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E. P. HOLLY.

LIQUID IMPELLING DEVICE.

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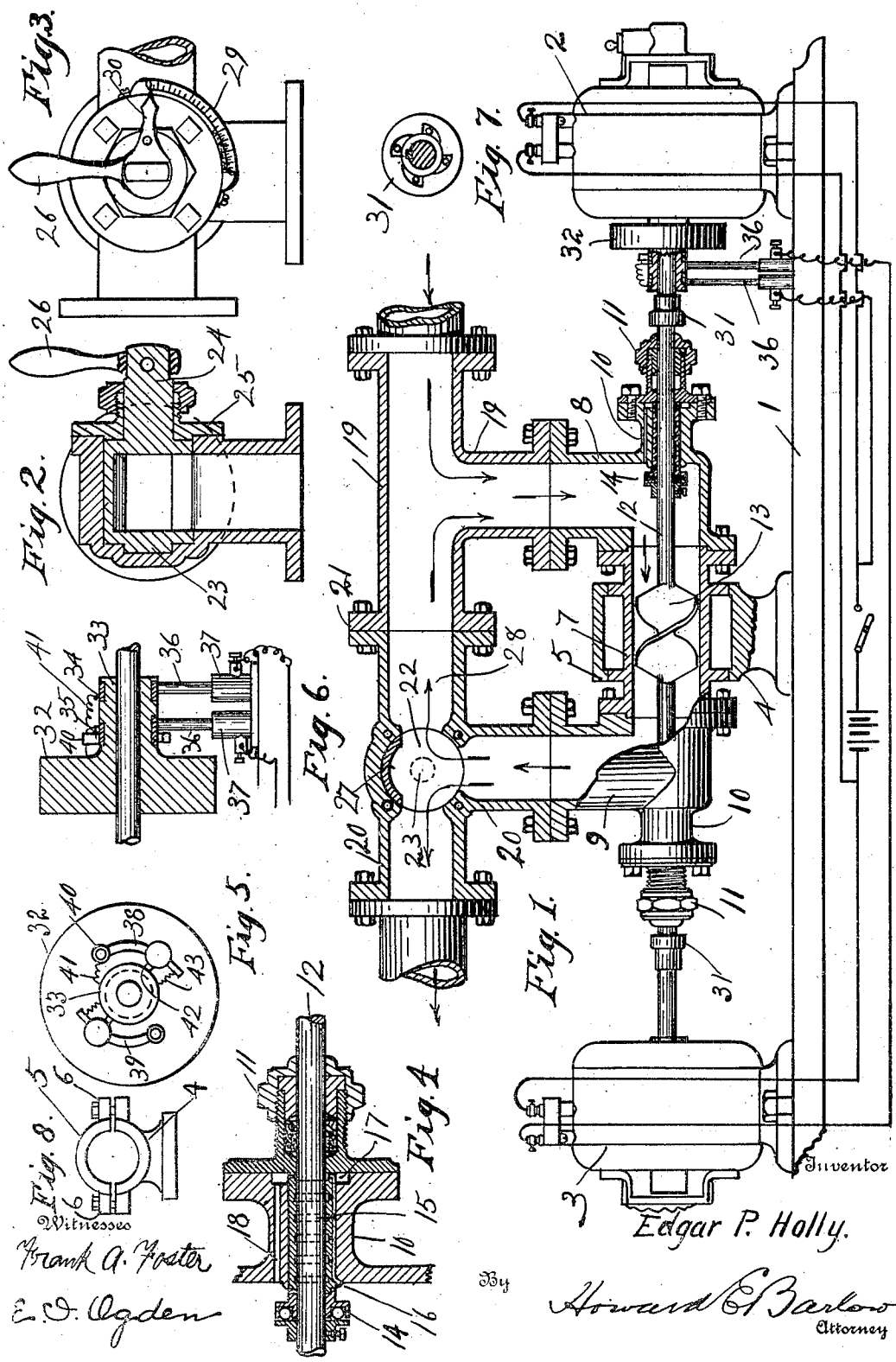

UNITED STATES PATENT OFFICE.

EDGAR PRENTICE HOLLY, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO WILLIAM W. CASTLE, OF EAST WEYMOUTH, MASSACHUSETTS.

LIQUID-IMPELLING DEVICE.

No. 825,652. Specification of Letters Patent. Patented July 10, 1906.

Application filed July 10, 1905. Serial No. 268,904.

To all whom it may concern:

Be it known that I, EDGAR PRENTICE HOLLY, a citizen of the United States, residing at the city of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Liquid-Impelling Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to pumps or impelling devices for forcing liquids through pipes.

The object of the invention is to provide a simple and practical device to be inserted into a system of piping to force or stimulate the flow of liquids through said system by the action of a rapidly-revolving screw or propeller to work without the use of valves or other reciprocating parts.

The device is particularly useful in stimulating the circulation of condensed steam in power-plants, to facilitate the circulating of hot water for heating greenhouses where the drop or pitch of the pipes is not sufficient for the practical operation of such a system without the use of a stimulator, and also in the heating system of large public buildings—such as hospitals, schools, and the like—where by the use of my device the hot-water heating system is made much more efficient.

