April 18, 1933. J. L. KEMPTHORNE 1,904,374

ENGINE

Original Filed Nov. 25, 1930 2 Sheets-Sheet 1

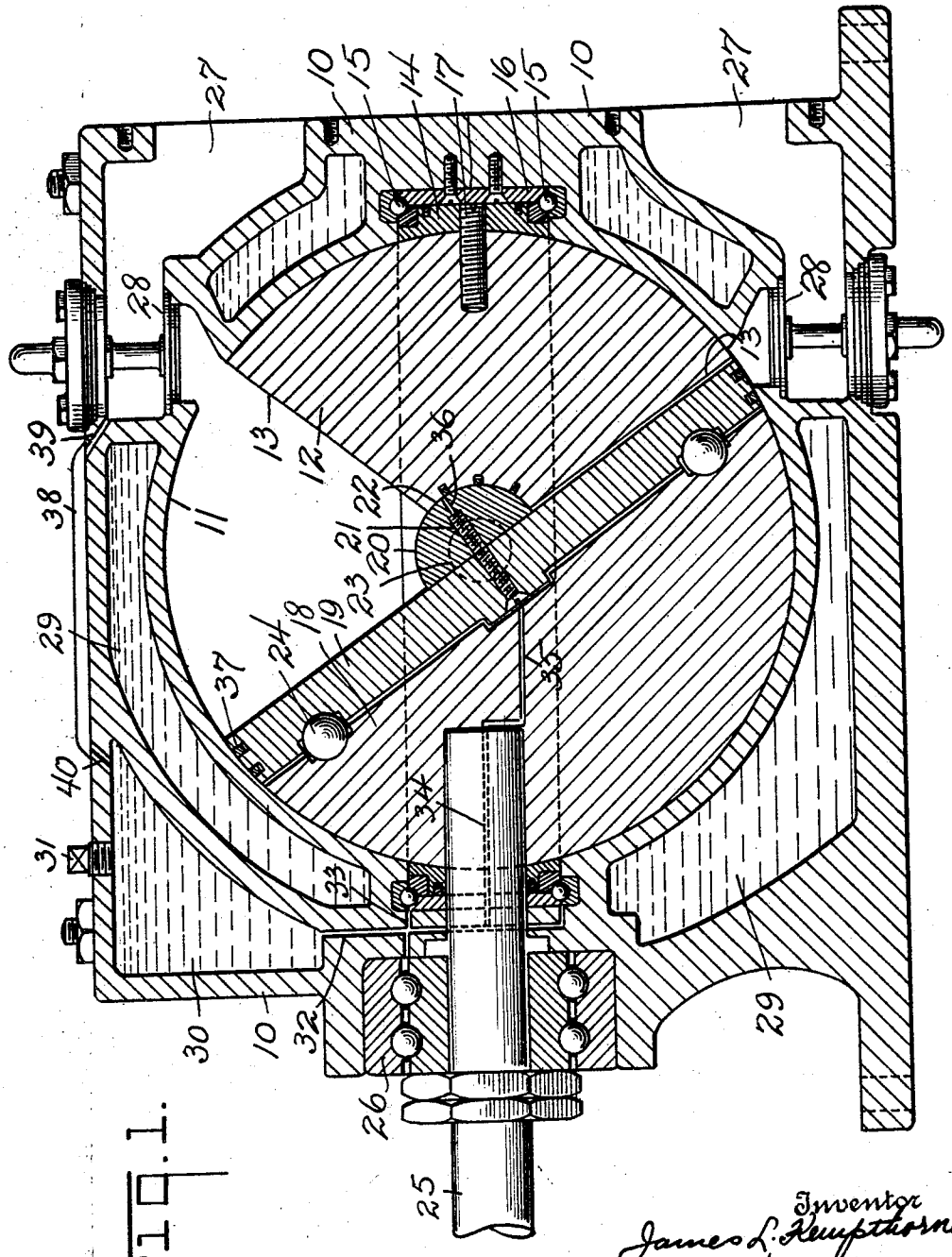


FIG. 1.

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Fig. 3.

