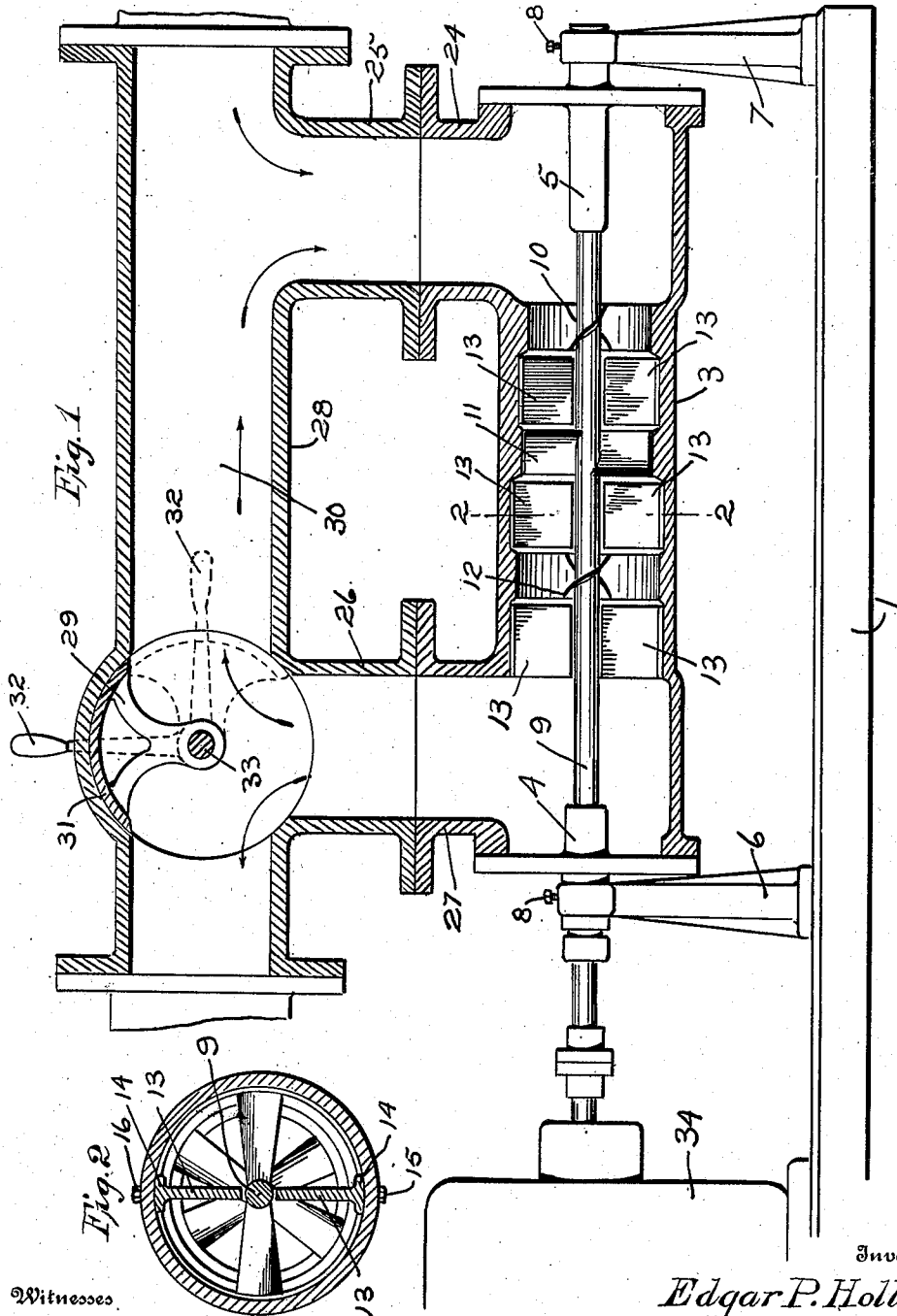


E. P. HOLLY.
LIQUID IMPELLING DEVICE.
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900,853.

Patented Oct. 13, 1908.



Witnesses
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LIQUID-IMPELLING DEVICE.

No. 900,853.

Specification of Letters Patent.

Patented Oct. 13, 1908.

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To all whom it may concern:

Be it known that I, EDGAR P. HOLLY, a citizen of the United States, residing at Roxbury, 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 drawing.

This invention relates to pumps or impelling devices and has for its object to construct a pump with a plurality of sets of propelling blades, said sets increasing in diameter step by step from the first to the last so that the effective working capacity of each succeeding set will be gradually increased and at the same time the slip or percentage of loss of the propellers will be decreased and practically overcome.

A further object of the invention is to provide guiding or deflecting blades and place a set in front of each set of propellers, as it is found in the practical use of devices of this character that where the water is driven or forced by one or more sets of rotary propellers that the action of the same on the fluid has a tendency to start the fluid whirling or surging through the pipe, thus greatly increasing the frictional resistance of the flowing liquid and also reducing the efficiency of the propellers. By the introduction of the fixed blades to prevent the whirling motion of the liquid and a plurality of propellers of gradually increasing size it is found that liquid may be forced through the pipes at a much greater rate of speed and also be forced to a much greater height, thereby greatly increasing the range of usefulness of the system, broadening its field of action and obtaining the maximum efficiency with the expenditure of but the minimum amount of power.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings: Figure 1—is a side elevation, partly in section, of my improved device as applied to a system of piping. Fig. 2—is a sectional end view on line 2—2 of Fig. 1, showing the position of the fixed blades as secured to the outer shell and a plurality of sets of propelling blades mounted on a rotary shaft.

