C. A. SCHLACHTER.

HYDRAULIC CLUTCH.

APPLICATION FILED JUNE 30, 1909.

952,217.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

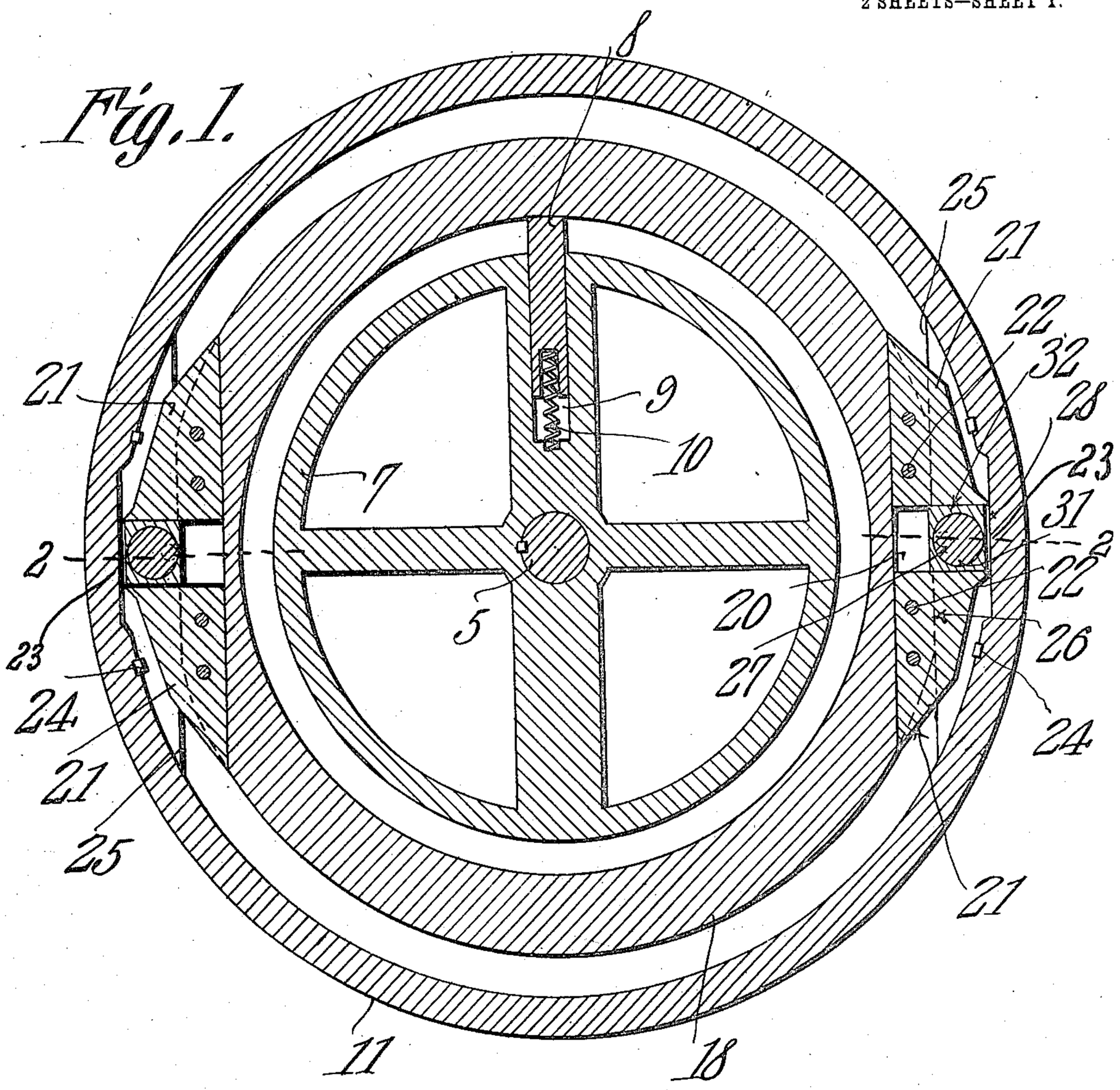
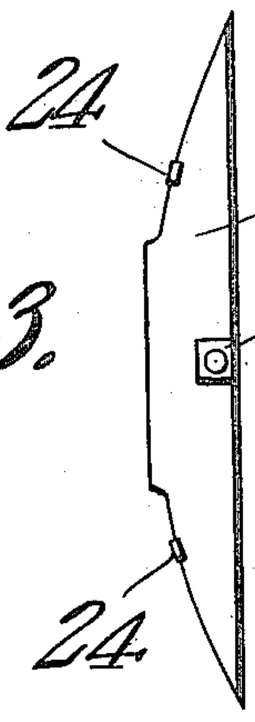



Fig. 3.




Witnesses

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2 SHEETS—SHEET 2.