The device is composed, essentially, of a motor-driven screw-propeller mounted in a cylinder and a controlling valve and system of piping arranged to control the amount of pumped liquid to be forced through the system. The device is so arranged that the propeller may run continually and at a constant speed and by the setting of the said valve any desired portion of the liquid passing through said propeller may be forced through the system and the balance returned through a by-pass to be pumped over again.

The invention is fully set forth in this specification and more particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of my propeller and circulating-controlling device, showing the controlling-valve and by-pass through which the liquid may return to be circulated again. Fig. 2 is a side elevation of the controlling-valve in section. Fig. 3 is a front elevation of the valve, showing the pointer and graduated segment to facilitate the setting of the valve. Fig. 4 is a detailed view in section of the thrust-bearing of the shaft, showing means for lubricating the same. Fig. 5 is a front elevation showing the contact-arms which are actuated to make the electric circuit and start the motor on the opposite end of the shaft when the motor, to which these arms are connected, ceases to rotate. Fig. 6 is a sectional view of the device illustrated in Fig. 5, showing the contacts. Fig. 7 is a front elevation of the roll-clutch which automatically engages the shaft when the motor to which it is attached rotates. Fig. 8 is a side elevation showing a small detail view of the main supporting-standard, showing the bolted cap for binding the propeller-cylinder in position.

Referring to the drawings, 1 is a common base-plate on which the two driving-motors 2 and 3 and the other operating mechanism are mounted. At 4 is the central or main supporting-standard secured to the base and provided with a cap 5, bolted through the ears 6 6 (see Fig. 8) to bind and hold the cylinder 7, which rests within it. This cylinder is provided at one end with a right-angle-inlet connection 8 and at its opposite end with a similar connection 9 for the discharge, each of these fittings being provided with bearings 10 10 and packing-glands 11 11, through which bearings and glands the shaft 12 of the propeller 13 passes.

The essential feature of this propeller 13 is that it is formed like a double helicoid or screw, which is something after the manner of a marine propeller-wheel. This propeller may be made separate and mounted on the shaft, or it may be made integral with said shaft, as shown in the drawings. In either case it is held to turn freely with the shaft in said cylinder. Where the shaft 12 passes out through the bearing 10 on the inlet side it is provided with a ball thrust-bearing 14. The main bearings at both ends are lubricated by the liquid in the system. This liquid passes in through the inlet-duct 16 and circulates through the plurality of lubricating-rings 15, that surround the shaft. The lubricant then runs along to the chamber 17 and returns to the main chamber through the passage 18, thereby thoroughly lubricating the rapidly-revolving shaft, keeping the same cool by constant circulation around it. Connected to the outwardly-turned end of the right-angle fitting 8 is the inlet T-fitting 19,

and a similar T-fitting 20 is connected to the outlet-elbow 9. These two T-fittings are connected together at 21 to form a continuous passage or by-pass through which the liquid not forced through the system may return by a short course back to the propeller, to be pumped over again. Located at the intersecting point of the three branches of the T in the discharge-channel is the rotatable valve 22. This valve is cut away on its interior, with the exception of the wall portion 27, which is left of sufficient width to either open wide or completely shut off the return passage-way or by-pass 28 when desired.

The barrel of the valve has a bearing at its rear end 23 and is also provided with a stem 24, projecting outward from its front end through the plate 25, and to this stem is connected the actuating-handle 26. In order to facilitate the setting of the valve to any given amount of opening, I have fixed the graduated segment 29 to the casing and connected the pointer 30 to the stem.

The propeller 13 may be driven in any convenient manner; but it is preferably driven at a high velocity direct by an electric motor; and in cases where it is absolutely necessary that the operation be continuous and uninterrupted the motors 2 and 3 are both connected one to each end of the propeller-shaft through the ball or roll clutch 31. (See Fig. 7.) When thus connected, the circuits of the motors are so arranged that the stopping of one motor automatically completes the circuit and starts the other motor. To do this, a pulley or disk 32, of non-conducting material, is provided, having a hub 33 extending out therefrom. (See Fig. 6.) Around this hub are two bands of conducting material 34 and 35, insulated from each other. At 36 36 are two contact-fingers which connect the binding-posts 37 37 with said bands. On this pulley 32 is pivotally mounted a pair of arms 38 and 39. The arm 38 is connected from its pivoting point 40 with the band 34 on the hub by the wire 41, (see Fig. 5,) while the opposite end of said arm makes a connection to the band 35 through the contact-point 42 when the pulley is at rest and said arm is drawn down by the spring 43 against said band, thus completing the electrical circuit, and the motor on the opposite end of the shaft is started up. The arm 39 is an exact duplication of arm 38 and serves only to balance the pulley when running.

The operation of the device may be further described as follows: The construction of this device renders it well adapted to be readily connected to any circulation system, and with the expenditure of but a small amount of power the circulation through the system may be stimulated and made as rapid as desired. The cylinder 4, in which the propeller runs, is mounted in the supporting-standard in such a manner that it may be conveniently turned therein to swing the discharge and inlet line of pipe off at any angle to readily accommodate itself to the varying conditions under which the device may be installed.

