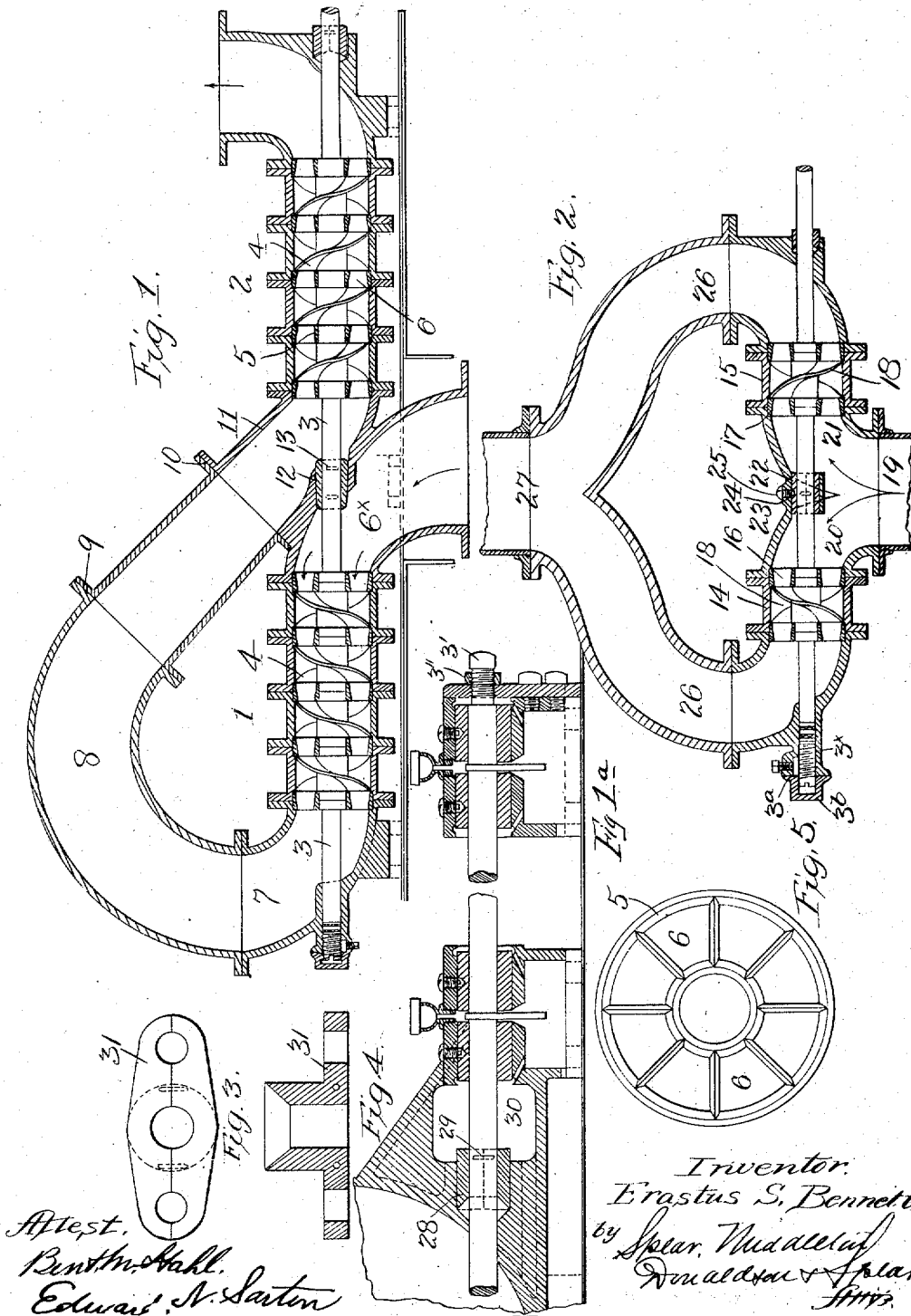


E. S. BENNETT.
SCREW PUMP.
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Patented Jan. 7, 1913.



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UNITED STATES PATENT OFFICE.

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SCREW-PUMP.

1,049,651.

Specification of Letters Patent.

Patented Jan. 7, 1913.

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To all whom it may concern:

Be it known that I, ERASTUS S. BENNETT, citizen of the United States, residing at New York, N. Y., have invented certain new and useful Improvements in Screw-Pumps, of which the following is a specification.

My invention relates to screw pumps in which a piston of screw or bladed form rotates within a cylinder, and it consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a central longitudinal sectional view through one form of my invention in the form of a force pump; Fig. 1^a is a view of a detail. Fig. 2 is a similar view through the form of the invention used as a circulating pump. Figs. 3, 4 and 5 are details.