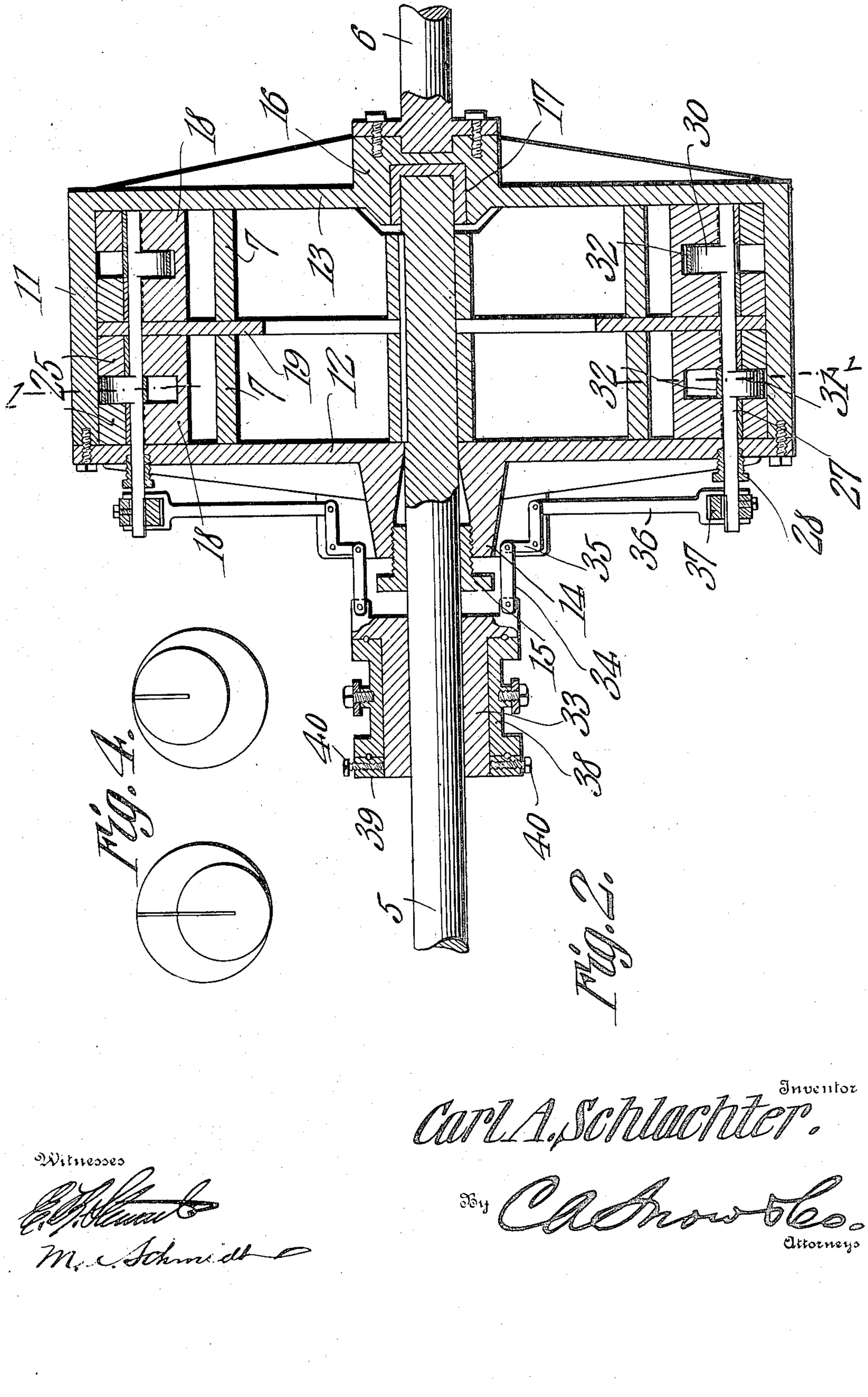


Fig. 4.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC CLUTCH.

952,217. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed June 30, 1909. Serial No. 505,244.

*To all whom it may concern:*

Be it known that I, CARL A. SCHLACHTER, a citizen of the United States, residing at Rockwell City, in the county of Calhoun and State of Iowa, have invented a new and useful Hydraulic Clutch, of which the following is a specification.

This invention relates to that class of hydraulic clutches comprising, broadly speaking, a rotary pump, to which the drive member is made fast, the driven member being made fast to the fluid chamber of the pump; or, the parts may be interchangeably arranged. The clutching action is effected by the resistance offered to the rotation of the piston reacting on the walls of the fluid chamber. Means are also provided whereby the circulation of the fluid may be retarded more or less, according to the speed desired, the extent of retardation determining the rate of speed at which the driven member is rotated.

