

No. 829,441.

PATENTED AUG. 28, 1906.

C. O. SOBINSKI.
AIR PUMP OR COMPRESSOR.
APPLICATION FILED DEC. 19, 1904.

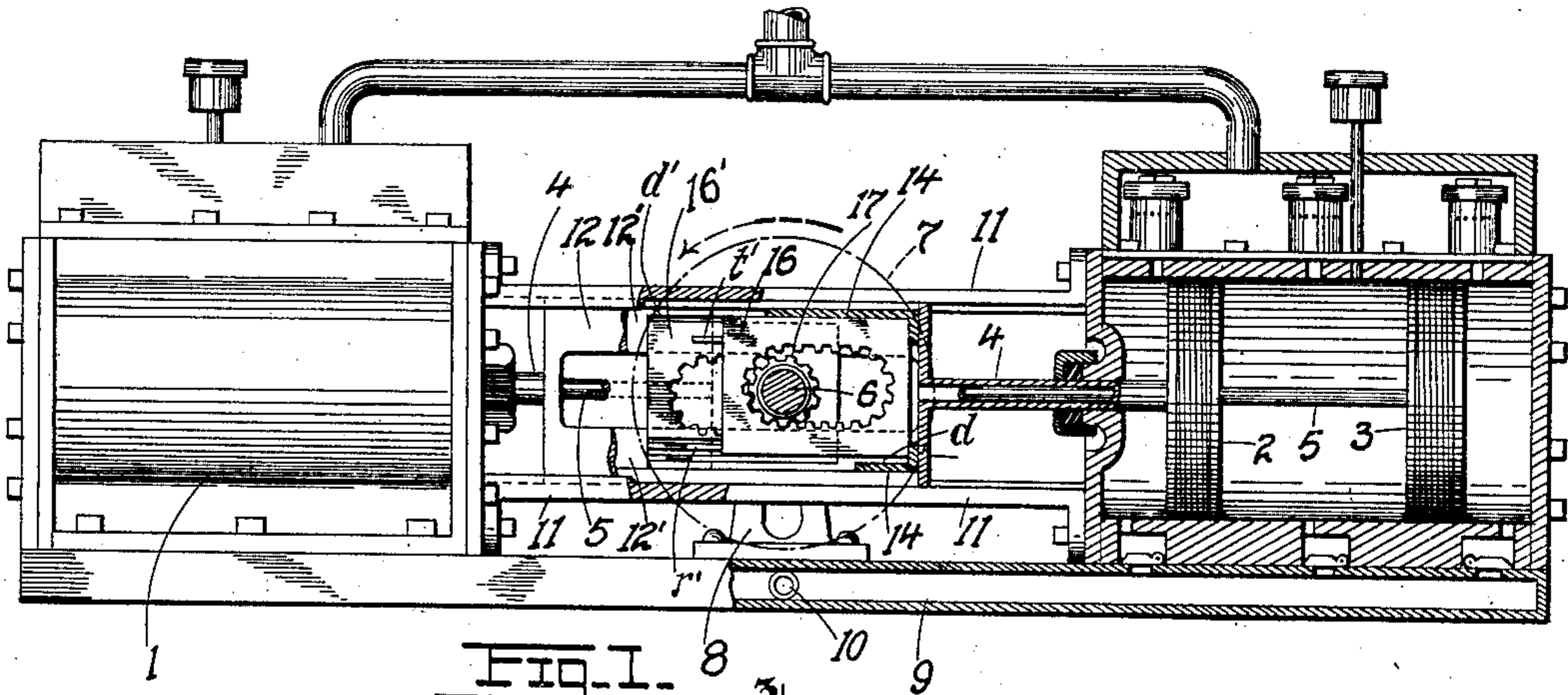


FIG. 1.

