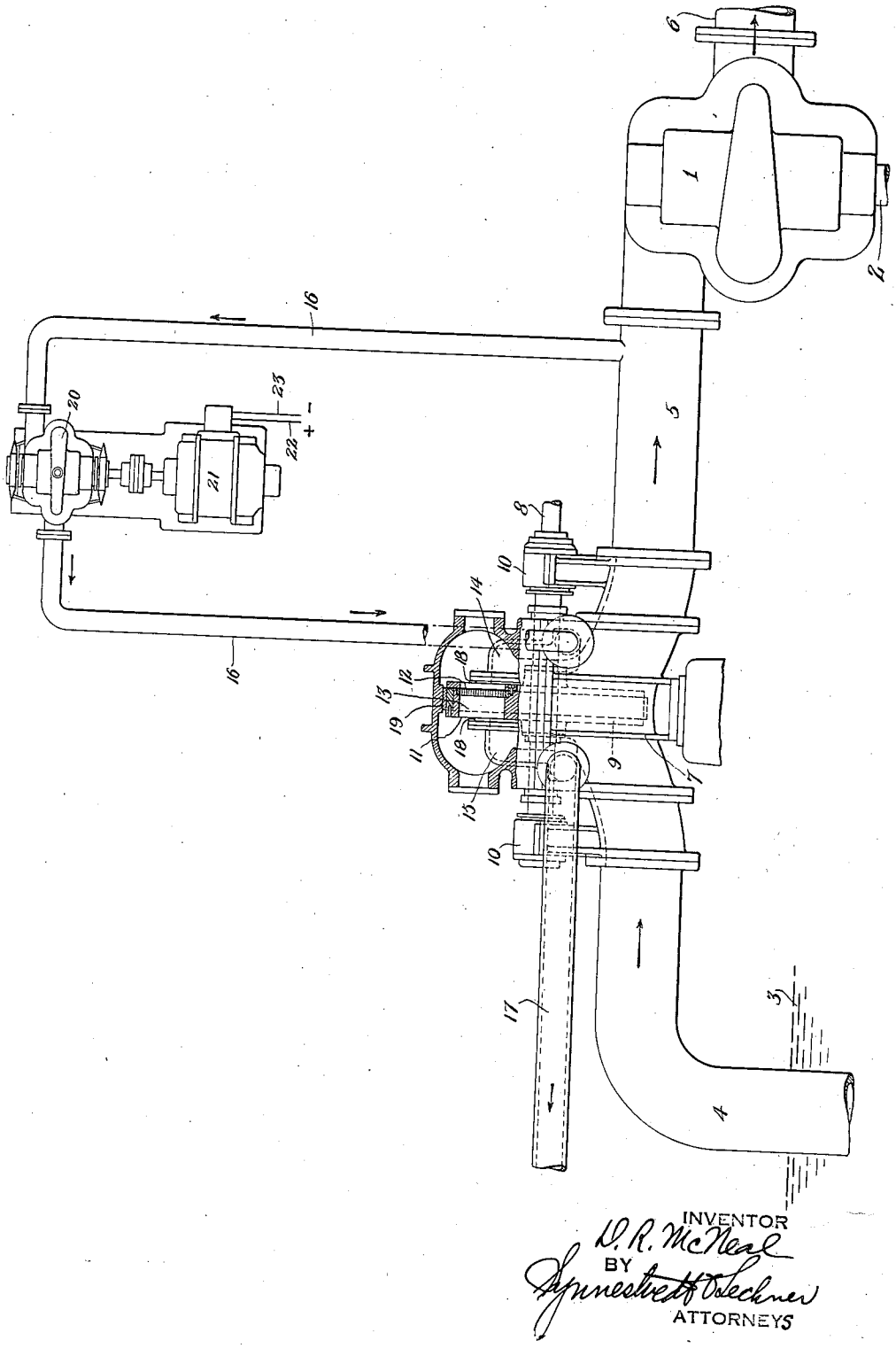
Dec. 23, 1941. D. R. McNEAL 2,266,980

STRAINING EQUIPMENT

Filed Sept. 21, 1939



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Patented Dec. 23, 1941 2,266,980

UNITED STATES PATENT OFFICE

2,266,980

STRAINING EQUIPMENT

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Application September 21, 1939, Serial No. 295,861

2 Claims. (Cl. 210—152)

This invention relates to straining equipment, and is particularly useful in water supply systems for large industrial plants which draw directly from a river or other source of supply which may be burdened with considerable quantities of rubbish, such as sticks, leaves, and trash of one kind or another.

