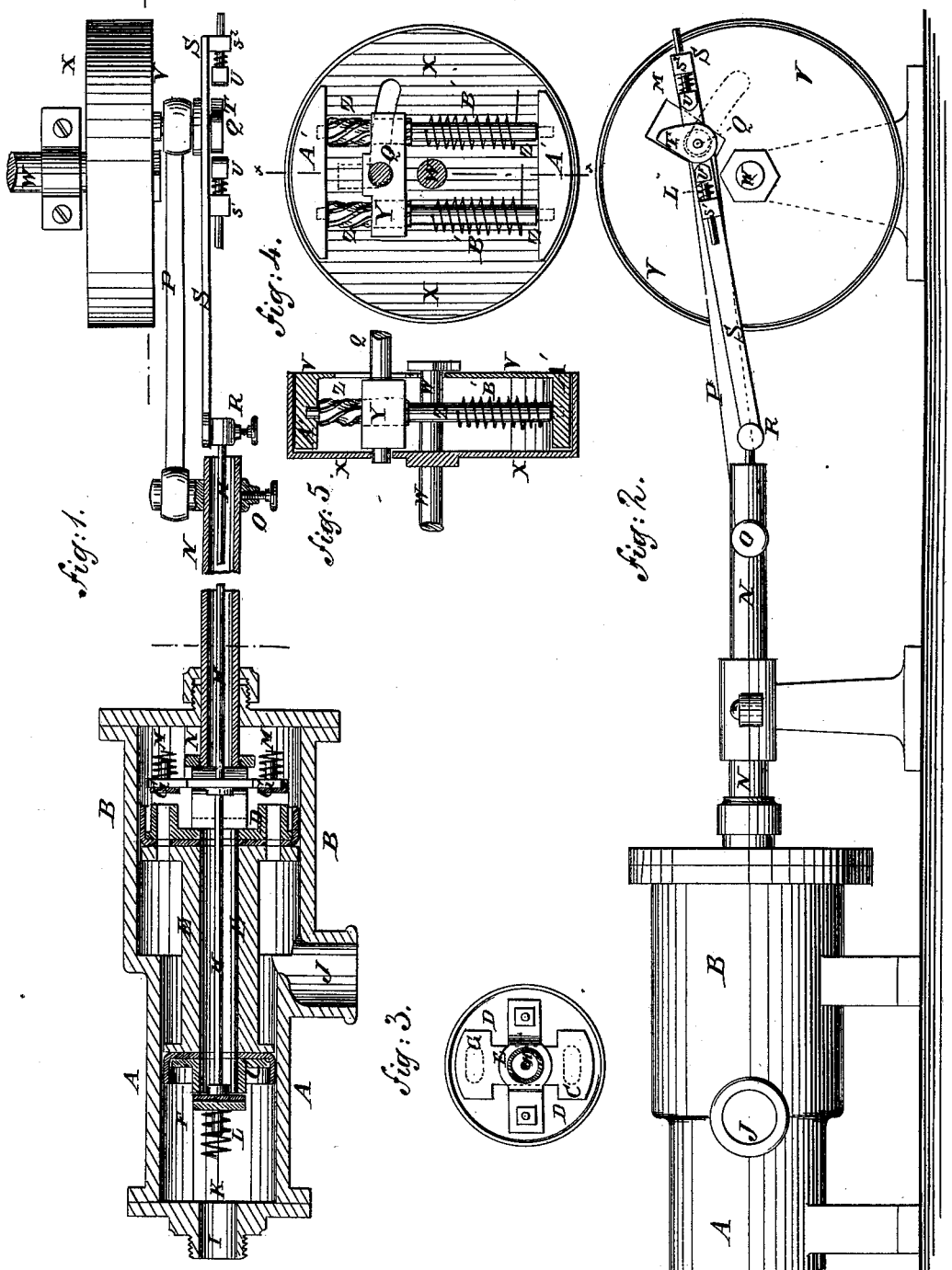
A. KNECHT.

Reciprocating Apparatus or Motor.

No. 220,625. Patented Oct. 14, 1879.



WITNESSES:

Chas. Nida.
C. Bedgwick

INVENTOR:

A. Knecht

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ADAM KNECHT, OF ILCHESTER, MARYLAND.

IMPROVEMENT IN RECIPROCATING APPARATUS OR MOTOR.

Specification forming part of Letters Patent No. **220,625**, dated October 14, 1879; application filed March 5, 1879.

To all whom it may concern:

Be it known that I, ADAM KNECHT, of Ilchester, in the county of Howard and State of Maryland, now domiciled at Quebec, in the Dominion of Canada, have invented a new and useful Improvement in Reciprocating Apparatus or Motor, of which the following is a specification.

Figure 1 is a longitudinal section of my improved apparatus. Fig. 2 is a side view of the same. Fig. 3 is a detail view of the piston and valve of the larger cylinder. Fig. 4 is a detail view of one of the disks connected with the crank. Fig. 5 is a detail cross-section of the two disks connected with the crank, taken through the line *x x*, Fig. 4.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish a reciprocating apparatus or machine operated by the pressure of liquid, steam, or air, for water-meters, for hydraulic engines, for operating pumps, for transmitting motion, for toys, and for various other uses and purposes.