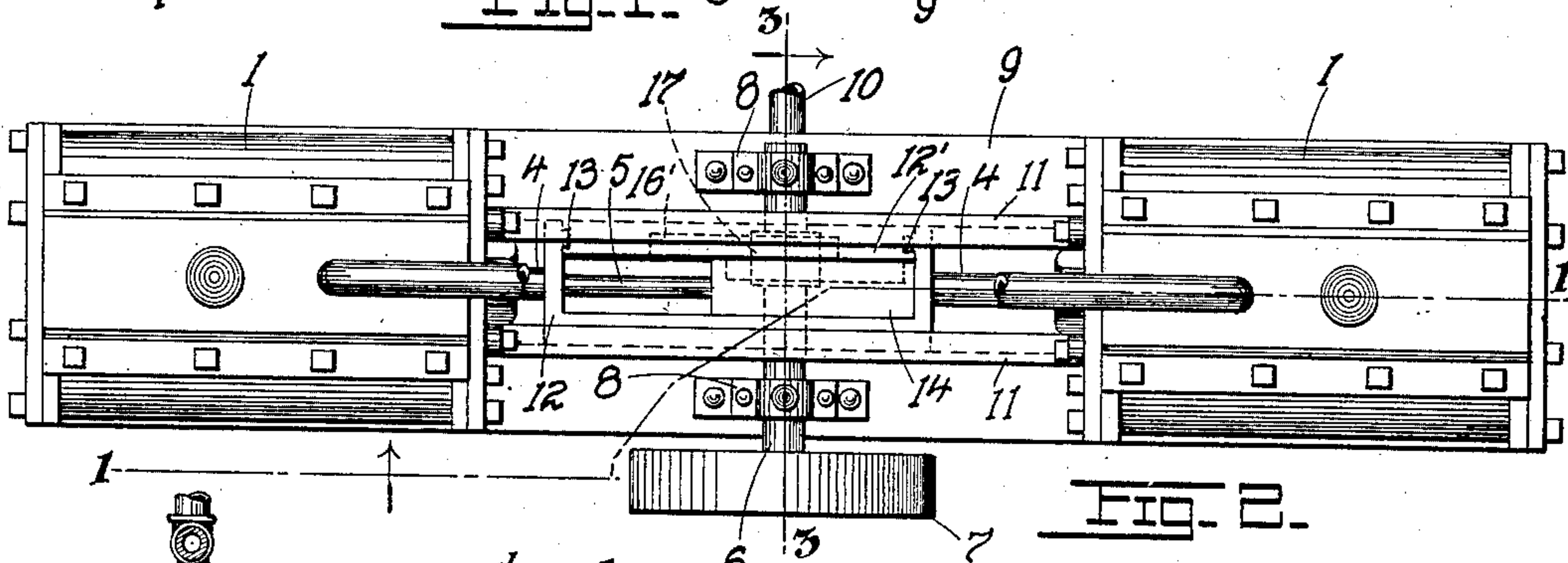


FIG. 2.

