March 22, 1927. 1,621,840

H. HOYOSS

HYDRAULIC ENGINE

Filed July 28, 1922 2 Sheets-Sheet 1

Fig. 1

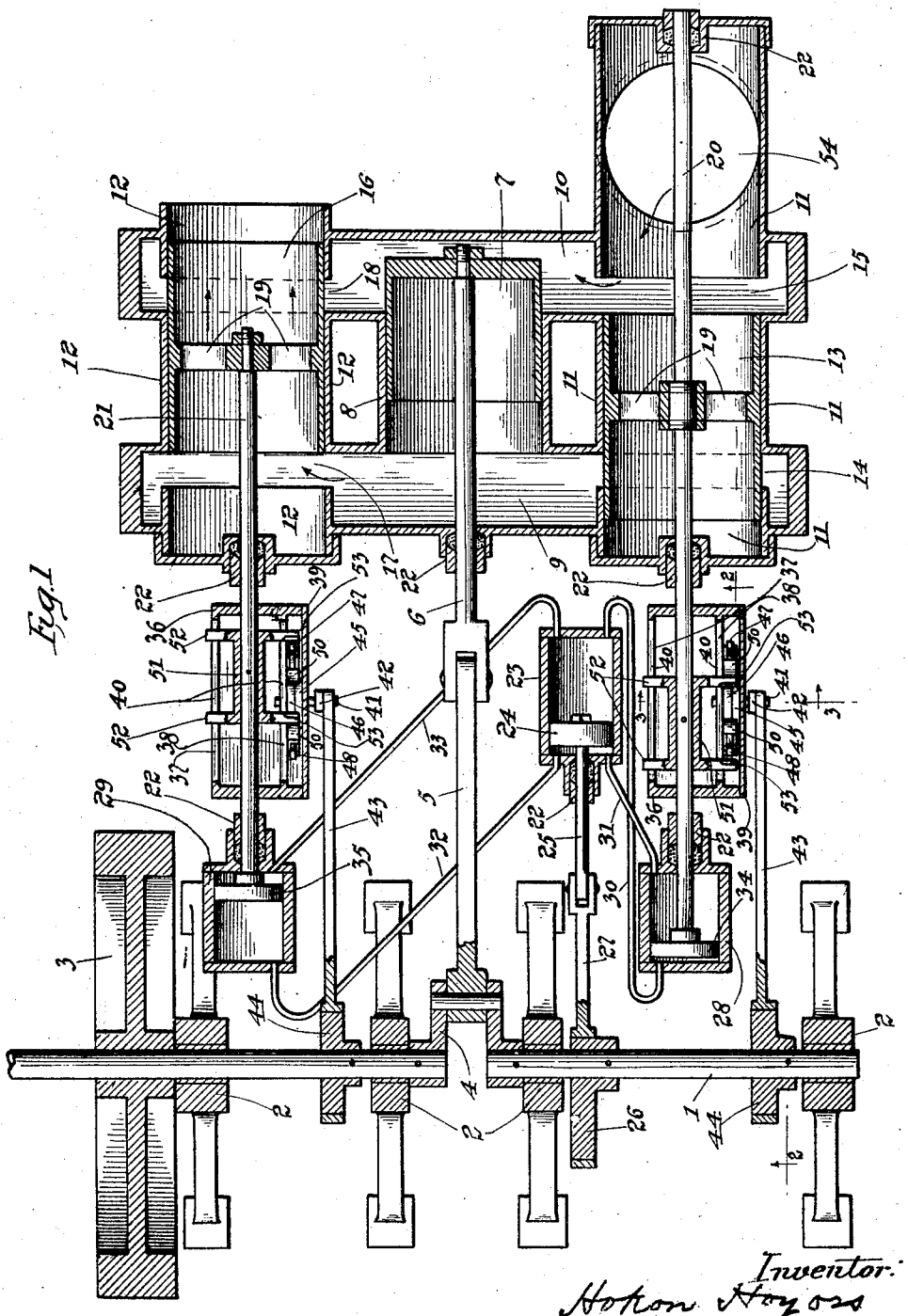

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Fig. 2

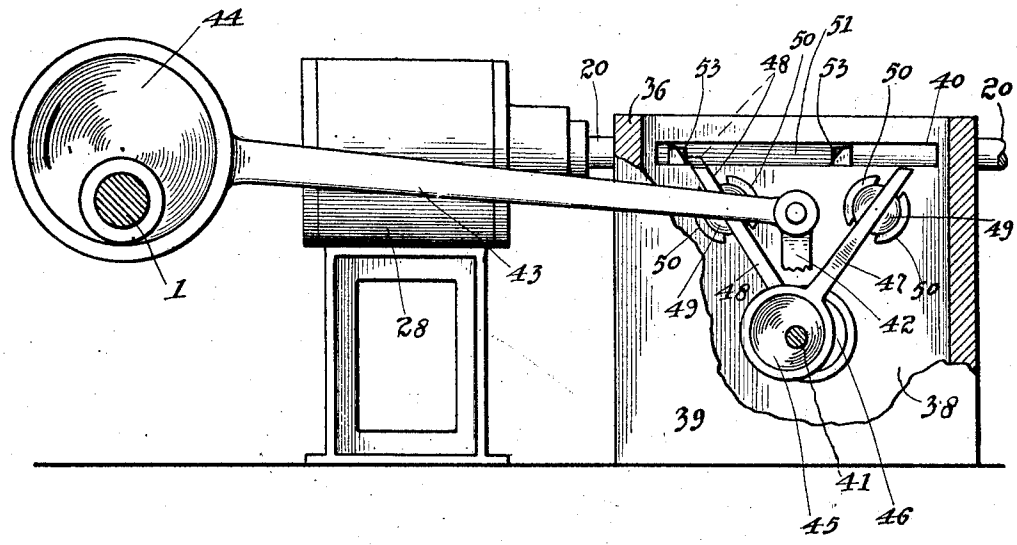


Fig. 3.

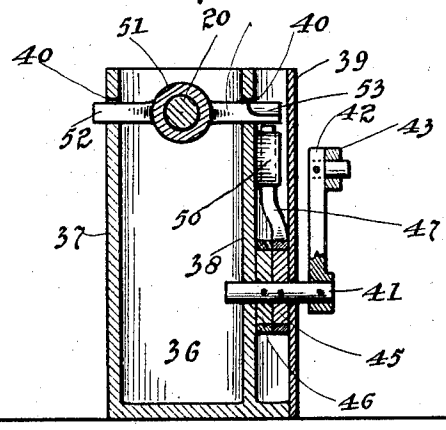
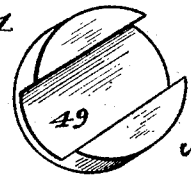


Fig. 4



Inventor:
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Patented Mar. 22, 1927. 1,621,840

UNITED STATES PATENT OFFICE.

HOKON HOYOSS, OF CHICAGO, ILLINOIS.

HYDRAULIC ENGINE.

Application filed July 28, 1922. Serial No. 578,204.

My invention relates to improvements in stationary hydraulic engines adapted for use in mills, factories, power stations, and the like, where water is available as a power producing medium.

An object of the invention, broadly stated, is to provide a hydraulic engine having a double-acting power piston operating in a cylinder in open communication with a chamber at each end thereof, with an inlet valve mechanism for permitting an alternate ingress of water to said chambers, and exhaust valve mechanism for permitting egress of water from said chambers alternately, ingress of water to one chamber being concurrent with egress of water from the other, whereby back pressure on the power piston is avoided.

A further object is to provide a hydraulic engine having a reciprocating cylinder piston, with piston-controlled inlet and exhaust ports adapted to fully open and close when said piston is substantially at the dead centers, whereby maximum efficiency is afforded.

A further object is to provide a hydraulic engine having a cylinder in open communication with a chamber at each end thereof, with piston valve-controlled inlet and exhaust ports leading to and from said chambers, and pneumatic mechanism adapted to quickly operate the valves when a power piston reciprocating in said cylinder is at the dead center.

