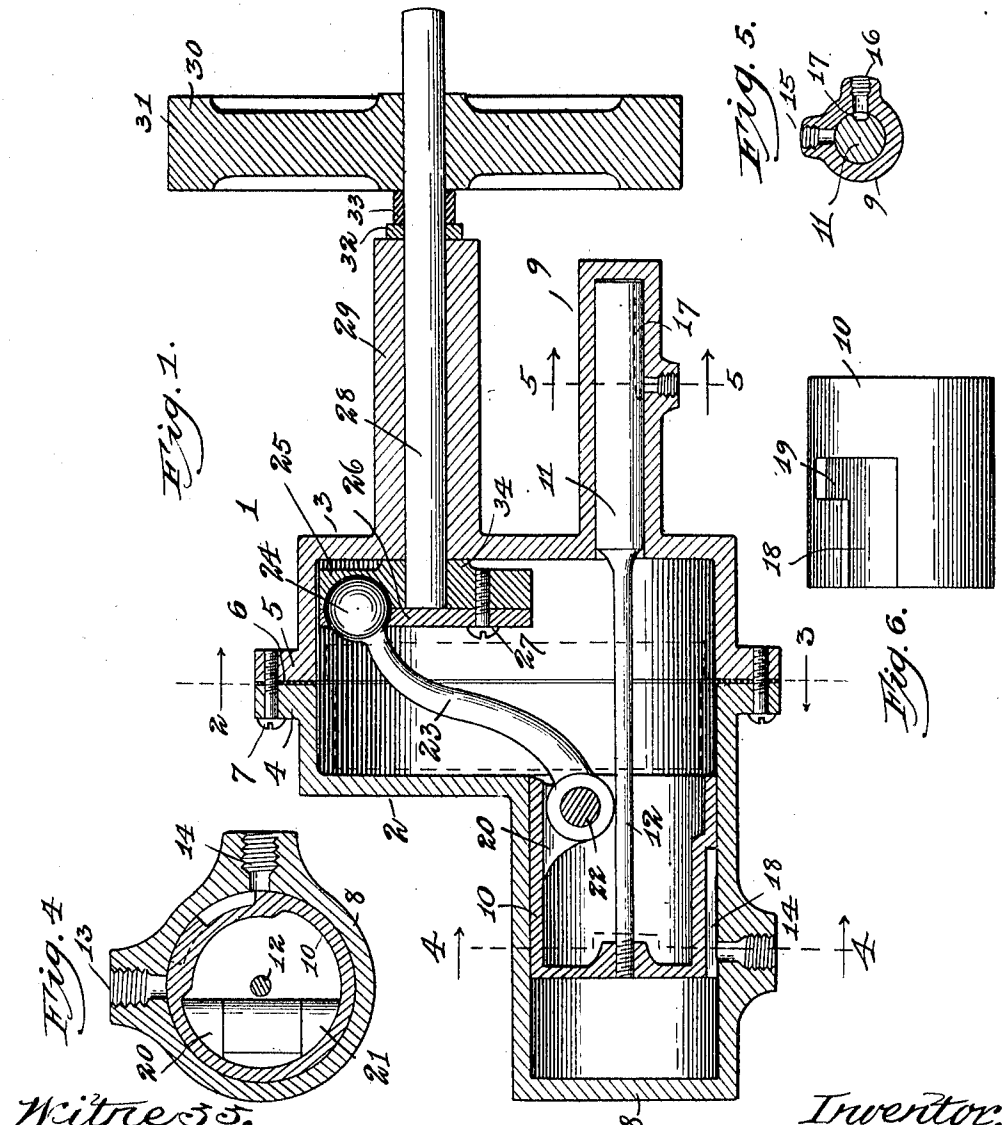
C. A. ANDERSON.

PUMP OR ENGINE CONSTRUCTION.

APPLICATION FILED MAY 14, 1915. RENEWED MAY 26, 1919.

1,326,889. Patented Dec. 30, 1919.

2 SHEETS—SHEET 1.



Witnesses,

Inventor,

Charles A. Anderson

By Frank L. Belknap Atty.

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2 SHEETS—SHEET 2.

Fig. 2.