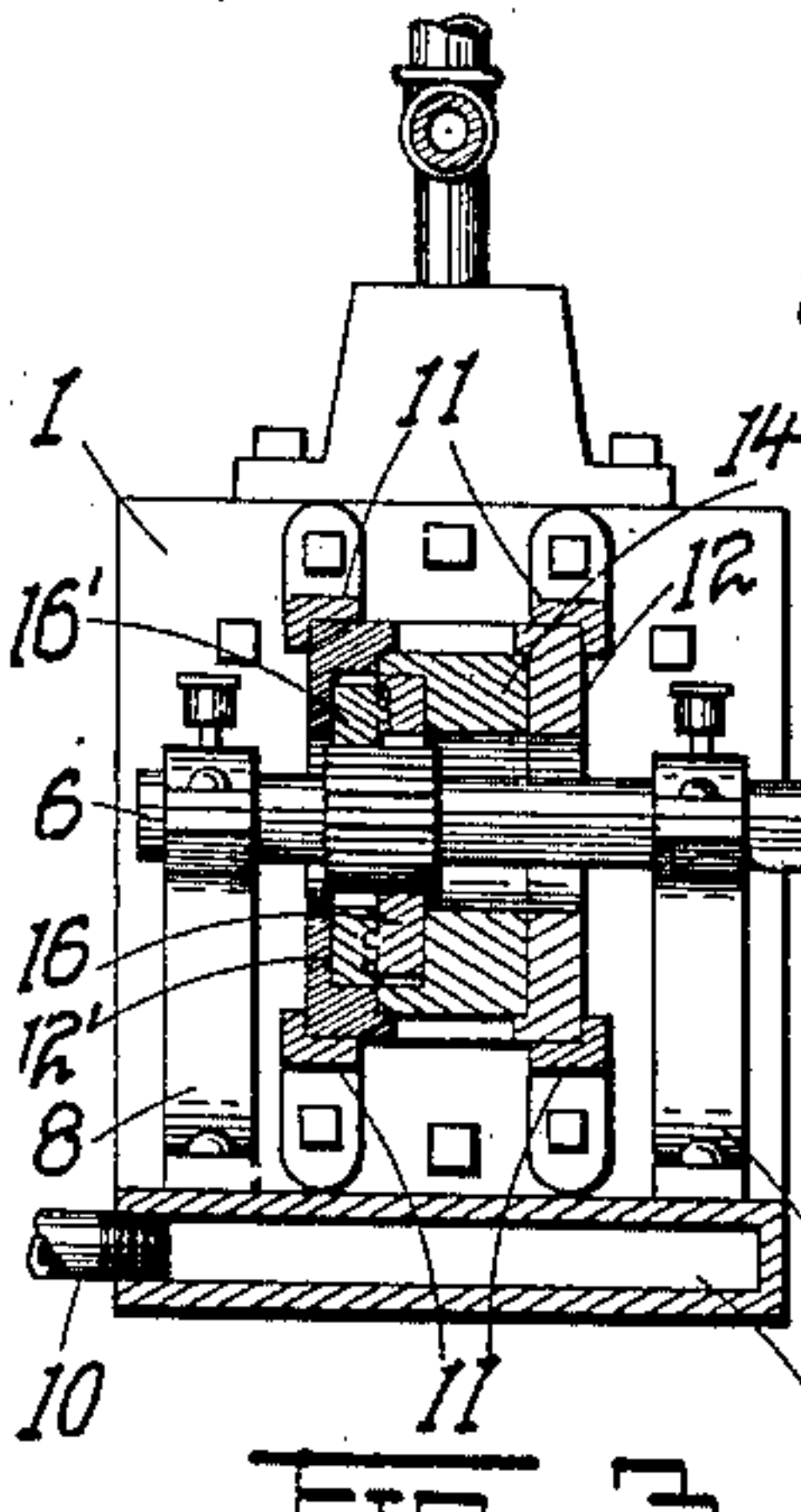


FIG. 3.