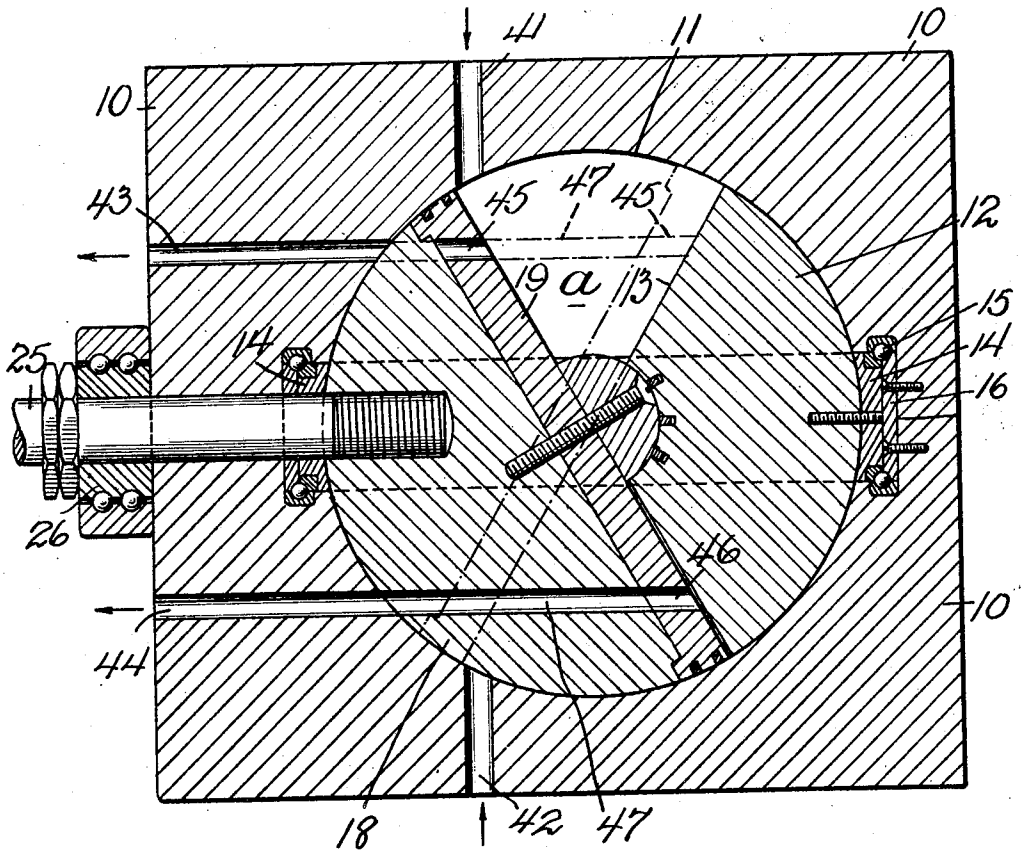
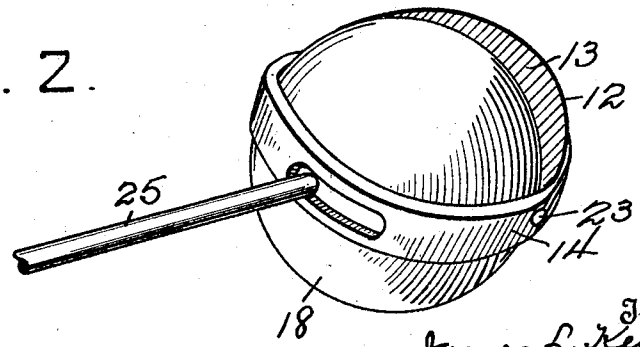


Fig. 2.



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UNITED STATES PATENT OFFICE

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ENGINE

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This invention relates to an improved invention which is adapted for various purposes but I particularly describe the engine as designed for a pump or compressor.

The object of the invention is to provide an engine of this kind which is of large capacity for its size and which is made up of few parts and which is positive in its action.

The invention is illustrated in the accompanying drawings in which Figure 1 is a longitudinal section of a pump made according to my invention. Figure 2 is a perspective view of interior working parts of the pump and Figure 3 is a modified form illustrating the engine as designed as a compressor.