It is the object of the present invention to provide a mechanism of the kind stated which is easily operated, and positive in its action, and also one which is simple in structure, and in which vibration is reduced to a minimum.

With these objects in view the invention consists in a novel construction and arrangement of parts, to be hereinafter described and claimed, reference being had to the drawings hereto annexed, in which:—

Figure 1 is a vertical section taken on the line 1—1 of Fig. 2. Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1. Fig. 3 is an elevation of one of the guide ribs, hereinafter referred to. Fig. 4 is a diagrammatic view, illustrating the relative positions of the piston.

In the drawing, 5 and 6 denote two shafts, In the following description, 5 will be considered the drive shaft, and 6 the driven shaft, but it will be understood that the arrangement may be reversed.

On the shaft 5 is mounted, side by side, and spaced slightly apart, a pair of rotary pistons 7, which are keyed or otherwise made fast on said shaft so as to turn therewith. The pistons are in the shape of wheels, and each carries a radially extending blade 8, which is slidably mounted in a recess 9, made in the body thereof. A spring 10 seating in the recess behind the blade, presses the same outwardly. The pistons 7 operate in a cylinder 11, closed at its ends by heads 12 and 13 respectively. The head 12 is provided with a stuffing-box 14, through which the shaft 5 extends into the cylinder, and the stuffing-box is provided with a gland 15.

On the head 13 is a hub 16, to which the shaft 6 is made fast in any suitable manner. The head, on the inside of the cylinder, is also formed with a bearing 17, in which the inner end of the shaft 5 is supported. The cylinder 11 and pistons 7 are arranged concentrically with respect to each other, and also with respect to the shafts 5 and 6, said shafts being in axial alinement.

Mounted side by side in the cylinder 11 is a pair of rings 18, in which the pistons 7 travel. These rings are of the same width as the pistons, and they are held spaced apart by a thin ring 19, and at their outer edges they fit the inner surfaces of the heads 12 and 13. The inside diameter of the rings 18 is greater than the diameter of the pistons 7, whereby a space therebetween is had, into which space the blades 8 extend, they being held in contact with the inner surface of the rings by the springs 10. This space thus forms the fluid chamber of the pump, and the blades rotate therein. The rings 18 are loose in the cylinder 11, and they form movable walls of the fluid chambers, said walls being adapted to move in the direction of the pistons, to retard or to entirely stop the flow of the fluid, as will be presently described. There is sufficient space between the rings and the cylinder 11 to permit this movement of the rings.

At diametrically opposite points, the outer surface of the rings 18 is recessed as indicated at 20, said recesses extending radially. On opposite sides of each recess each ring carries a lug 21, which seats in a notch made in the outer surface of the rings. The lugs are fastened to the rings by bolts, rivets, or other suitable fastening means 22. The lugs project from the outer surface of the rings for a short distance, and the space between the projecting portions coincides with the recesses 20. The lugs extend outwardly as far as the inner surface of the cylinder 11, said surface at this point being made plane, as indicated at 23, so that the rings may be shifted as already described.

To the inner surface of the cylinder 11 are secured, by means of keys or other suitable fastening means 24, ribs 25, which project into the space between the cylinder and the rings 18 a sufficient distance so as to

form a guide for the latter, the ribs being located on opposite sides of the lugs 21, and engageable thereby. The outer surface of the rings, at diametrically opposite points, is made plane, as indicated at 26, so as to fit the outer edges of the ribs, whereby the rings are also prevented from rotating.

The rings 18 are shifted by the following mechanism: At 27 is indicated a shaft extending transversely into the cylinder 11 parallel to the axes of the shafts 5 and 6, through an opening in the head 12, provided with a stuffing-box and a gland 28. In the ribs 25 are bearings 29, in which the shaft 27 is supported. On the shaft are cams 30, and 31, one of which is for operating one of the rings, and the other for operating the other ring of the pistons. The cams work in boxings 32 having a sliding fit between the lugs 21, and, as the latter are made fast to the rings, it will be evident that when the cam shaft is rotated, the cams, through the boxings, will cause the rings to be shifted toward or from the piston. The cams are oppositely presented from the shaft 27, so that the rings move in opposite directions.

Both sides of the rings, at diametrically opposite points, are provided with the herein described cam mechanism, and said mechanism is operated by the following means:— On the shaft 5 is mounted a sliding collar 33, which is connected by a link 34 to one arm of an angle lever 35, fulcrumed on a suitable support on the head 12. The other arm of the angle lever is connected by a link 36 to a crank arm 37, made fast on the shaft 27. Both cam shafts are connected to the collar 33 by this system of links, lever and crank. The collar 33 may be operated by an ordinary clutch lever connected to a sleeve 38, which is loosely mounted on the collar. The sleeve is held in position by a ring 39, secured to the collar by set screws 40, and ball bearings are also provided for the sleeve.