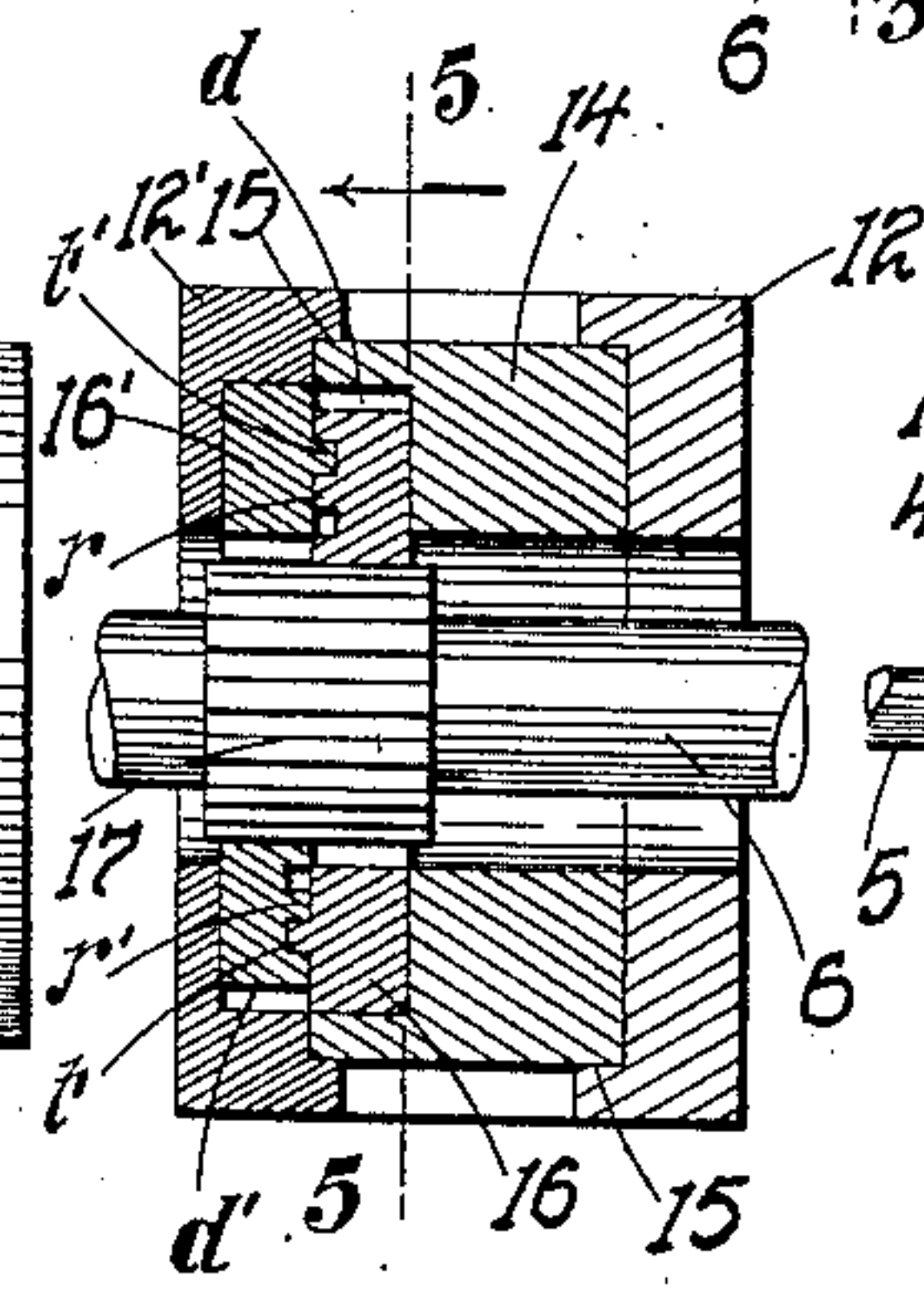


FIG. 4.