Referring to the pump construction shown in Figure 1 it comprises a casing 10 which is usually made of two sections, one fitting on top of the other, and in the casing is a spherical chamber 11. Partly occupying the spherical chamber is a segmental abutment 12 having divergent flat faces 13. This abutment member, through the operation of the pump to be hereinafter described, must have a slight oscillating movement. To provide for this I secure the abutment member to a ring 14 which can oscillate in the casing and to make this oscillation easy I may provide suitable anti-friction bearings such as the balls 15 in the ball race 16. I show the screws 17 as the means for fastening the abutment member to the ring 14. Opposed to the abutment member is a semi-spherical member 18 which includes a face plate 19 in rear of which the member 18 rotates and having a flat inclined face inclined relative to the axis of rotation. The face of it has an action similar to that of a wobble plate to which the face plate 19 conforms. However, the face plate 19 does not rotate but oscillates on each side of the centre of rotation and moves to and fro relative to the faces 13 of the abutment. The face plate 19 has a sealing strip 20 secured thereto as by the screws 21, this abutment plate extending across the centre of the chamber 11 and fitting into a groove 22 in the abutment member so that while the plate 19 oscillates in what might be termed a vertical plane it oscillates slightly in a horizontal plane with the abutment member 12 and for this purpose is preferably mounted in the ring 14 by the pins or trunnions 23. Suitable anti-friction devices such as the balls 24 may be inserted between the face plate 19 and the main part 18 of the semi-spherical member. The semi-spherical member is mounted on a shaft 25 rotating in suitable bearings 26 and projecting toward the outside of the casing as a means for operating the pump and secured at its inner end to the member 18 in any suitable way.

The pump is provided with inlet and outlet valves these being arranged side by side and properly disposed and I show in the drawing the outlet ports 27 provided with suitable valves 28 to allow the escape of fluid and it will be understood that the inlet ports are similarly disposed and constructed and are provided with inlet valves.

Suitable cooling chambers 29 may be provided for use of water to keep the engine cool. For lubrication I provide an oil chamber 30 in which the oil is introduced through a suitable opening 31. An oil duct 32 carries oil to the bearings 26 and the ball bearings 15 can be supplied with oil through the ducts 33. The duct 32 communicates with a duct 34 in the end of the shaft which communicates with a duct 35 in the member 18 which supplies a lubricant between its members 18 and 19 and the channel 36 conveys oil to the outer surface of the sealing strip. The face plate 19 may be provided with suitable piston rings 37.

In Figure 1, I show the upper half of the chamber 11 as being open and the lower one as being closed and it will be evident that on a half rotation of the shaft 25 that the upper chamber will be closed and the lower chamber will be open. In this way each complete rotation of the shaft 25 opens and closes each of the chambers so that one of the compartments draws in and then expels through its valves the capacity of the half of the chamber 11 on each of such rotations.

In order to insure the lubrication of the parts I provide a channel from an outlet port 27 to the top of the oil chamber. In the drawings this channel is represented by the

pipe 38 which connects at one end through a duct 39 with the exhaust port of the engine and through the duct 40 with the top of the oil chamber so that enough pressure is delivered above the oil to force it into the several parts of the engine to be lubricated.

In Figure 3 I show a similar construction with modifications sufficient to show its use as a compressor and in which the rotating and oscillating semi-spherical member closes and opens the inlet and outlet ports. The inlet ports are shown at 41 and 42. The outlet ports are shown at 43 and 44. Correspondingly arranged ports for completing the exhaust ports are shown at 45 and 46 in the face plate 19. The member 18 which rotates in rear of the face plate has a single port 47 that in the rotation of the member 18 connects first the ducts 43 and 45 and then on a half rotation connects the ducts 44 and 46, this connection being completed as the face plate approaches the face 13 of the abutment member on that half or part of the engine.