By the mechanism herein described, it will be evident that when the collar is slipped along the shaft 5, the cam shafts will be rocked, and the rings 18 are caused to move toward or from the piston 7.

The operation of the clutch is as follows:—The space between the rings 18 and the pistons 7 is filled with oil, glycerin, steel balls or some other fluent substance. Fig. 1 shows the positions of the parts when the driven shaft is stationary. The rings extend concentric to the pistons, and, in this position, no resistance is offered to the rotation of the blades 8, the fluid being carried around thereby. To connect the shaft 6 to the shaft 5, the collar 33 is moved in the direction of the cylinder 11, whereby the rings 18 are caused to move in the direction of the pistons, and which places said rings eccentrically with respect thereto. As the rings approach the pistons, a contracted space is formed therebetween at one point, through which space the fluid is forced, whereby its flow is retarded, and a pressure on the rings is thus produced, said pressure being communicated to the cylinder 11 by reason of the fact that the rings are connected thereto, and from the cylinder the pressure is transmitted to the shaft 6. This pressure increases as the rings approach the piston, and when said pressure overcomes the load on the shaft 6, the latter will start to rotate. When the rings are in contact with the pistons, the flow of the fluid is entirely shut off, and the two shafts will then rotate at the same rate of speed. It will therefore be evident that the speed of the driven shaft can be readily controlled, the change from one speed to another being gradual, and without jerks or jars to the mechanism.

In Fig. 4 the relative positions of the pistons and rings, as well as the blades of the pistons, are shown diagrammatically. It will be noted that the rings approach the pistons from opposite directions, and when they are in contact therewith they extend eccentrically to the axis of the respective pistons, and on opposite sides thereof. This arrangement balances the mechanism. The relative position of the blades is such that there is a constant pressure on the fluid, one blade being at the limit of its stroke as the other blade is commencing its stroke. This action is effected by mounting the blades on the same side of the axis of the shafts, and, by the opposite eccentricity of the rings as described.

What is claimed is:—

1. The combination with a drive and a driven shaft, of a rotary piston carried by one of the shafts, a fluid chamber in which the piston works, said chamber being connected to the other shaft, and having a wall which is movable toward and from the piston, to extend eccentrically thereto, spaced lugs on the wall on diametrically opposite sides thereof, a boxing in the spaces between the lugs, a cam in the boxing, a shaft carrying the cam, said shaft extending to the outside of the fluid chamber, and means for operating the cam shaft.

2. The combination with a drive and a driven shaft, of rotary pistons carried by one of the shafts, fluid chambers in which the pistons work, said chambers being connected to the other shaft, each chamber having a wall which is movable toward and from the other piston to extend at opposite eccentricity thereto, radial blades carried by the piston, and engageable at its outer ends with the movable walls, and means for moving said walls toward and from the pistons.

3. The combination with a drive and a

driven shaft, of rotary pistons carried by one of the shafts, fluid chambers in which the pistons work, said chambers being connected to the other shaft, each chamber having a wall which is movable toward and from the other piston to extend at opposite eccentricity thereto, radial blades carried by the pistons, and engageable at their outer ends with the movable walls, said blades being mounted on the same side of the axis of the shafts, and means for moving said walls toward and from the pistons.

4. The combination with a drive and a driven shaft, of rotary pistons carried by one of the shafts, fluid chambers in which the pistons work, said chambers being connected to the other shaft, and each chamber having a wall which is movable toward and from the pistons to extend eccentrically thereto, radial blades carried by the pistons and engageable at their outer ends with the movable walls, spaced lugs on the walls on diametrically opposite sides thereof, boxings in the spaces between the lugs, oppositely presented cams in the boxings, a shaft carrying the cams, said shaft extending to the outside of the fluid chambers, and means for operating the cam shaft.

5. The combination with a drive and a driven shaft, of a rotary piston carried by one of the shafts, a fluid chamber in which the piston works, said chamber being connected to the other shaft, and having a wall which is movable toward and from the piston to extend eccentrically thereto, radial blades carried by the piston, and engageable at its outer end with the movable wall, means for moving said wall toward and from the piston, spaced lugs on the wall on diametrically opposite sides thereof, and ribs on the inner surface of the chamber, between which ribs the lugs are slidably received.

6. The combination with a drive and a driven shaft, of a rotary piston carried by one of the shafts, a cylindrical fluid chamber in which the piston works, said chamber being connected to the other shaft, and having a wall which is movable toward and from the piston to extend eccentrically thereto, and the inner surface of the chamber having plane surfaces at diametrically opposite points, spaced lugs on the wall, engageable at their outer ends with the plane surfaces of the fluid chamber, and means for moving said walls toward and from the piston.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CARL A. SCHLACHTER.

Witnesses:

E. C. STEVENSON,

C. E. STEVENSON.