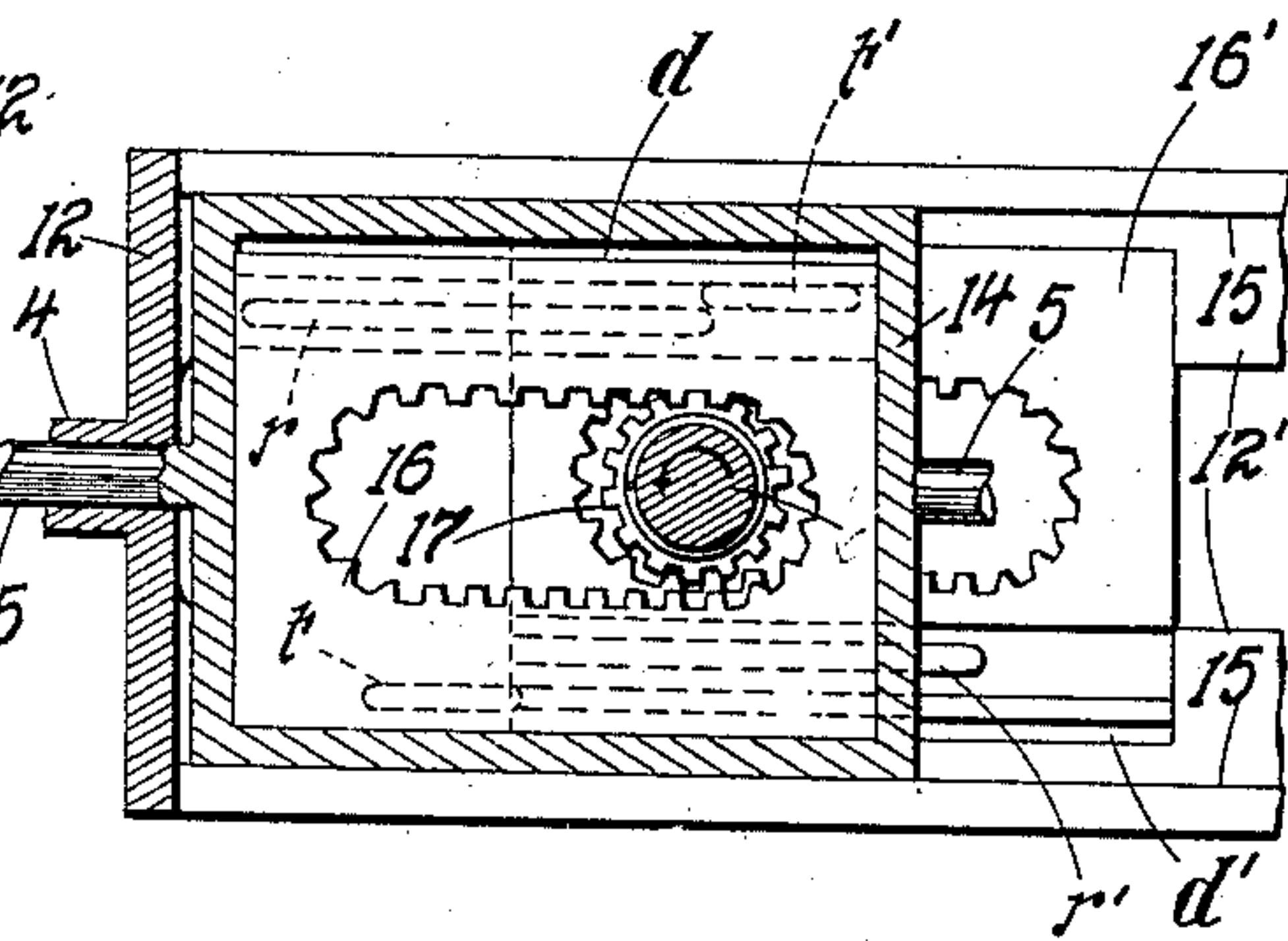


FIG. 5.

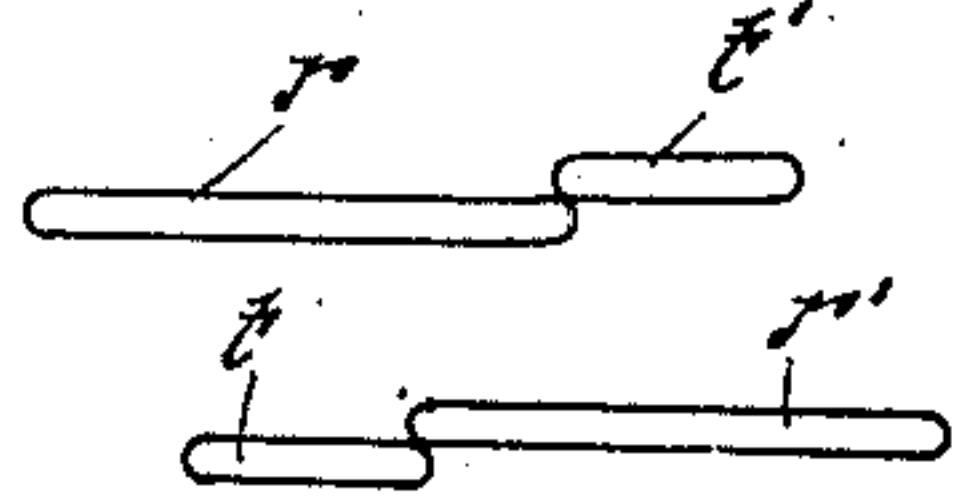


FIG. 6.