In these drawings, and referring particularly to Fig. 1, 1 and 2 indicate two cylinders axially in line and made up of sections, through which cylinders the shaft 3 extends. This shaft has a plurality of screw blades 4 thereon, which operate in connection with diaphragms 5 having tapered openings 6 therethrough for the passage of the water. The two cylinders are separated from each other, and between their adjacent ends the inlet head or coupling 6^{*} is located, this being of curved form having its inner bore tapered from its outer end toward its point of connection with the end of the cylinder 1, so as to direct the incoming water thereto. From the discharge end of the cylinder 1 an outlet head 7 extends, this being flared outwardly somewhat after the manner shown in Letters Patent No. 1,012,504, granted to me December 19, 1911, and being connected by a pipe 8 which curves over and back to a point between the two cylinders, the said pipe being gradually tapered from the discharge 7 to its point of connection with the inlet end of the cylinder 2. This pipe may be made up of a series of sections coupled together at 9 and 10, the last section 11 being coupled directly to the inlet end of the cylinder 2. This pipe extends at an angle to the axis of the cylinders, so that the water flowing therethrough will find an easy inlet to the end of the cylinder, and the same thing is true of the main inlet section 6^{*}, both of these sections being inclined to the axial line of the cylinders. I provide a

bearing for the shaft of the pump at a point intermediate of the adjacent ends of the cylinders 1 and 2, this bearing consisting of a bronze bushing 12 of split form with the two sections doweled together at 13, the said bushing being tapered in one direction and being seated in the wall of the inlet pipe or sections 6 and 11. This bronze bushing will be held in its tapered seat by the suction of inflowing water on one side, and by the back pressure from the water on the other side, and no other fastening is required. It can be readily renewed by taking out the short joint in the connecting pipe.

The circulating pump of Fig. 2 consists of short sections of cylinders 14, 15, having diaphragms 16 and 17 and within which are located short screw sections 18. These cylinders are separated from each other for the inlet of the fluid which flows to the cylinders through the inlet pipe 19, which has branches 20, 21, curving toward the adjacent ends of the cylinders, and at a central point between these cylinders a bearing 22 for the shaft is provided, consisting of a bushing split and doweled as above described, and supported in a seat 23 in a portion of the central coupling. The bushing is provided with a notch at 24 receiving a screw 25 for holding the bushing in place, the said screw not being seated in the bottom of the notch. From the ends of the cylinders discharge pipes 26 extend, which are joined into a common discharge pipe 27. It will be observed from the drawings that the inlet and discharge sections are very much larger than the bore of the pump or cylinder. For instance, take a pump six inches in diameter with a cylinder area of 28.27 inches minus the hub of 3.54 inches, which leaves an area of 24.73. This area is further reduced by the contraction of the opening in the diaphragms. The total opening in the diaphragm is 17.81 inches, or equal to a pipe 4 $\frac{1}{4}$ inches in diameter. With a pump of these proportions and with a speed normal, the speed of water through an eight inch discharge pipe is twelve and a half feet per second. Further, the fluid approaches and leaves the screw pump through coupling having very easy curves in the enlarged or flaring passages constituting the inlet and outlet heads.

In Fig. 1^a I show the extension of the shaft 3 belonging at the right of Fig. 1, and the bearings for the said shaft. In

order to accurately adjust the shaft so that the screw blades will be held centrally in relation to the diaphragms within the cylinder so that the ends of the blades will just clear these diaphragms, I provide means for adjusting the shaft longitudinally, which may consist, as shown in Figs. 1 and 1^a, of set screws 3' bearing against the ends of the shaft, and held by lock nuts 3'', or I may employ the form of adjustment shown in Fig. 2, in which a set screw 3^x is employed having a groove in its end for adjustment, and a tightening block or lock 3^a pressed by a set screw against the threaded portion of the screw, so that after the screw is adjusted, it may be locked in position by the block, and then a cap 3^b may be placed in position. The bushing or bearing 22 shown in Fig. 2 is of plain cylindrical form, whereas, as before stated, the bushing or bearing 12 in Fig. 1 is tapered toward the left. At 28 I show a stuffing box, and this is also split, and has its sections doweled together at 29. At the right of this stuffing box I form in the frame an opening 30, so that by moving the stuffing box toward the right, its sections can be separated and removed through the opening 30, and the packing material may then be removed and replaced, and the stuffing box placed again in position. This stuffing box, as shown in Figs. 3 and 4, has laterally extending arms 31 which may be bolted to the frame of the machine.

I claim as my invention:—

1. In combination in a screw pump, a pair of cylinders axially in line, and having screw pistons therein, and diaphragms, a curved inlet head extending between the two cylinders and connecting with the end of one of them, and a return pipe extending in the form of a loop from the discharge

end of the first cylinder to the inlet end of the second cylinder and at a point between the two cylinders, both the return pipe and the inlet pipe being inclined substantially equally and in the same direction in respect to the axis of the pump, substantially as described.

2. In combination two cylinders, a screw piston for each cylinder, said cylinders being axially in line and with a space between them, a shaft common to the two pistons, an inlet coupling or head for one of the cylinders, a return pipe extending from said cylinder back to the other cylinder, and a tapered bushing split and having its parts held together, said bushing being held in a tapered seat and exposed on its smaller end to the suction, and on its larger end to pressure whereby the bushing is held in place substantially as described.

3. In combination two cylinders, a screw piston for each cylinder, said cylinders being axially in line and with a space between them, a shaft common to the two pistons, an inlet coupling or head for one of the cylinders, a return pipe extending from said cylinder back to the other cylinder, and a tapered bushing split and having its parts held together, said bushing being held in a tapered seat and exposed on its smaller end to the suction, and on its larger end to pressure whereby the bushing is held in place, the inlet portions having a removable section for the removal of the bearing, substantially as described.

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

ERASTUS S. BENNETT.

Witnesses:

JOHN J. DONDRAN,
MYRON L. JUSTIN.