An essential feature of this device is the convenient arrangement by which the quantity of discharge may be regulated to deliver the required amount. It is often necessary that this quantity be varied to allow a greater or less flow, also to adjust the same quickly. In most cases it is not convenient or practical to regulate the quantity by changing the driving speed of the propeller, and therefore as a simple and practical method of obtaining this result I have arranged a by-pass or short return-channel and set a valve to control the opening to the same. When it is desired that the total amount propelled shall be forced through the system, the by-pass is completely closed by the valve; but when only a portion of the contents is to be forced through the system the valve is moved by the handle 26 to the desired position indicated by the pointer on the graduated segment. The amount passing through this by-pass returns to the propeller to be pumped over again, and thus the amount forced through the system may be nicely controlled while the propeller is being driven at a constant speed.

My invention is not restricted to the precise construction and arrangement of parts herein shown and described, nor to the various details thereof, as the same may be modified or rearranged in various particulars without departing from the spirit and scope of my invention, one practical embodiment of which has been herein illustrated and described without attempting to show all of the various forms and modifications in which my invention might be embodied.

The device is extremely simple and practical in construction and efficient in its operation.

It will be noted that in this application I am not specifically claiming the helical impelling device, nor am I making specific claims to the motors and the means whereby one motor is automatically started by reason of the failure in operation of the other motor. Said elements form the subject-matter of a separate application filed by me March 22, 1904, Serial No. 199,411, and are specifically claimed therein.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a system of piping through which fluid is designed to flow, of a cylinder having its ends connecting the supply and discharge ends of said system, a mechanically-actuated impelling device located within said cylinder, means for regulating the quantity of fluid impelled through said system, and means for maintaining a

normally uniform speed of said impelling device irrespective of the quantity of fluid passing through the system.

2. The combination with a system of piping through which fluid is designed to flow, of a cylinder having its ends connecting the supply and discharge ends of said system, a helical rotatable impelling device located within said cylinder, means for regulating the quantity of fluid impelled through said system, and means for maintaining a normally uniform speed of rotation of said impelling device irrespective of the quantity of fluid passing through the system.

3. The combination of a system of piping through which fluid is designed to flow, a cylinder connecting the supply and discharge ends of said system, a mechanically-actuated impelling device located within said cylinder, a by-pass also connecting said supply and discharge ends, means for simultaneously varying the quantity of fluid entering said by-pass and said supply end, and means for maintaining a normally uniform speed of said impelling device irrespective of the quantity of fluid passing through said system.

4. The combination with a system of piping through which fluid is designed to flow, of a cylinder connecting the supply and discharge ends of said system, a mechanically-actuated impelling device located within said cylinder, a by-pass also connecting said supply and discharge ends, a valve placed at the intersection of said by-pass and said discharge end for simultaneously varying the quantity of fluid entering said by-pass and supply end, respectively, and means for maintaining a uniform speed of said impelling device irrespective of the quantity of fluid passing through said system.

5. A device of the character described comprising a casing, an impelling device mounted therein, an inlet and an outlet to said casing, a discharge-pipe communicating with said outlet, a by-pass connecting said inlet and outlet, and a valve for simultaneously controlling the flow through said by-pass and said discharge-pipe.

6. A device of the character described comprising a casing, a helical rotatable impelling device mounted therein, an inlet and outlet for said casing, a discharge-pipe communicating with said outlet, a by-pass connecting said inlet and outlet, and a valve for simultaneously controlling the flow through said by-pass and said discharge-pipe.

7. A device of the character described comprising a casing provided with an inlet and an outlet each having bearings, a rotatable impelling device mounted in said bearings, a discharge-pipe communicating with said outlet, a by-pass connecting said inlet and outlet, and a valve for simultaneously controlling the flow through said by-pass and said discharge-pipe.

8. A device of the character described comprising a casing, angular inlet and outlet connections at the opposite ends thereof, T-fittings connected to said inlet and outlet and forming a by-pass, a valve in one of said T-fittings and controlling the volume of liquid passing to either branch thereof, and an impelling device in said casing.

9. A device of the character described comprising a casing, angular inlet and outlet connections at the opposite ends thereof and each provided with a bearing, T-fittings connected to said inlet and outlet and forming a by-pass, a valve in one of said T-fittings and controlling the volume of liquid passing to either branch thereof, and an impelling device mounted in said bearings.

10. A device of the character described comprising a standard, a casing adjustably mounted in said standard, angular inlet and outlet connections at the opposite ends of said casing, said connections being provided with bearings, T-fittings connecting said inlet and outlet to form a by-pass, a valve in one of said T-fittings controlling the volume of liquid passing to either branch thereof, and an impelling device located in said cylinder and mounted in said bearings.

In testimony whereof I affix my signature in presence of two witnesses.

EDGAR PRENTICE HOLLY.

Witnesses:
FITZ-HENRY SMITH, JR.
DONALD M. HILL.