C. MOUKOS.

PUMP.

APPLICATION FILED MAR. 5, 1909.

953,430.

Patented Mar. 29, 1910.

4 SHEETS—SHEET 1.

FIG. 2

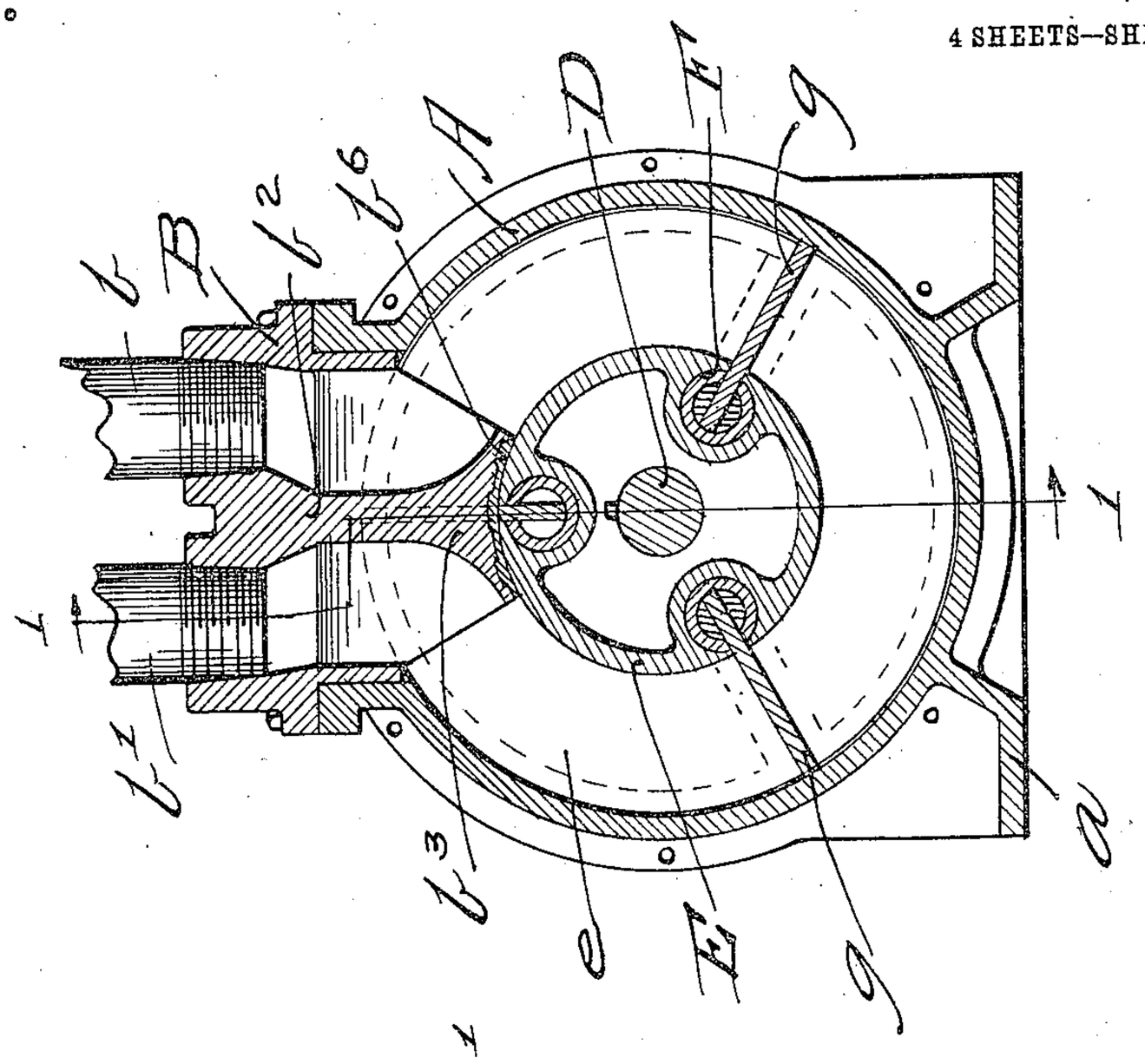
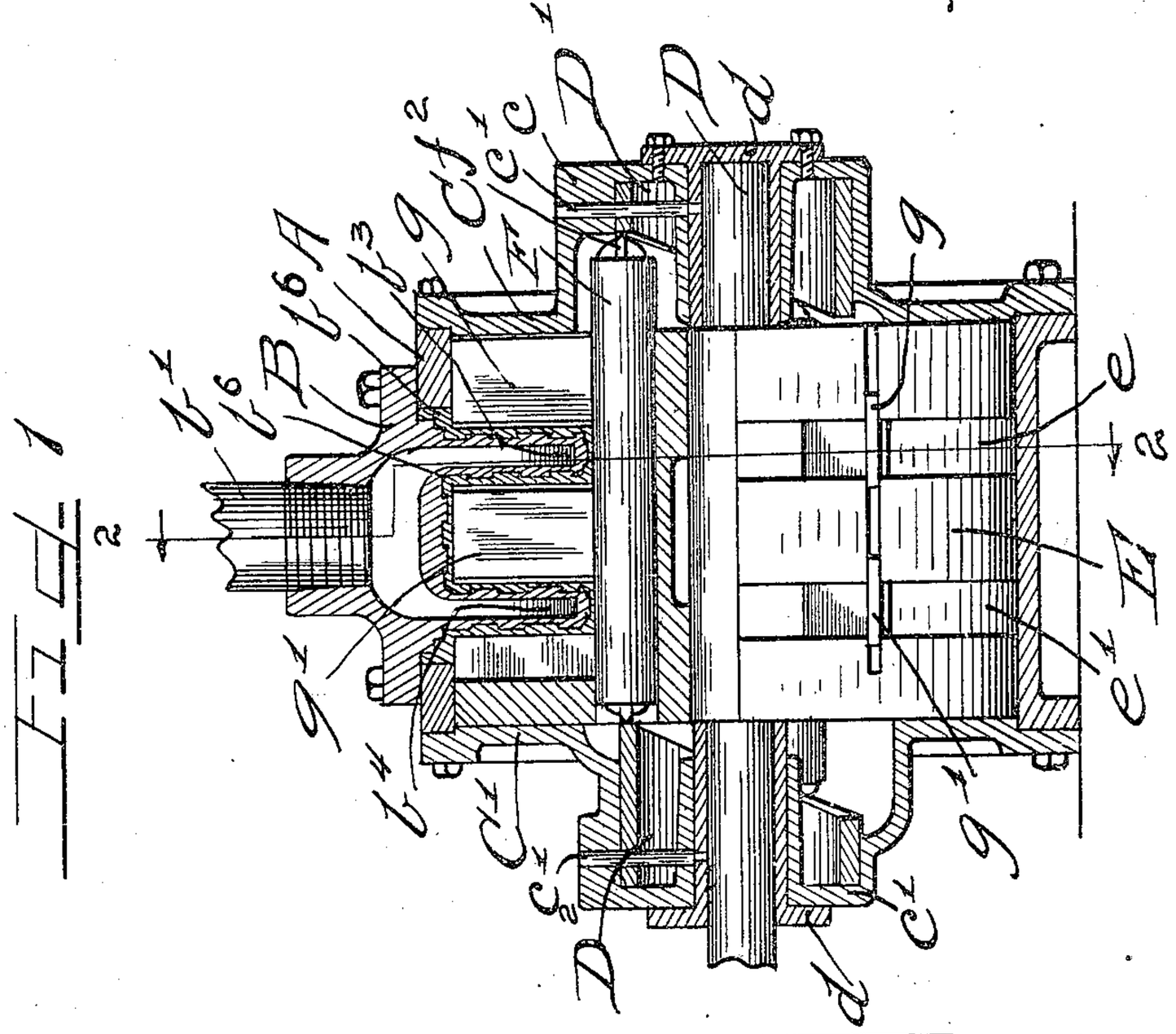