And a further object is to provide properly timed pneumatically-operated trip devices to insure quick valve movement.

With these ends in view, my invention finds embodiment in certain features of novelty in the construction, combination and arrangement of parts by which the said objects and certain other objects are attained, all as hereinafter fully described with reference to the accompanying drawings and more fully pointed out in the claims.

Similar characters of reference indicate the same parts in the several figures of the drawings.

In said drawings,—

Fig. 1 is a plan section of the engine showing the position of inlet and exhaust piston valves directly after instantaneous movement thereof, arrows at the bottom of the figure indicating the ingress of water to act on one side of the power piston, and arrows at the top of the figure indicating egress of water to be effected by the other side of the power piston during movement thereof to the left.

Fig. 2 is a vertical longitudinal section taken on line 2—2 of Fig. 1, showing trip machinism.

Fig. 3 is a vertical transverse section taken on line 3—3 of Fig. 1, showing the relation of eccentrics employed in the trip mechanism.

And Fig. 4 is a detail perspective view showing an oscillating member adapted to cooperate with eccentric rods employed in the trip mechanism.

The preferred form of construction as shown in the drawings comprises a power shaft 1 journaled in bearings 2 and carrying a fly-wheel 3, a crank 4 being provided in said shaft, as shown in Fig. 1. A connecting-rod 5 is adapted to transmit power from a piston rod 6 and power piston 7 to crank 4, there being a power cylinder 8 in which said piston is free to reciprocate.