Referring to the drawings at 1 is the base plate on which both the driving motor and the impelling mechanism are mounted. This mechanism is composed essentially of a cylinder 3 provided with inwardly projecting bearings 4 and 5 at either end, supported on their respective standards 6 and 7. By means of these two bearings the opposite ends of the cylinder and the mechanism contained therein are held in line rendering the device adapted to be rotated or turned on its axis in said standards and set into any desired position, and to be securely held by means of screws 8—8. The propeller shaft 9 is mounted in these bearings 4 and 5 and has located upon it three or more sets of propelling wheels 10, 11 and 12, preferably of the two-blade type. These sets of propelling blades are adapted to increase in diameter step by step from the first to the last in arithmetical progression, the first set 10 being the smaller, the second set 11 being slightly larger than the first set and the third set 12 being slightly increased over the second set, and so on. I have herein shown three sets of blades which is sufficient for accomplishing certain results, but two sets may be employed if desired and where it is necessary to force the water to a greater height or to send the same with a greater force I may employ four or more sets of propelling blades which will continue to increase in size like those already shown.

Another feature of my invention is that I have also provided means for guiding or directing the fluid straight through the pipes preventing the same from whirling or surging as it is forced therethrough by the action of the propelling blades upon it. This may be accomplished by the placing of one or more blades, fins or partitions 13—13 lengthwise of the cylinder 3 and in close proximity to the rapidly revolving propelling blades 10, 11 and 12. These stationary fins or directing vanes may be made in any convenient form and held in any convenient manner, but I have shown said blades, as illustrated in Fig. 2, as being provided with a T-shaped head 14 at one edge adapted to fit against the inner surface of the cylinder to which these vanes are secured by means of the bolts 15 and 16. Any desired number of blades may be located between the propellers and a set of directing blades may also be placed at either or both sides of said propellers, if de-

sired, but for ordinary work it is found necessary only to place one set of fixed blades ahead of each set of propelling blades. By the use of these fixed vanes or plates the propellers have a much greater effective action upon the fluid to force the same straight ahead without allowing it to take a whirling or surging motion, thus greatly reducing the percentage of the flowing friction resistance in the pipe and giving the device a maximum force or lifting power.

Connected to the outwardly turned ends of the right angle fitting 24 and 27 are the two corresponding downwardly turned ends 25 and 26 of the fitting 28. The upper portion of this fitting is provided with a continuous passage or bypass 30 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 these fittings and in the discharge channel is the rotatable valve 29. The opening in the pipe into which this valve is set is enlarged so that the passage way through the pipe will not be choked when the valve is open. This valve is cut away on its interior with the exception of the wall portion 31 which is left of sufficient width to either open wide or completely shut off the return passage way or bypass 30 when the handle 32, which is connected to the supporting shaft 33, is moved around into the dotted position illustrated in Fig. 1. By means of this valve controlled bypass the quantity of liquid forced through the system may be nicely controlled without being obliged to regulate the speed of the driving motor 34.

The essential feature of my improved device is the successive and proportional increase in size of the propelling wheels from the first to the last. This increase is mathematically calculated so that the area of each succeeding wheel will take care of the slip or what would otherwise be the percentage of loss of the next preceding wheel. For instance, it is found in practice that a given size propeller running at a certain velocity will deliver a given number of gallons. It is also found that there is a certain percentage

of slip or loss in this style of pump over a pump with a positive action, (like a piston pump), and in order to compensate for or overcome this percentage of slip I have employed a plurality of propellers and increased the effective working capacity of each by increasing its diameter sufficiently to overcome this slip or loss and cause this style of pump to deliver practically the same as a pump with the said positive action, at the same time eliminating the great factor of friction over such a pump and obtaining practically the maximum efficiency with the expenditure of the minimum amount of driving power.

My improved impelling device is very simple in construction, and exceedingly efficient in its operation.

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

1. A liquid impelling device comprising an impelling chamber provided with an inlet and an outlet, the wall of said chamber being provided with annular recesses, a shaft rotatably mounted in said chamber, a plurality of propellers carried by said shaft and successively increasing in diameter as they approach the outlet, said propeller being located at points between said recesses, and removable blades located in said recesses and interposed between said propellers for preventing a whirling motion of the fluid passing through said chamber.

2. A liquid impelling device comprising an impelling chamber provided with an inlet and an outlet, the wall of said chamber being provided with annular recesses, a shaft rotatably mounted in said chamber, a plurality of propellers carried by said shaft, and located at points between said recesses, a plurality of blades provided with T-shaped heads fitting against the inner walls of said recesses, and means for securing said blades in position.

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

EDGAR P. HOLLY.

Witnesses:

HOWARD E. BARLOW,
E. I. OGDEN.