FIG. 1



Witnesses

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4 SHEETS—SHEET 2.

Fig. 3

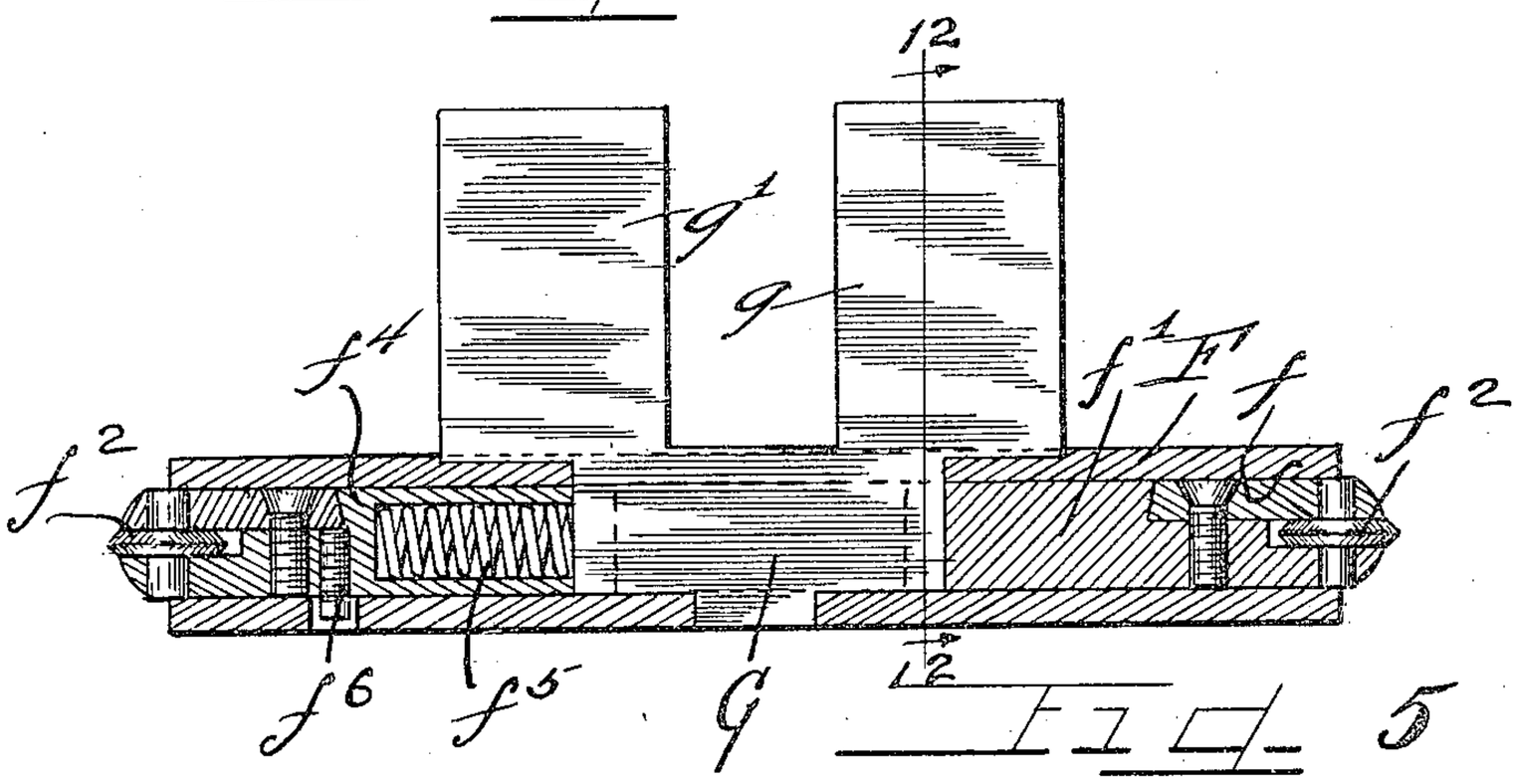