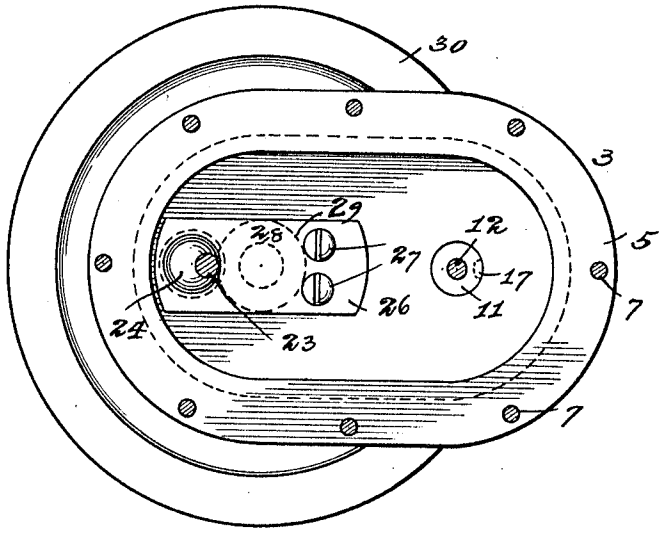
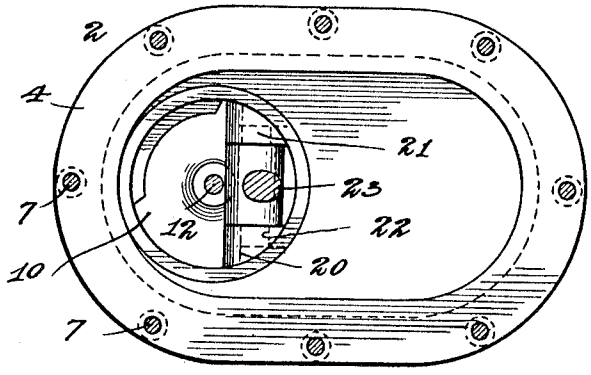


Fig. 3



Witness,
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UNITED STATES PATENT OFFICE.

CHARLES A. ANDERSON, OF CHICAGO, ILLINOIS.

PUMP OR ENGINE CONSTRUCTION.

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Application filed May 14, 1915, Serial No. 28,069. Renewed May 26, 1919. Serial No. 299,894.

To all whom it may concern:

Be it known that I, CHARLES A. ANDERSON, a citizen of the United States, residing in the city of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Pump or Engine Constructions, of which the following is a specification.

My invention relates to pump or engine construction, and more particularly to improvements in pump or engine construction, adapted for use in boiler systems, refrigerating lines and the like, though in its broader aspects, it is not limited to the particular use or uses specified.

Among the salient objects of the invention are to provide a construction which can be used either as an engine or pump, as a plurality of pumps, or as a combined engine and pump; to provide a construction which may be used as a steam engine, vapor engine, gas engine, air engine, and the like, and so designed that when vapor is used to drive it, the apparatus can be connected to a condenser, and the vapor after expanding in the power cylinder is condensed and pumped back into the boiler or generator; to avoid the necessity of any additional parts, the piston itself being employed as a slide valve, and having grooves controlling the inlet and exhaust ports, so arranged that the engine or pump can be reversed and either port used as the inlet or outlet; to provide means for rocking the piston during its reciprocating movement so that the port openings are controlled by a combined rotary and reciprocating movement of the piston, the valve passage in the wall of the piston being so proportioned that a relatively sharp opening and closing of the ports may be obtained and pressure on the piston is permitted for only a part of the outward or power strike; to provide a construction in which a plurality of axially alined cylinders can be employed, the pistons in the cylinders being rigidly connected so that movement given to one piston is simultaneously imparted to the other piston; to utilize an offset rod attached to one of the pistons as a means for rocking the pistons as they reciprocate, the free end of the offset rod being so connected to a continuously rotatable shaft that rotary movement of the latter will cause a rocking movement of the piston, or the reciprocating of the piston will cause both a rocking of the piston and a continuous rotation of the shaft; to provide a construction in which the shaft connected to the offset rod may be provided with a fly wheel to balance the action of the pistons, this fly wheel being adapted for use either as a drive wheel or a driven wheel; to provide a construction in which the liquid can be pumped out to the boiler or vapor generator and the liquid evaporated against pressure; to provide means to prevent leakage between the working pistons and the outer air; and in general to provide an improved construction of engine or pump, or combined engine and pump, for use in refrigerating lines, boiler systems, and the like.

In the drawings:

Figure 1 is a central vertical section through an apparatus embodying my invention.