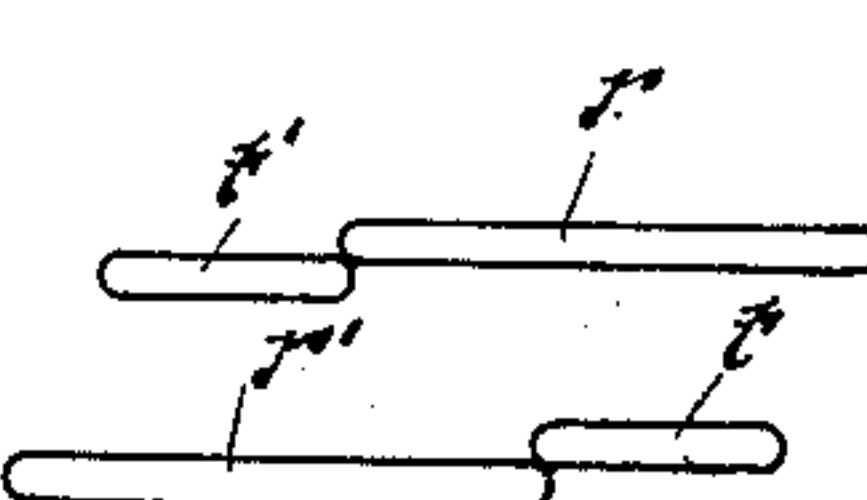


FIG. 7.

Witness
H. J. Gawn
J. O. Michel

Inventor
Charles O. Sobinski.
By
E. J. Storer
Attorney.

UNITED STATES PATENT OFFICE.

CHARLES O. SOBINSKI, OF ST. LOUIS, MISSOURI.

AIR PUMP OR COMPRESSOR.

No. 829,441.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed December 19, 1904. Serial No. 237,538.

To all whom it may concern:

Be it known that I, CHARLES O. SOBINSKI, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Air Pumps or Compressors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in driving-gear for pumps, compressors, and the like; and it consists in the novel construction and arrangement of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a vertical longitudinal section of the machine, taken on the broken line 1 1 of Fig. 2. Fig. 2 is a top plan thereof. Fig. 3 is a vertical transverse section on line 3 3 of Fig. 2. Fig. 4 is a sectional detail similar to the corresponding parts of Fig. 3, with the cross-heads, however, shown in position to take the opposite stroke from that indicated in Fig. 3. Fig. 5 is an enlarged vertical longitudinal section on line 5 5 of Fig. 4, and Figs. 6 and 7 are diagrammatic views showing the relative positions of the tongues and ribs of the rack-plates mounted on the cross-heads for the extreme positions of the respective strokes of the cross-heads.

The present invention is an improvement on the pump or compressor shown and described in United States Letters Patent No. 630,525, issued to me under date of August 8, 1899, and while contemplating the several objects and advantages of the patented invention the present improvement is considered to possess decided advantages, particularly in the matter of simplicity and increased efficiency.

In detail the invention may be described as follows:

Referring to the drawings, 1 represents the pump-cylinder, in which operate the pistons 2 and 3, the hollow piston-rod 4 of the former loosely receiving the piston-rod 5 of the latter, the piston-rods both extending in the same direction toward the transversely-disposed operating or drive shaft 6, operated by a pulley 7, connected to any suitable source of power. (Not shown.) As in my patent above referred to, I herein show two sets of cylinders and pistons, the one set being a duplicate of the other, so that a description of one half of the machine will answer for the

corresponding parts of the opposite half. Both pistons are reciprocated by the rotation of the shaft 6, the latter being mounted in suitable bearings 8, projecting from the chambered base of the machine. This base is provided with an air-chamber 9, to which leads the common inlet or air-supply pipe 10.