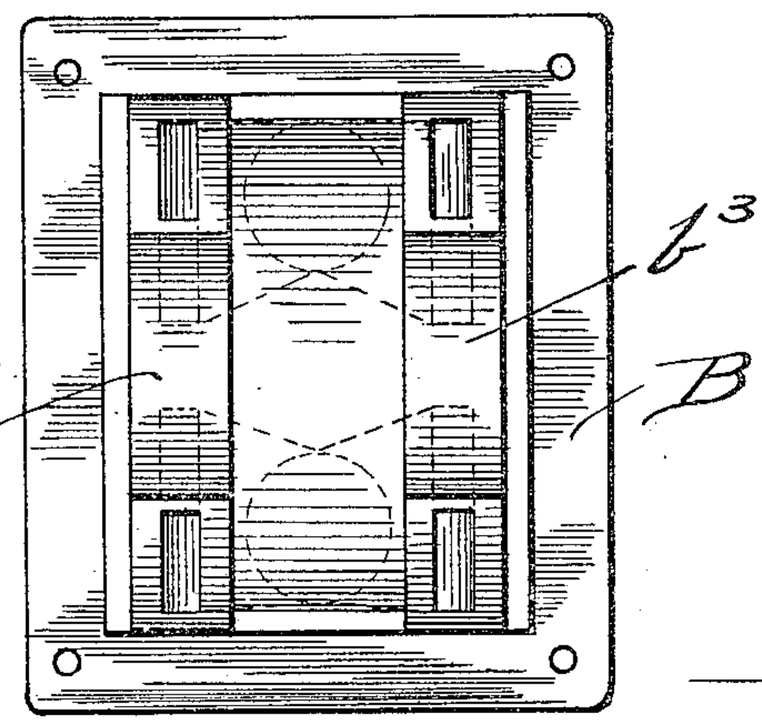


Fig. 5

Fig. 4



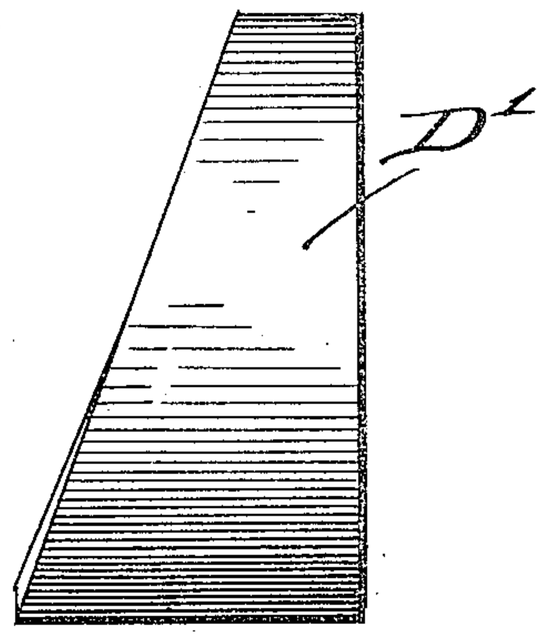
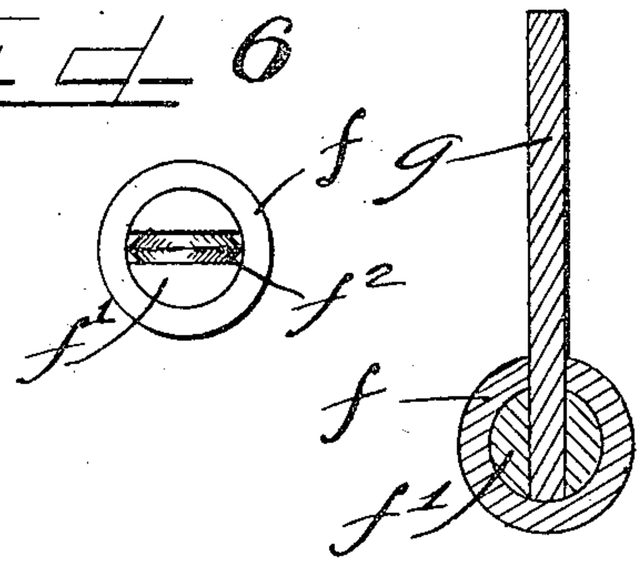