Figs. 2 and 3 are sections on the lines 2—3 of Fig. 1, looking in the directions of the arrows.

Fig. 4 is a cross section on the line 4—4 of Fig. 1.

Fig. 5 is a cross section on the line 5—5 of Fig. 1.

Fig. 6 is a side elevation of the main piston.

Referring to the embodiment of my invention shown in the drawings, 1 designates a casing preferably formed of a pair of castings 2 and 3, the former of which is provided with a flange 4, and the latter with a complementary flange 5. Between these flanges is a seal or gasket 6, the flanges being fastened together by suitable securing means such as the screws 7. The sections 2 and 3 are provided with cylinders 8 and 9 respectively, these cylinders being in axial alinement as shown in Fig. 1. Within the cylinder 8 is a reciprocating piston 10, and the cylinder 9 is provided with a reciprocating piston 11, rigidly secured to the piston 10 by means of a stem 12, so that whatever movement the piston 10 makes will be duplicated by the piston 11.

Each of the cylinders is provided with inlet and exhaust ports, the cylinder 8 having an inlet 13 and an exhaust port 14 as shown in Fig. 4, and the cylinder 9 has a similar pair of inlet and exhaust ports 16 and 15. The necessity of additional valves for governing the ports is avoided as the ports of both cylinders are controlled by

means of passages or grooves in their respective pistons, the piston 11 having a groove 17, while the piston 10 has a longitudinal groove 18 provided near the central portion of the piston with an offset groove 19 for the purpose hereinafter described.

In order that the piston groove may control both ports in its cylinder and to insure that the inlet port will be closed when the exhaust is open and vice versa, I provide means for rotating or rocking the pistons simultaneously with their longitudinal reciprocation.

Referring in detail to the portion of the apparatus designed to impart rotating or rocking movement to the pistons, it will be noticed that the piston 10 is formed in the shape of a hollow cup, and on its inner wall is provided with lugs or flanges 20 and 21, through which extends a wrist pin 22, so as to neutralize any side thrust on the piston. Pivotally secured to the wrist pin is a curved arm 23, the arm having a double curve, that is, its portion nearest the wrist pin 22 is curved in one direction and the other half in the opposite direction. The free end of the last mentioned portion is provided with a ball 24 swiveled within a socket formed in the plate 25, and held therein by means of a plate 26, detachably secured to the socket plate by means of screws 27. The socket plate 25 is secured to rotate with a shaft 28, sleeved within a bearing 29, which bearing is formed as an integral portion of the casting 3. Beyond the bearing portion 29, the shaft 28 is provided with a fly wheel 30, the outer surface 31 of this fly wheel being preferably smooth so that the wheel can, if desired, be used as a belt wheel and the shaft 28 as a power shaft.

Intermediate the fly wheel 30 and the end of the bearing 29 is a washer 32, which is forced against the end of the extension 29 by means of a member 33 formed of flexible material. This member is tightly sleeved upon the shaft 28 and serves as a spring between the fly wheel 30 and the end washer 32, and also holds the plate member 25 against the inner wall of the casting 3. In order to reduce the friction between the wall of the casing and the plate 25, the latter is provided with a reduced portion 34, which is accurately finished to form an end bearing. This bearing and the pistons are oiled by means of lubricant contained within the chamber formed by the castings 2 and 3, the escape of lubricant between the meeting edges of the castings being prevented by the gasket 6. Leakage through the bearing 29 is prevented as it is sealed from the air by means of the washer 32 and the member 33 formed of flexible spring material. The chamber thus formed serves as a housing for the moving parts and is partially filled with lubricant so that all the moving parts are continuously oiled, and the prevention of the passage of oil from the lubricant chamber out through the bearing for the shaft by means of the tightly sleeved spring member 33, is an important feature.

In use, the outward or power stroke movement of the piston 19 will, through the action of the curved arm cause the plate 25 and the shaft 28 to rotate, the proportion of parts being such that the plate is turned substantially 180 degrees upon the power stroke. Then as the piston 10 by the inertia of the fly wheel moves back, the wrist pin 22 to which the arm is secured will draw the arm 23 back and turn the plate 25 and shaft 28 through the remaining 180 degrees of the circle. After the shaft 28 starts to rotate, the power of piston 10 and the momentum of the fly wheel 30 will keep the plate 25 and shaft 28 rotating. When the piston 10 passes the inner dead center of its travel, the curved arm 23 will cause a sufficient rotation or oscillation of the piston 10 to move passage 18 out of registration with the exhaust port 14, and the offset passage 19 then comes into registration with the inlet passage 13. This admits the vapor behind the piston and drives the latter forward again on a power stroke.