Operating between the guides 11 11, disposed in pairs between the cylinder-heads of the double machine, is an open cross-head 12, secured to the hollow piston-rod 4, said cross-head 12 being provided with a detachable wall or section 12', which is secured thereto by a dovetail tongue-and-groove connection 13, Fig. 2, the removal of the section 12' being necessary to admit of the insertion between the side walls of the cross-head 12 of the cross-head 14, the latter being connected to the piston-rod 5 and being free to reciprocate within the cross-head 12 in ways formed by the ledges 15 of the side walls of said cross-head 12, Fig. 3. Unless special reference is made to the detachable section 12' of the cross-head 12 it is to be understood that when the cross-head 12 is hereinafter alluded to it shall include the section 12', since this section serves to complete the cross-head as finally assembled. From the parts as described it is apparent that as one cross-head and its piston move in one direction the other cross-head and its piston are free to move in the opposite direction, each being free to reciprocate simultaneously in opposite directions, as in my patent referred to. The mechanism by which the pistons are thus reciprocated and which constitutes the present invention may be described as follows:

Confined in a suitable depression *d*, formed on one of the faces of the cross-head 14 and susceptible of a limited vertical movement in said depression, is an interior toothed member or rack-plate 16, and confined in a similar depression *d'* on the adjacent face of the removable wall 12' of the cross-head 12 and similarly susceptible of vertical reciprocation therein is a similar interior toothed member or rack-plate 16', the shaft 6 passing transversely through the oblong openings of the plates 16 16' and through similar oblong cut-away portions or openings of the cross-heads, the length of said cut-away portions or openings being of course sufficient to allow for the necessary stroke imparted to the cross-heads and their pistons.

Secured to the shaft 6 is a pinion 17, which is adapted to mesh simultaneously with the

lower longitudinal toothed edge of the plate 16 and with the upper toothed edge of the plate 16', Fig. 3, or with the upper toothed edge of the plate 16 and the lower toothed edge of the plate 16', Figs. 4, 5, so that, assuming that the shaft 6 and pinion 7 revolve constantly in one direction, the direction of reciprocation which the pinion 17 imparts to the plates 16 16' will depend on which side of the toothed portion of either plate is in engagement with the teeth of the pinion. Thus, assuming the pinion 17 rotating as indicated by the arrow in Fig. 5, the plate 16' will have been reciprocated to the right and plate 16 to the left, or in Fig. 1 the plate 16 will have moved to the right and plate 16' to the left. Now since the plates 16 16', mounted, respectively, in the cross-heads 14 12, are incapable of longitudinal movement within their respective depressions d d' in said cross-heads the latter must follow the plates in their reciprocations, as said plates are impelled simultaneously in opposite directions by the rotating pinion 17.

The mechanism by which one and then the other side of the toothed opening of either plate 16 16' is brought into engagement with the pinion, whereby the plates are thus reciprocated in opposite directions, may be described as follows: In their reciprocations the plates 16 16' are interlocked along their adjacent faces, the plate 16 being provided with a tongue t , which travels in a groove or way formed in the plate 16' on either side of a rib r' , and the plate 16' is provided with a tongue t' , which travels in a groove formed in the plate 16 on either side of a rib r . Referring now, for example, to Figs. 4, 5, it will be seen that the plate 16 is at the lower edge of the depression d in the cross-head 14, and the plate 16' bears against the upper edge of the depression d' in the cross-head 12, the tongue t being below the rib r' and the rib r being below the tongue t' . At the same time the pinion 17 is in mesh with the upper set of teeth of the plate 16 and with the lower set of teeth of the plate 16'. As the pinion 17 continues its rotation in the direction indicated, advancing plate 16 to the left and plate 16' to the right, the pinion finally encounters the teeth at the ends of the oblong openings formed in the respective plates, by which time the tongue t will have passed the limits of rib r' and tongue t' the limits of rib r . Continued rotation of the pinion will thus tend to propel the plate 16 upwardly and at the same time depress the plate 16', whereupon the position of the respective tongues and ribs will be reversed, the release of the respective tongues and ribs from one another permitting the vertical play of the plates within their respective depressions d d' . By the time, however, that the relative vertical position of the plates 16 16' has been reversed the pinion 17 will be respectively in engage-