Fig. 12

Fig. 6



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4 SHEETS—SHEET 3.

Fig. 7

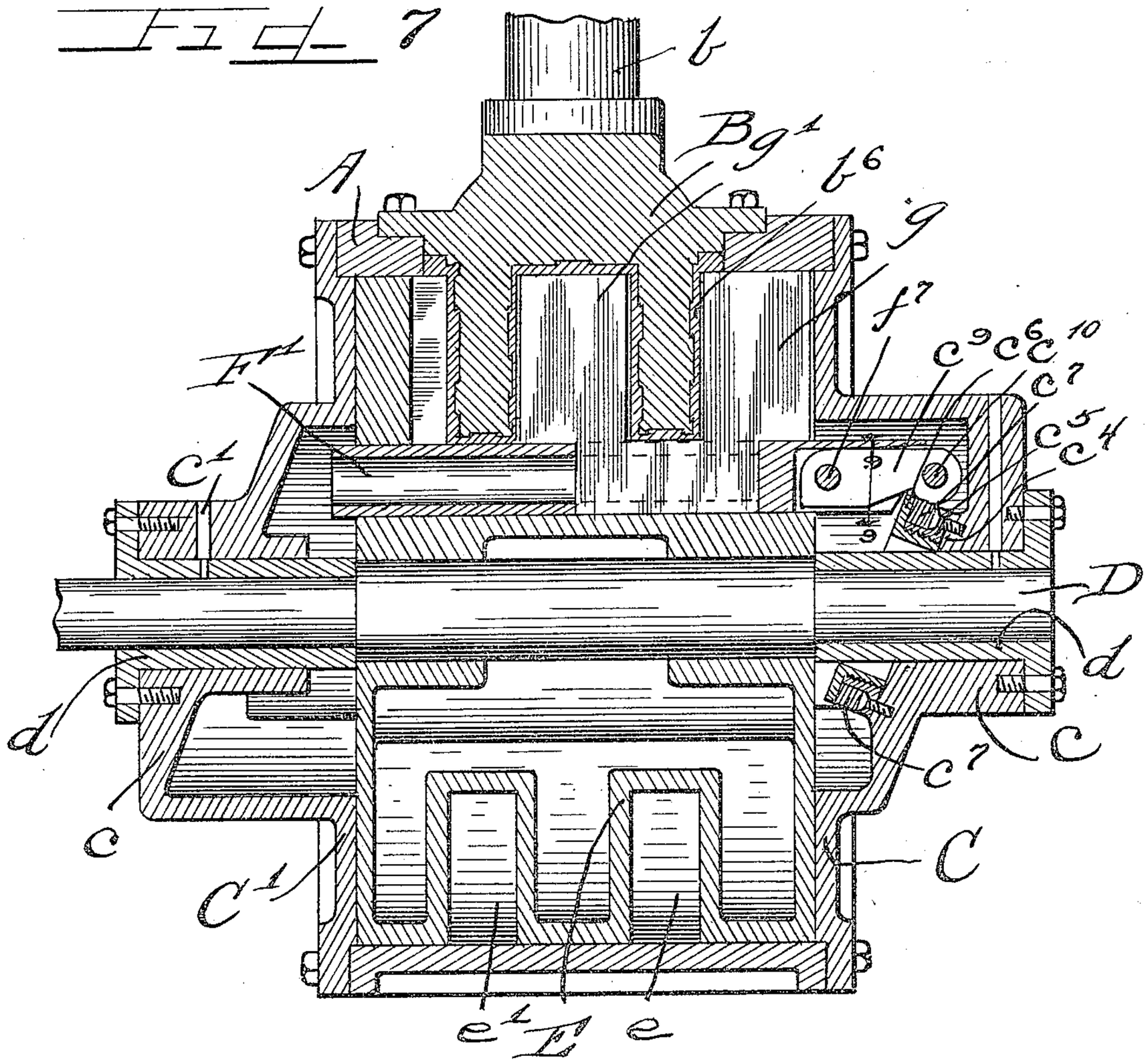


Fig. 8

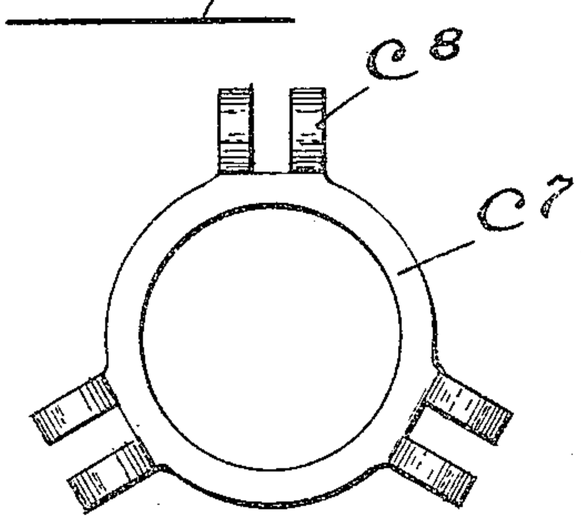
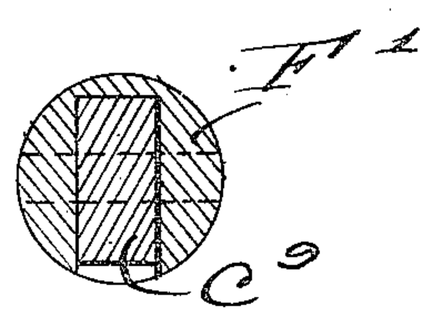