Arranged at the ends of cylinder 8 and in open communication therewith are transversely extending chambers 9 and 10, one end of which communicates with an inlet valve cylinder 11, and the other with an exhaust valve cylinder 12. A piston valve 13 is adapted to open and close annular inlet ports 14 and 15 provided in cylinder 11, and a similar valve 16 is adapted to open and close annular exhaust ports 17 and 18 provided in cylinder 12, both the inlet and exhaust valves being open at each end and provided with a medial spider 19 rigidly connected to inlet and exhaust valve rods 20 and 21, respectively. Suitable packing boxes 22 are provided for the reciprocating rods of the engine, including piston rod 6 and valve rods 20 and 21.

In order to provide air pressure for the pneumatic operation of the valves, a cylinder 23 is provided and equipped with a reciprocating piston 24 having a piston rod 25 actuated by power shaft 1 through the medium of an eccentric 26 and eccentric rod 27. This cylinder is brought into communication with cylinders 28 and 29 co-axial with valve rods 20 and 21, respectively, by means of pipes 30, 31, 32 and 33, so that the air pressure on opposite sides of an inlet valve rod piston 34 and exhaust valve rod piston 35 is determined by the position of piston 24 in cylinder 23, these cylinders being substantially sealed to prevent the admission

of atmospheric air, and the air circulation from one cylinder to another being effected by the action of piston 24.

Similar valve trip mechanism is provided for inlet valve 13 and exhaust valve 16, the one being operatively connected to inlet valve rod 20 and the other to exhaust valve rod 21. This mechanism comprises a casing 36 having side walls 37 and 38 and a face plate 39, the walls having slots 40 in the same horizontal plane, and there being a short shaft 41 journaled in wall 38 and face plate 39. An upwardly extending crank arm 42 is pinned to shaft 41, and to this arm is pivoted an eccentric rod 43 actuated by an eccentric 44 pinned to power shaft 1. From this construction, it will be seen that shaft 41 is rocked in its bearings, and that eccentrics 45 and 46 pinned thereto are also rocked during the normal operation of the engine. The free ends of eccentric rods 47 and 48 actuated by eccentrics 45 and 46, respectively, are guided by means of oscillating channeled discs 49 mounted to turn freely between segmental bearings 50 formed integral with and projecting from wall 38, as clearly shown in Fig. 3. Pinned to the valve rod is a sleeve 51 having fingers 52 projecting laterally therefrom and adapted to slide freely in slot 40 of wall 37. Fingers 53 having beveled surfaces project from sleeve 51 in the opposite direction from fingers 52 and slide freely in slot 40 of wall 38, said surfaces being so located as to intercept and engage with the free ends of the eccentric rods.

The operation is as follows:—Assuming that water under pressure is flowing into valve cylinder 11 from a source of supply 54 and that the valves have just been moved into the position shown, or while power piston 7 is substantially on the dead center, then power piston 7 will be moved to the left by the force of the water. At the same time the spent water will flow through port 17 and exhaust valve 16 and be discharged. During the movement of piston 7 to the left, piston 24 will move to the right and create an air pressure at the left of piston 34 and at the right of piston 35 by forcing air through pipes 30 and 33. Pistons 34 and 35 will not move under the air pressure, however, until piston 7 reaches the limit of its stroke, since eccentric rod 48 of the inlet valve mechanism and eccentric 47 of the exhaust valve mechanism are engaged with fingers 53 during the movement of piston 7, as indicated by dotted lines in Fig. 2. But the timing of eccentrics 45 and 46 is such that when piston 7 reaches the dead center at the left fingers 53 will be released, whereupon valves 13 and 16 will be thrown over instantly under the influence of the air pressure back of pistons 34 and 35.

It will be noted that the action of piston 24 is such as to build up a maximum air pressure at the moment the tripping or releasing action occurs, thereby producing positive and quick results.

While I have illustrated and described the preferred construction for carrying my invention into effect, there might be variations and modifications without departing from the spirit of the invention.

I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In an engine of the class described, a power shaft, a power cylinder having inlet ports and outlet ports, a power piston therein and operatively connected to said power shaft, valves for controlling said inlet and outlet ports, fluid pressure means for actuating said valves in opposite directions, controlling means for retaining said valves in a predetermined position against said pressure, and means actuated by said power shaft when said piston is on dead center for actuating said controlling means for releasing said valves.

2. A hydraulic engine comprising a power shaft and a power cylinder operatively connected therewith, inlet and exhaust valve cylinders having annular ports, chambers serving as a passageway from said ports to said power cylinder, piston valves in said valve cylinders, valve rods extending from each valve, air cylinders into which said rods extend, pistons at the extremity of said rods for operation in said air cylinders, an air compressor operatively connected to said power shaft and in piped connection with said air cylinders, and trip mechanism operatively connected with said rods and power shaft.

In witness whereof, I have hereunto set my hand this 25th day of July, 1922.

HOKON HOYOSS.