As the inlet ports 41 and 42 are arranged on the ends of the chambers or half chambers away from the abutment member they are opened alternately by the semi-spherical member at the end of the suction or opening position for that half chamber. For instance, in full lines in Figure 3 the upper half chamber *a* is open to the inlet 41 and the lower half chamber is cut off from the inlet 42 by the semi-spherical member 18 but the outlet 44 is connected to the outlet 46 through the channel 47 and the compressed air or fluid is ejected.

On a half rotation the parts would assume a position shown in dotted outline in Figure 3 and the chamber *a* would be closed as is the lower chamber in full lines and the lower chamber would be open as shown in dotted lines and exhaust channel 47 would connect the outlet ports 43 and 45. It will be seen that an engine of large capacity is capable of easy operation and can be utilized after a pump compressor has been produced.

Various changes can be made in the position and form of the parts without departing from the scope of the invention.

I claim:

1. An engine comprising a casing having a spherical chamber therein, a segmental abutment mounted to oscillate in the chamber, and a semi-spherical member rotatable in the chamber opposite the abutment and in contact therewith across the centre whereby the abutment is caused to oscillate when the member rotates.

2. An engine comprising a casing having a spherical chamber therein, a segmental abutment with flat faces and mounted to oscillate in the chamber, and a semi-spherical member rotatable in the chamber opposite the abutment and having an inclined face which is in contact therewith across the centre, said member including a face plate providing said contact and in the rear of which the balance of the member rotates.

3. An engine comprising a casing having a spherical chamber therein, a segmental abutment mounted to oscillate in the chamber, and a member rotatable in the chamber opposite the abutment and having an inclined face which is in contact therewith across the centre and a shaft secured to the member and projecting from the casing.

4. A pump or compressor comprising a casing having a spherical opening, a ring forming part of the wall of the opening, an abutment secured to the ring and having faces diverging from the centre, a plate, a sealing strip engaging the centre of the abutment and the plate, said plate fitting the opening, a shaft in the rear of the plate, and a rotatable member on the shaft and bearing on the rear face of the plate.

5. A pump or compressor comprising a casing having a spherical opening, a ring forming part of the wall of the opening, an abutment secured to the ring and having faces diverging from the centre, a plate, a sealing strip engaging the centre of the abutment and the plate and seated at its ends in the ring to permit the strip to oscillate, said plate fitting the opening, a shaft in the rear of the plate, and a rotatable member on the shaft and bearing on the rear face of the plate.

6. A pump or compressor comprising a casing having a spherical opening, a ring forming part of the wall of said opening and arranged to oscillate, an abutment of segmental shape secured to said ring, a plate arranged at an angle in said opening, a sealing strip between the centre of the abutment and the centre of the plate and with its ends in the ring so that it can oscillate in a plane perpendicular to the oscillation of the ring and be carried by the ring when the ring oscillates, a shaft, and a rotatable member on the shaft and engaging the rear face of the plate.

7. An engine comprising a casing having a spherical opening therein, an abutment with two flat faces converging toward the centre, said abutment being arranged to freely oscillate in the opening, and a member opposite said abutment and having a continuous flat face in contact across its centre with the central part of the abutment.

8. A pump comprising a casing having a spherical opening, a freely moving abutment arranged to oscillate in the opening and having flat faces converging to the centre, a plate having a continuous flat face in contact across the centre with the abutment, a rotatable member in rear of the plate, said casing, plate and rotatable member having openings to serve as ports at predetermined points in the rotation of the rotatable member.

9. A machine of the kind described comprising a casing having a spherical opening therein, a shaft, a face plate operated from and at an angle to the axis of the shaft, an abutment opposite the face of the face plate, a ring to which the abutment is secured, said ring being mounted to permit it to oscillate and a sealing strip interposed between the face plate and the abutment and supported by the ring to enable it to oscillate with the ring and relative thereto.

10. In a machine of the kind described, a casing having a spherical opening, a shaft, a face plate arranged at an angle in the shaft and fitting the opening, a ring arranged to oscillate, an abutment supported by the ring and opposite the face plate, and a sealing strip between the face plate and the abutment and adapted to oscillate relative to the ring and to cause the oscillation of the ring in conformity with the movement of the face plate.

In testimony whereof he affixes his signature.

JAMES L. KEMPTHORNE.