Fig. 9



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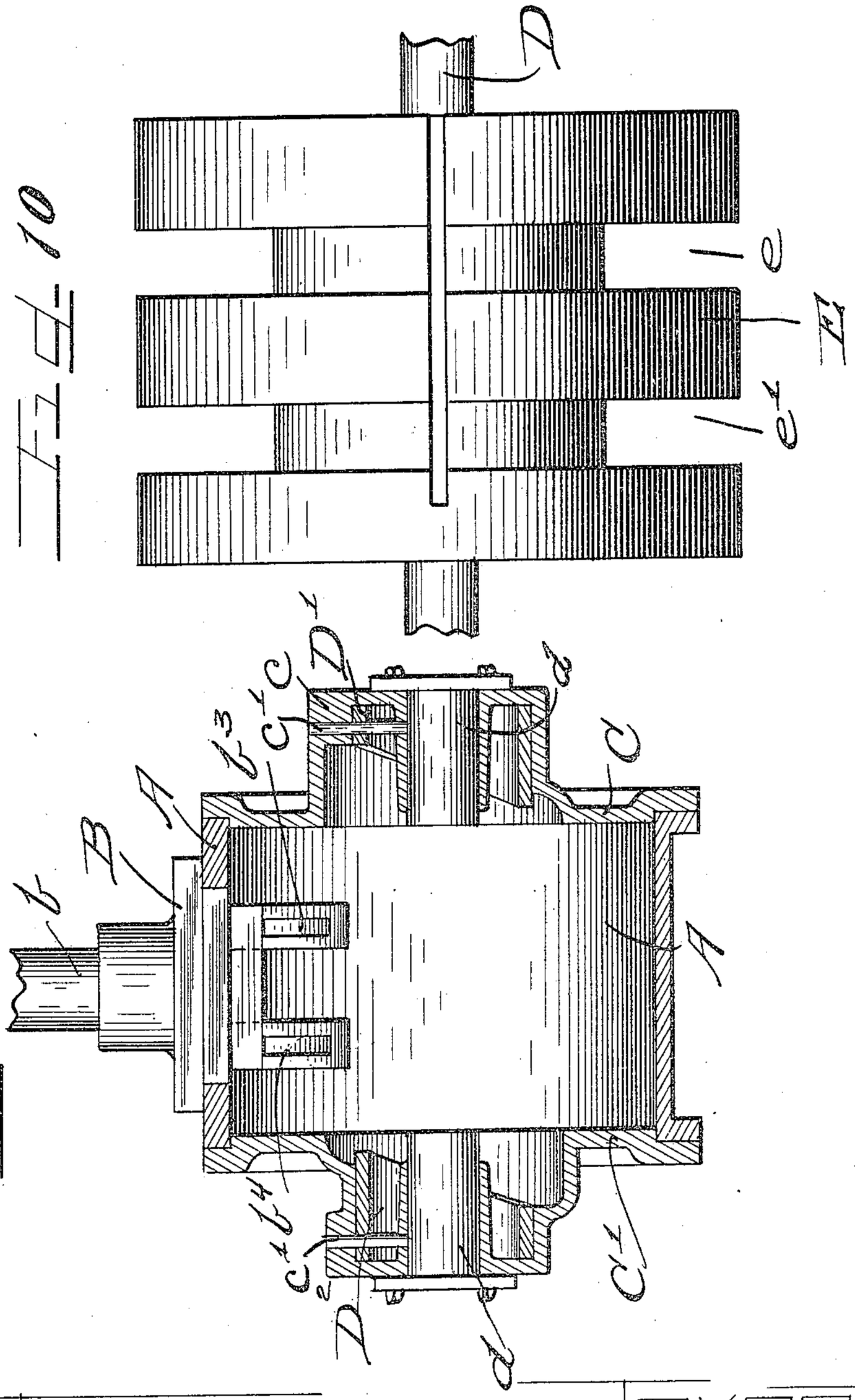
4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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PUMP.