In systems of this kind it is customary to strain the water as it is drawn from the river by means of some suitable continuously operating strainer device which can be cleaned while the system is in operation, so as to avoid all interruptions to the supply. The strainers customarily employed make use of a straining element which is composed of a plurality of sections which may be successively isolated and removed from service and cleaned by reversal of fluid flow without interrupting the service through the balance of the straining sections. Strainers of the kind specified may take various forms, but the best exemplification thereof is probably the rotary type of strainer shown, for example, in my Patent 2,057,497, in view of which the invention of the present application will be shown and described as embodied in a rotary strainer of this kind.

The principal object of the invention is to ensure a positive and constant supply of water which is thoroughly cleaned by means of a strainer of the character described. In attaining this object it is my aim to avoid all possibility of air entering the suction line of the main pump, which is a difficulty not infrequently encountered with present systems. It is also an object of the invention to avoid the necessity for introducing a valve in the wash water or cleaning fluid supply line, although such a valve may be employed if desired. However, by eliminating a valve at this point, it is possible to simplify the installation and reduce its cost, which is a distinct advantage, particularly in large capacity systems where valves for this purpose would have to be unusually large and expensive.

Still another object of the invention is to provide a system in which a supplementary or booster pump is employed for maintaining the proper pressure in the straining unit and particularly in that portion of the straining unit which is being subjected to a cleaning operation.

Another object is to so arrange the installation as to avoid all possibility of reverse operation of the booster pump, i. e., operation thereof under the influence of pressure from the source of wash water supply. This has sometimes occurred in previous installations where the wash water is taken from the discharge side of the main pump. In attaining this objective I propose to take the supply of wash water from the suction side of the main pump where the pressure is normally somewhat less than atmospheric.

A still further object of the invention resides in the provision of a system in which only a comparatively short line is required for bringing the wash water supply to the clean-out section of the strainer.

By my invention I also provide for a flow of wash water which is more uniform in pressure, regardless of variations in the demand for water by the system as a whole, and, at the same time, I make it possible to have the supply of water to the main system entirely independent of the highly varying wash water requirements.

In summary, it is the aim of my invention to provide for more dependable service of the kind described and at a minimum of installation and maintenance cost.

The foregoing objects, together with such other objects as may appear hereinafter, or are incident to my invention, are obtained by means of a system which is illustrated somewhat diagrammatically but in preferred arrangement in the accompanying drawing wherein the figure illustrates the principal parts of my improved system including a rotary strainer of the type disclosed in the above mentioned patents, the upper portion of which is broken away to illustrate certain details in section.

In the drawing, the main pump 1, operated by any suitable power means through the shaft 2, draws its supply from the river 3 through the suction line 4, 5, and delivers it to the point or points of use through the delivery line 6, the direction of flow being indicated by the arrows in the pipes 4, 5, and 6. Between the sections 4 and 5 of the suction line I introduce a rotary strainer 7 of the type which is fully described and claimed in my earlier patent above mentioned. Inasmuch as the strainer 7 is located in the suction line 4, 5, it is obvious that the pressure existing in the suction line will be the pressure which will exist in the strainer casing and this is a somewhat negative pressure, i. e., a pressure less than atmospheric.

The strainer 7 comprises a suitable casing in which is mounted upon a shaft 8 a rotary straining wheel 9. The shaft 8 is carried in bearings 10 and, through the medium of any suitable source of power, the shaft 8 is used to slowly rotate the strainer wheel 9 in a manner well understood in this art.

The straining wheel 9, as is more fully illustrated and described in my earlier Patent 2,057,497, is provided with a series of spokes or radial division members 11 between which are carried suitable straining elements 12 of any desired character. In the figure these elements are shown as being located to the right of the center of the straining wheel 9 in order to provide a series of straining pockets 13 between the spokes 11, in which pockets the debris may collect. As the wheel rotates, the straining pockets are successively brought between the oppositely disposed clean-out boxes 14 and 15, in which position fluid may be applied in a reverse direction to wash or clean the straining elements, the cleaning fluid coming in through the supply pipe 16 and passing out through the line 17 which is arranged to discharge into the river or other source of supply at a point well away from the suction line 4. There are suitable passages within the strainer casing for conveying the clean-out water to and away from the clean-out boxes which need not be particularly described because in and of themselves they are well known in the art and form no part of the present invention.

The faces of the wheel 9, where they come opposite the clean-out boxes 14 and 15, are tightly sealed by means of suitable resilient or rubber gasket means 18, the nature and function of which are more fully illustrated and described in my patent already referred to. Suffice it to say for the present application that these sealing devices 18 effectively prevent leakage of fluid in either direction between the straining circulation and the wash circulation, the former circulation taking place from the section 4 to the section 5 of the suction line through all of those straining pockets which are not in line with the clean-out boxes 14 and 15. The wheel 9 is sealed at its periphery by means of a suitable sealing device 19, so that the water or fluid to be strained may not pass from one side to the other, except through the strainer. In other words, the water which is being strained enters at 4, passes through the straining wheel 9 over that area which is not opposite the clean-out boxes 14 and 15 and then leaves through the pipe 5. At the same time, the wash water enters through the pipe 16 and then passes from the clean-out box 14 to the clean-out box 15 after traversing the straining element which is in position between the two boxes, the direction of flow of the wash water, of course, being opposite to that which takes place in that portion of the strainer which is effecting the straining operation. The direction of flow is indicated by the arrows.