The invention consists in the combination of the two cylinders, the two pistons, the tube, and the valves, whether the springs be used or not; in a tappet or shifting-cam on the crank-pin, as shown and described, and for the purpose set forth; in the combination of the hollow piston-rod, the piston connecting rod, the valve connecting rod, the tappet or shifting-cam, the crank-pin, the slotted loose disk or pulley, the slotted fast disk or pulley, the sliding block, the swiveled screws, and the spiral springs with each other, with the driving-shaft, and with the two cylinders, the two pistons, the tube, and the valves; and in a reciprocating apparatus or motor having valves in its pistons, and shifted automatically by the extended stroke of the piston or by the valve-rod, as hereinafter fully described.

A and B are two cylinders of unequal diameters, firmly connected or formed in one piece, or disconnected and space intervening, and provided with pistons C D, connected by a tube, E, so that they may move together.

The pistons C D are provided with valves F G, connected by a rod, H, of such a length that when either of the valves F G is open the other will be closed.

When liquid, steam, or air enters the opening I in the head of the smaller cylinder, A, it closes the valve F, opens the valve G, and forces the two pistons C D in the direction of the larger cylinder B, the liquid, steam, or air between the piston D and the head of the larger cylinder B being forced through the valves G and out through the opening J in the side of the cylinders A B at their point of meeting. As the piston D approaches the head of the cylinder B, the valve G is closed by the pressure of the said head, and the valve F is opened. The tube E is now open at both ends, and the liquid, steam, or air passes through it and presses against the piston D, and the area of the piston D being greater than that of the piston C, the two pistons are forced in the direction of the cylinder A by the excess of pressure upon the said piston D. This movement of the two pistons forces the liquid, steam, or air that is between them out through the opening J.

As the valve F reaches the stop-bar K, attached to the head of the cylinder A, it is closed, the valve G is opened, and the motion of the pistons is again reversed, and so on as long as the pressure of the liquid, steam, or air is continued.

Spiral or other suitable springs L M are attached to the valves F G, or to the cylinder-heads, to quicken the movements of the said valves as they are forced from their seats.

If desired, the rod H may be attached to the valves F G near their edges by hinges or other suitable means, to open the said valves gradually, and thus effect a saving of power.

If desired, the valves F may be placed at the inner side of the piston D, and the valve G at the end of the tube E adjacent to the said piston; but in this case the opening J must be taken as the inlet and the opening I as the outlet.

When the device is to be used as a meter, a rod can be attached to the moving part and connected with an indicator, in the usual way, as only a certain quantity of water can pass through at each stroke of the piston.

When the device is to be used as an engine, a hollow piston-rod, N, is attached to the piston D. The piston-rod N passes out through a stuffing-box in the head of the cylinder B,

and to its outer part is pivoted, by an adjustable clamp, O, the end of a connecting-rod, P, the other end of which is pivoted to the crank-pin Q. In this case the rod H, that connects the valves F G, is extended, and passes out through the hollow piston-rod N, and to its outer end is pivoted, by an adjustable clamp, R, the end of a connecting-rod, S. The outer part of the connecting-rod S is slotted longitudinally to receive and slide upon the crank-pin Q.

By this construction the length of the piston-stroke may be regulated by operating the valve-rod H by a tappet, T, attached to the crank-pin Q, and which operates against shoulders S^1 S^2, formed upon the side of the rod S, and thus operates the valves F G. In this case the springs L M of the valves F G may be removed and interposed between the shoulders S^1 S^2 and the tappet T, the said tappet operating against the heads of pins U, passing through the said springs and through the said shoulders. The springs in this position produce the same effect as when connected directly with the valves F G.

The crank-pin Q passes through a radial slot in a loose pulley or disk, V, placed upon the driving-shaft W, and through a curved or straight slot in the pulley or disk X, made fast to the said driving-shaft W.

The crank-pin Q is attached to the center of a block, Y, placed at the side of the disk or pulley V, and has screw-holes formed in its ends to receive the screws Z. The ends of the screws Z are swiveled to two blocks, A′, rigidly attached to the said disk or pulley V.

Upon the shanks of the screws Z are placed spiral springs B′, one end of which is attached to the said screws Z, and their other ends are attached to the said disk or pulley V. The springs B′ are so arranged as to turn the screws Z in the direction that will carry the block Y and the crank-pin Q toward the center of the disks V W.

If desired, a single-acting force-pump may be connected with the head of the cylinder B, and have its piston-rod connected with the piston D; or a double-acting force-pump may be interposed between the cylinders A B, its piston being attached to the tube E. It can also be used as a double-acting force-pump by operating the pistons by means of the valve-rod.

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

1. The combination of the cylinders A B, constructed as shown and described, with inlet and outlet openings I J, the tube E, the pistons C D, adapted to fit their respective cylinders, and the valves F G, connected by the rod H, substantially as and for the purpose set forth.

2. The tappet or shifting-cam T on the crank-pin Q, in combination with the valve-connecting rod S, substantially as and for the purpose set forth.

3. The combination of the hollow piston-rod N, the piston connecting rod P, the valve connecting rod S, the tappet or shifting-cam T, the crank-pin Q, the slotted loose disk or pulley V, the slotted fast disk or pulley X, the sliding block Y, the swiveled screws Z, and the spiral springs B′ with each other, with the driving-shaft W, and with or without the two cylinders A B, the two pistons C D, the tube E, and the valves F G, substantially as herein shown and described.

4. A reciprocating apparatus or motor having valves in its pistons, and shifted automatically by the extended stroke of the piston or by the valve-rod, substantially as herein shown and described.

5. The combination of the tube E, the valves F G, valve-rod H, and springs L M, all constructed and arranged for operation substantially as shown and described.

ADAM KNECHT.

Witnesses:
JAMES CANNON,
MATTHEW AYLWARD HEARN.