953,430. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed March 5, 1909. Serial No. 481,454.

To all whom it may concern:

Be it known that I, CHARLES MOUKOS, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pumps and belongs to that class of pumps which may be denominated combined rotary and reciprocating, and adapted for use in pumping fluids of any kind either as an exhaust or suction, pressure or force pump, as preferred.

The object of the invention is to afford a rotary pump of high capacity in which reciprocating or sliding valves are employed to control or regulate pressure.

It is also an object of the invention to afford a construction of extreme simplicity having few parts, and not likely to get out of order and adapted to be very positive in operation and to operate practically without packing of any kind.

It is furthermore an object of the invention to afford a reciprocating element in connection with a rotary pump or motor adapted to afford maximum efficiency although not packed in any manner.

The invention also has for its object an exceedingly cheap, simple and durable pump or device of the class described having few parts and not likely to get readily out of order and in which all functions are performed automatically by the rotation of the pumping cylinder.

The invention consists in the matters hereinafter described and more fully pointed out and defined in the appended claims.

In the drawings: Figure 1 is a section taken longitudinally of the shaft and showing the rotative cylinder half in side elevation and half in vertical central section, substantially on line 1—1 of Fig. 2. Fig. 2 is a section on line 2—2 of Fig. 1. Fig. 3 is an enlarged view in longitudinal section of the sliding valves and the reciprocating stem therefor. Fig. 4 is an enlarged bottom plan view of the casting or fitting containing the inlet or exhaust ports. Fig. 5 is a view in side elevation of the shifting cam for the valve stem. Fig. 6 is an end elevation illustrating the anti-friction roller in the end of the vlave stem. Fig. 7 is an enlarged, vertical section of a machine embodying my invention showing a slightly different mechanism for actuating the valve stems. Fig. 8 is a face view of the eccentric ring for actuating said rods. Fig. 9 is an enlarged section on line 9—9 of Fig. 7. Fig. 10 is a view in elevation of the rotative cylinder showing the same removed from the casing. Fig. 11 is a view of the outer casing with the cylinder and valves removed. Fig. 12 is a section on line 12—12 of Fig. 3.

As shown in the drawings: A, indicates a cylindric casing or shell constructed as shown, on its under side with foot pieces *a*, to enable the casing to be secured upon a suitable foundation should it be desired, or, in any event, to afford a support for the same. Said casing is cut away at its top to afford a relatively large and substantially rectangular opening therethrough to receive therein the inlet and exhaust fitting B, hereinafter more fully described, and, as shown, each end of said casing is closed by a head C—C′, as shown in Fig. 1, which is bolted rigidly to the ends of the casing and the centers *c*, thereof project outwardly to afford relatively long bearings for the shaft D, which is journaled, as shown, at its ends in inwardly projecting bearing sleeves *d*, one at each end of the machine. Also fitted in said outwardly projecting hub or boss at the center of each head, is a cam D′, D², respectively, of which, as shown, the cam D′, shown in Figs. 1 and 5, is substantially cylindric and is cut obliquely at its inner end to afford a relatively long inward throw or, in other words, is longer on its bottom, while the cam D², is complemental. therewith and is longest at its top. Both of said cams are rigidly secured in place by means of bolts or in any suitable manner and extending therethrough and through the bearing sleeve and hub boss, *c*, is an oil pipe or tube *c′*, which serves also to assist in holding said cams rigidly in place. Rigidly secured on the shaft D, in said casing and fitting quite closely therein and between the heads C—C′, is what I have termed the rotative cylinder or piston E. This, as shown more fully in Figs. 1, 2 and 7, is cast hollow, if preferred, and is provided with a plurality of peripheral relatively narrow but deep

grooves, extending peripherally around the same and approximately half-way from the periphery to the shaft, said grooves being indicated by e—e'. Cored in said cylinder or piston longitudinally and equal distances from the center, and arranged equal distances apart are three tubular cylindric seats for the reciprocating valve stems F, which, as shown in Figs. 1, 2 and 3, each comprises a tube f, of the requisite length having fitted therein a stem or rod f', journaled on the outer end of which, in any suitable manner, is an anti-friction roller f^2, adapted to track on the cam D'. Said tube is slotted longitudinally and near its center and fitted therein and rigidly engaged thereto is a plate G, having integrally connected therewith at its outer edge valve plates g—g'. Said stem or rod f', engages the end plate G, as shown in dotted lines in Fig. 3, and in the other end of said tubular stem f, is inserted a rod f^4, which also is slotted at its inner end to engage the end of the plate G, and is also bored or cored in its inner end to receive a spring f^5, the end of which bears against the end of said plate and acts to hold said rod f^4, outwardly. Journaled on the outer end of said rod f^4, in any suitable manner is an anti-friction roller f^2, such as before described, and seated in said rod or bar f^4, and extending into an aperture in the tube f, is a pin or screw f^6, which limits the outer adjustment of said rod.

The cylinder, as shown, is slotted longitudinally in radial alinement with each of said reciprocating stems to receive the plates g—g', which provide sliding valves, as shown in Figs. 1 and 2, and as the cylinder rotates carrying the valve stems therefor, it is obvious that said cams shift said stems longitudinally of said cylinder or piston thereby reciprocating the sliding valves across the grooves in said cylinder to successively open and close the same.