If the piston and cylinder 9 are being employed as a pump during the above mentioned and described cycle of operations, the piston 11 will move away from the end of the cylinder 9, at the time that the piston 10 moves toward the end of the cylinder 8, and during this movement, its port 17 will register with the inlet, thus sucking in a cylinder full of the liquid after which the rotation of the piston 11 will automatically cut off communication between the inlet 15 and the cylinder passage 17 and will then bring the latter into registration with the outlet passage 16 so that upon reverse movement of the piston 11, the liquid drawn in by the suction of the piston on its outward stroke will be forced out of the port 16 and thus pumped wherever desired.

In case vapor such as steam is used for driving the piston 10, the vapor so used, when withdrawn from the exhaust port 14, can be passed through a suitable condenser, and then pumped back into the boiler or generator by means of the piston 11, which serves as a pump. In case it is desired to use one or both cylinders for pumping purposes, the shaft 28 may be utilized as a power shaft, and the fly wheel 30 as a belt wheel. In this use, the rotation of the shaft 28 will revolve the plate 25, and through the action of the arm 23, will impart to both the pistons 10 and 11, a combined reciprocating axial movement. It will be noticed that there are no additional valve members employed, and that the construction throughout is one of great simplicity. The propor-

tioning of the ratio of the cylinders 8 and 9 can, of course, be varied by changing their diameters or the size of the offset passage 19, and the nature and amount of vapor employed for driving the piston 10 can be varied. Also various changes in detail of construction, such as the angle of the shaft 28 may be varied in any desired degree to the axis of the longitudinal movement of the pistons or piston, and other changes in construction and combination of parts can be made without departing from the scope of my invention. I, therefore, do not desire to limit the latter except as specified in the appended claims.

I claim as my invention:

1. In a device adapted for use as a high pressure pump or engine, the combination with a sealed casing, of a cylinder at one side thereof and opening into the casing, a second cylinder extending from the opposite side of the casing and opening into the latter, a shaft bearing extending from the casing, a rotary shaft in said bearing, a projecting member secured to the inner end of the shaft within said casing, a ported piston in each cylinder fixed connections between said pistons, a curved crank arm connecting the projecting members and the pistons, said connections being offset from the axial lines of the shaft and pistons whereby the rotation of the shaft causes a combined rotary and reciprocatory movement of the pistons.

2. In a device adapted for use as a high pressure pump or engine, the combination with a sealed casing, of a cylinder at one side thereof and opening into the casing, a second cylinder extending from the opposite side of the casing and opening into the latter, a shaft bearing extending from the casing, a rotary shaft in said bearing, a projecting member secured to the inner end of the shaft within said casing, a ported piston in each cylinder fixed connections between said pistons, a curved crank arm connecting the projecting members and the pistons, said connections being offset from the axial lines of the shaft and pistons whereby the rotation of the shaft causes a combined rotary and reciprocatory movement of the pistons and sealed connections between the shaft and bearing whereby when gas is used as motive power, gas leaking by the pistons serves to equalize the pressure on the opposite sides of the latter.

3. In a device adapted for use as a high pressure pump or engine, the combination with a sealed casing, of a cylinder at one side thereof and opening into the casing, a second cylinder extending from the opposite side of the casing and opening into the latter, a shaft bearing extending from the casing, a rotary shaft in said bearing, a projecting member secured to the inner end of the shaft within said casing, a ported piston in each cylinder fixed connections between said pistons, a wrist pin secured to one side of one of said pistons, a curved arm pivotally secured to said wrist pin at one end and having its other end connected to said projecting member by a ball and socket joint whereby rotation of the shaft causes a combined reciprocatory and rotary movement of the pistons.

4. In a device adapted for use as a high pressure pump or engine, the combination with a sealed casing, a cylinder extending from one side thereof and opening into the casing, a shaft bearing extending from the opposite side of the casing and opposite relative to the cylinder, a shaft in said bearing, a member secured to the inner end of said shaft and projecting at an angle thereto, a ported piston in said cylinder adapted to coöperate with a port formed in the cylinder, a curved crank arm movably connected to the piston and said projecting member at points offset from the axial lines of the pistons and shaft.

CHARLES A. ANDERSON.