It will be noted that the wash water pipe 16 receives its supply from the suction line 5 at a point between the strainer 7 and the main pump 1. In the wash water supply line 16 is a booster pump 20 driven in any suitable manner, preferably by means of the electric motor 21 having the current supply lines 22 and 23.

Whenever the main pump 1 is operating to deliver water to the supply system, the motor 21 should be operated to run the pump 20 in order to supply cleaning fluid to wash out the collected debris, and the speed of operation of the pump 20 must be such as to develop a pressure higher than atmospheric in the clean-out boxes 14—15 and the wash water discharge line 17. This avoids all possibility of air entering the line 17 and interfering with the proper functioning of the main pump 1, in which connection it must not be overlooked that as the strainer wheel 9 rotates, it carries whatever pressure may exist in the suction line 4—5 over into the wash box section 14—15. It will be seen, therefore, that in the absence of the pump 20 by means of which a positive pressure can be supplied to the boxes 14—15, it would be possible for atmospheric pressure from the discharge pipe 17 to enter the wash box section 14—15 and be carried back into the straining section as the wheel 9 continues its rotation. This air would, of course, interfere with the proper functioning of the pump 1. My invention completely eliminates this difficulty.

As will be readily understood by those skilled in this art, my improvements make it possible to achieve the objectives set forth in the beginning of this specification, but it might be pointed out that, in service, the pressure in the delivery 6 will vary over a considerable range, depending upon the demand for water. If the wash water pipe 16 were to be supplied from the pipe 6, as has been customary in this art, these variations would have a direct bearing upon the uniformity of the cleaning operation.

With my invention, however, this difficulty does not arise. Furthermore, if the wash water pipe 16 were to be supplied from the pipe 6, it would be essential that some sort of a valve be introduced into the line 16 in addition to the booster pump 20, because without such a valve it would be impossible to positively close off the line 16 so that at times of relatively high pressure in the line 6 it might sometimes happen that the booster pump 20 would be run in reverse direction under the influence of the flow of water from pipe 6 through pipe 16. The necessity for such a valve in the pipe 16 is overcome by my invention, although a valve may be introduced for the purpose of completely shutting off the line 16 should it be necessary to remove the pump 20 for repair or replacement. Such a shut-off valve, however, need not be particularly expensive because it is not necessary to operate it automatically as is required for satisfactory operation of the system when the pipe 16 is fed from the pipe 6.

Another distinct advantage incident to my invention is to be found in the fact that the supply line 16 can be made extremely short whereas it might very well have to be unduly long were it to be supplied from the pipe 6 because the main pump 1 is frequently located at a considerable distance from the strainer 7. In fact, a series of main pumps may be necessary in extensive installations, and if the supply is to be taken from the discharge side of the main pump system it is obvious that a much longer supply pipe 16 would have to be employed.

In short it will be seen that my improvements make possible the provision of an entirely uniform pressure of cleaning fluid, regardless of all variations in the demand for water by the system as a whole and this in spite of the fact that the wash water supply is taken from a point in advance of the main pump where the pressure during operation of the system is less than atmospheric. At the same time I provide a system in which the main supply is independent of the highly varying demand for wash water.

What I claim is:

1. In a fluid supply system, the combination of a strainer casing having an inlet line and an outlet line, a main pump in the outlet line for drawing the fluid through the strainer casing, a rotary strainer member arranged in the path of flow through said strainer casing, a pair of oppositely disposed clean-out boxes adjacent the path of

movement of said rotary member, a line for supplying washing fluid to one of said clean-out boxes and discharging it through the other, said washing fluid supply line being connected to the outlet line of the strainer casing at a point between the strainer and the pump in said outlet line, the direction of flow of the washing fluid through the strainer being opposite to the direction of flow of the fluid being cleaned, together with a booster pump in the washing fluid supply line adapted to circulate the cleaning fluid and maintain its pressure at a point above atmospheric pressure.

2. In a fluid supply system having a continuously operating straining equipment wherein the strainer includes a plurality of sections which may be successively isolated and cleaned by reversal of fluid flow without interruption of service through the remaining sections, the combination of a main pump and a suction line for drawing the fluid through the strainer, a line for supplying washing fluid to the isolated strainer section, said last line being connected to said suction line at a point between the strainer and the main pump, and a booster pump in the washing fluid supply line adapted to circulate the washing fluid and maintain its pressure at a point above atmospheric pressure.

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