The inlet and discharge passages open through the casting or fitting B, before described. This, as shown, comprises a casting substantially rectangular in exterior outline adapted to be connected with pipes b—b', between which is an integral web b^2, which separates the inner ends of said pipes. As shown, said fitting extends inwardly and affords two parallel inwardly extending legs b^3—b^4, which project into the grooves e—e', in the cylinder, and as shown, in Fig. 4, are ported oppositely. As shown also, said legs and the space between the same are recessed or channeled in any suitable manner to permit Babbitt or other anti-friction metal to be secured thereto, and Babbitt or other anti-friction metal is cast thereon, as shown at b^6, in Figs. 1 and 2, said Babbitt coating being preferably cast in place after said exhaust fitting has been fitted to the cylinder or piston.

The operation is as follows: The pump is driven in any suitable manner by power applied to the shaft D, and the fluid to be pumped may be introduced through either the pipe b, or b', dependent upon the direction of rotation. The rotation of the cylinder acts to shift the valve plates longitudinally the cylinder, opening the grooves or channels as said plates approach the legs b^3—b^4, in passing which said plates are concealed wholly within the body of the cylinder, as shown in Figs. 1 and 7, while the corresponding plates at the lower part of the cylinder still lap across the grooves in said cylinder, and although not necessarily tight fitting therein, and although destitute of packing of any kind, serve to force the fluid or liquid in advance thereof around the pump and out at the other pipes b, or b', the valve plates, of course, retracting into the body of the cylinder as before described, as the plates approach the discharge. Inasmuch as the valve stems are provided with anti-friction rollers in the ends thereof, little friction is occasioned by such operation and the rods or stems f—f^4, being adjusted to exactly fit between the cams, it follows that there can be no hammering or binding due to the operation although the pump may be driven at a high rate of speed.

Of course, I am well aware that other means may be employed for reciprocating the valve plates and I have shown in Figs. 7, to 9 inclusive a slightly different construction for actuating the valve stems. For this purpose, as shown, the inner face of the hub is shaped to afford an inclined or cam face at one end thereof indicated by c^4, and rigidly bolted thereon is a collar c^5, internally threaded and in which is engaged a flanged collar c^6, the flange of which projects upwardly and inwardly and affords a recess between the same and the base of the collar c^5. Seated in said recess and rotatable therein is a ring c^7, provided, as shown, at 120° apart with three pairs of upwardly extending lugs c^8, adapted to engage therebetween the exterior rounded end of a link c^9, through which extends a pintle c^{10}, pivotally engaging said link on said ring. At its inner end said link is pivotally engaged in the valve stem F', by means of a pintle f^7. As shown, the valve plates are secured in place in said stem substantially as before described, and the stem may be made hollow or tubular, for the rest of its length for lightness, if desired, and, of course, if preferred, ball bearings may be provided for the rings c^7. The operation is in all respects as before described except that in this instance, the stems are reciprocated from one end only and are pulled and pushed back and forth by the rotation of said cylinder, said inclined ring serving as a cam for that purpose.

Of course, a pump constructed as described may be made of any desired capacity by varying the size of the parts or by extending the length of the cylinder and providing a greater number of channels or grooves, in which event, of course, the inlet and outlet passages will be connected with a suitable number of inwardly extending legs such as b^3—b^4, to afford one for each of said grooves or channels.

Obviously any suitable device may be employed for reciprocating the sliding valves, and I do not purpose limiting this application in this respect, but instead do not purpose limiting this application otherwise than necessitated by the prior art for many details of construction and arrangement may be varied without departing from the principles of this invention.

I claim as my invention:

1. The combination with a cylindric casing of an inlet and an outlet pipe communicating therewith, a rotatable cylinder in said casing provided with relatively broad peripheral channels, axially reciprocating valve plates slidable to close and to open said channels and a fitting secured to the casing having a plurality of legs to close the passages and provided with inlet and outlet passages.

2. The combination with a cylindric casing of a rotatable cylinder therein having deep and broad peripheral channels extending around the same, an inlet and an outlet fitting extending into said channel and filling the same at one point in the casing, independent inlet and outlet pipes opening through said fitting into said cylinder oppositely, sliding valves in said cylinder of a width to close said channels, means for actuating the valves to shift the same to wholly open the channel at said inlet and outlet positions and to wholly close the channel after passing said positions, and anti-friction means for shifting said valves.

3. In a device of the class described a casing, a rotatable cylinder having deep broad peripheral channels therein, valves slidable longitudinally of the cylinder to open and close said channels, anti-friction means for actuating said valves, an inlet and an outlet fitting extending into the casing having parallel legs, one leg extending into each channel and ported oppositely providing an inlet passage and an outlet passage for each channel, and anti-friction bearing metal lining the outer side of said legs in said channels.