ment with the lower longitudinally-disposed teeth of the plate 16 and with the upper set of teeth of the plate 16', driving said plates in the opposite direction, or to the position indicated in Fig. 1, when at the end of said stroke a similar operation will again change the relative vertical position of the plates 16 16' and drive them back to the first position. The locking of the tongues t t' against their respective ribs r' r keeps the plates bearing, respectively, against the upper and lower edges of the depressions housing them, thus keeping the proper longitudinal toothed edge of each plate in engagement with the driving-pinion 17.

In Figs. 6, 7 I have shown diagrammatically the position of the parts at the ends of a double stroke. In Fig. 6 (which corresponds to the position of the parts shown in Fig. 5) the tongue t and rib r of one plate are about to slip off the rib r' and tongue t' of the opposite plate. When they have actually slipped off and have been jointly elevated to a plane above said rib r' and tongue t' , they will be in position to advance relatively in one direction while the plate carrying the parts t' r' is advancing in the opposite direction, Fig. 7. If again at the end of this operation the relative vertical position of the several parts be restored to that indicated in Fig. 6, they will be free to reciprocate back to the position indicated in Fig. 7. In this way the cycle of operations is made continuous. The time at which the vertical transposition of the plates 16 16' takes place is at the moment the plates reach the ends of their respective strokes, when the pinion 17 seizes the terminal teeth of said plates, depressing one and simultaneously elevating the other, so as to reverse the engagement of their longitudinally-disposed teeth with the teeth of the driving-pinion 17. The "vertical" displacement or transposition here referred to is to be construed relatively to the axis of the shaft 6, which is horizontal, and generically means a displacement in a plane at right angles or perpendicular to such axis. If the latter were vertical, for example, the displacement would be horizontal. The displacement, too, is at right angles to the common axis of the cylinders.

The relative arrangement of ports and valves is substantially the same as in my patented construction, their specific details not being here entered into, as these form the subject-matter of another and separate application.

Having described my invention, what I claim is—

1. In a pump, a pair of juxtaposed cross-heads simultaneously reciprocating in opposite directions, depressions formed on their adjacent faces, interiorly-toothed plates confined in said depressions and susceptible only of a movement therein at right angles to the axis of reciprocation of the cross-heads, a

tongue and grooves and a rib between the grooves formed on each plate, the tongue of one plate operating in the groove on either side of the rib on the opposite plate, a drive-
5 shaft, and a pinion on the shaft engaging the toothed surfaces of the openings of the plates, the parts operating substantially as, and for the purpose set forth.

2. A pump comprising two cylinders, an
10 operating-shaft disposed between them transversely to their common axis, a pinion on said shaft, two oppositely-reciprocating pistons operating in each cylinder, the piston-rods of the pistons extending from each cylinder to-
15 ward the operating-shaft, and the rod of one piston being hollow to receive the rod of the other piston, a cross-head for each pair of piston-rods, suitable plates carried by the cross-heads having interior toothed oblong open-
20 ings for the passage therethrough of the operating-shaft, and having a movement independent of the cross-heads at right angles to

the axis of the rods, the opposite longitudinal toothed surfaces of the openings of the re-
spective plates alternately engaging the teeth 25
of the pinion from opposite sides, whereby said plates have imparted thereto a simultaneous reciprocation in opposite directions, and whereby by engagement with the terminal teeth of said openings the same are shift- 30
ed by the pinion for effecting the alternate engagement aforesaid at the ends of their respective strokes, and interlocking means on the respective plates for retaining them in
said shifted position till the ends of their re- 35
spective strokes are reached, substantially as set forth.

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

CHARLES O. SOBINSKI.

Witnesses:

EMIL STAREK,
JOS. A. MICHEL.