4. A pump of the class described embracing a rotatable cylinder having peripheral channels therein, valves slidable across said channels to close the same at a plurality of points in the rotation of the cylinder, anti-friction means for shifting the valves, an inlet and an outlet fitting extending into said channels and closing the same at one point, and ported oppositely therethrough, and mechanism for shifting the valves to retract the same to the body of the cylinder when approaching said inlet and outlet positions.

5. A pump comprising a casing, a rotatable channeled cylinder therein, valves for closing and opening the channels in said cylinder, cams at the ends of the casing, a tubular stem secured to each valve, a member slidably secured in each end of the tubular stem and a spring for forcing one of the members outwardly to hold the members against the cams.

6. In a device of the class described a casing, a rotatable member therein having peripheral channels, tubular stems slidable longitudinally of the rotatable members, plates secured thereto for closing and opening the channels, anti-friction rollers extending from each end of the stem and one slidably mounted, a spring for forcing the slidably mounted roller outwardly and cam members at the ends of the casing against which the rollers engage for adjusting the plates axially.

7. In a device of the class described a casing, a rotatable member therein having peripheral channels, tubular stems slidable longitudinally of the rotatable members, plates secured thereto for closing and opening the channels, anti-friction rollers extending from each end of the stem and one slidably mounted, a spring for forcing the slidably mounted roller outwardly, cam members at the ends of the casing against which the rollers engage for adjusting the plates axially, and a fitting seated in the casing having a plurality of legs, one extending into each channel and ported oppositely providing an inlet and an outlet passage in each leg.

8. In a device of the class described a casing, a rotary cylinder therein having peripheral channels, valves for closing and opening the channels, a member extending into the casing provided with parallel legs, one fitting into each channel and each provided with oppositely opening inlet and outlet passages and all of the inlet passages in the legs communicating and all of the outlet passages communicating.

9. A device of the class described embracing a casing, heads thereon, having outwardly extended hollow hubs, a cam in one hub, a shaft journaled axially in said casing, a cylinder rigidly secured thereon rotatable therewith and having a plurality of broad deep channels extending circumferentially around the same and having longitudinal slots at equal distances apart and extending radially inwardly in the cylinder, valve plates slidable in said slots to open and close the channels, a stem for the valve plates of

each slot, anti-friction bearing means on the end of each stem engaging the cam in said hub, inlet and outlet ports opening into said channels oppositely and separated each from each therein, and means for adjusting the stems to vary the throw of the valves.

10. A pump embracing a casing, a rotatable cylinder therein having peripheral channels and a fitting secured to the casing having legs extending into and closing the channels and inlet and outlet passages opening oppositely from each leg into each channel.

11. A pump embracing a casing, a rotatable cylinder therein having peripheral channels, a fitting secured to the casing having legs extending into and closing the channels, inlet and outlet passages opening oppositely from each leg into each channel, valves normally closing the channels, stems secured thereto projecting from opposite ends of the cylinder and members engaging the ends of the stems and positively shifting the same to adjust the valves to open the channels when passing the legs.

12. In a device of the class described a casing, a rotatable channeled cylinder therein, reciprocating valve plates for closing and opening the channels and means for actuating the valve plates comprising a tube connected with the valve plates, a stem in each end thereof, an anti-friction roller in the outer end of each stem, and oppositely disposed cams for engaging the anti-friction rollers therebetween and reciprocating the valve plates.

13. In a device of the class described a casing, a head on each end thereof having an enlarged hub providing a chamber, a cam member secured in each chamber in the hub, a bearing sleeve secured in each hub, a shaft extending through the bearing sleeves, a cylinder secured to the shaft and rotatable in said casing provided with peripheral channels, valves for closing and opening the channels, means connected with the valves and operated by the cam members secured in the chambers in the heads, and an inlet and outlet fitting secured to the casing having legs extending into the channels, each ported oppositely to provide an inlet and an outlet passage in each leg.

14. In a device of the class described a casing, a head on each end thereof having an enlarged hub providing a chamber, a cam member secured in each chamber in the hub, a bearing sleeve secured in each hub, a shaft extending through the bearing sleeves, a cylinder secured to the shaft and rotatable in said casing provided with peripheral channels, valves for closing and opening the channels, means connected with the valves and operated by the cam members secured in the chambers in the heads, oil pipes or tubes extending through the cams and bearing sleeves rigidly holding the cams in position and adapted to deliver lubricant to the bearings.

15. In a device of the class described a casing, a head on each end thereof having an enlarged hub providing a chamber, a cam member secured in each chamber in the hub, a bearing sleeve secured in each hub, a shaft extending through the bearing sleeves, a cylinder secured to the shaft and rotatable in the casing provided with peripheral channels, valves for closing and opening the channels, means connected with the valves and operated by the cam members secured in the chambers in the heads, and a fitting secured to the casing adapted to close all of the channels at one point and provided with inlet and outlet passages for each channel.

16. In a device of the class described a casing, a rotatable channeled cylinder therein, valves for opening and closing the channels, comprising a tube, a plate therein, plate valves integral with said plate, stems in each end of the tube, one provided with a recess therein, a spring in the recess bearing against the plate and anti-friction rollers secured to the outer ends of the stems.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

CHARLES MOUKOS.

Witnesses:
K. E. HANNAH,
LAWRENCE REIBSTEIN.