L. BRUTON.

HYDRAULIC ENGINE.

APPLICATION FILED JAN. 18, 1913.

1,083,186.

Patented Dec. 30, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

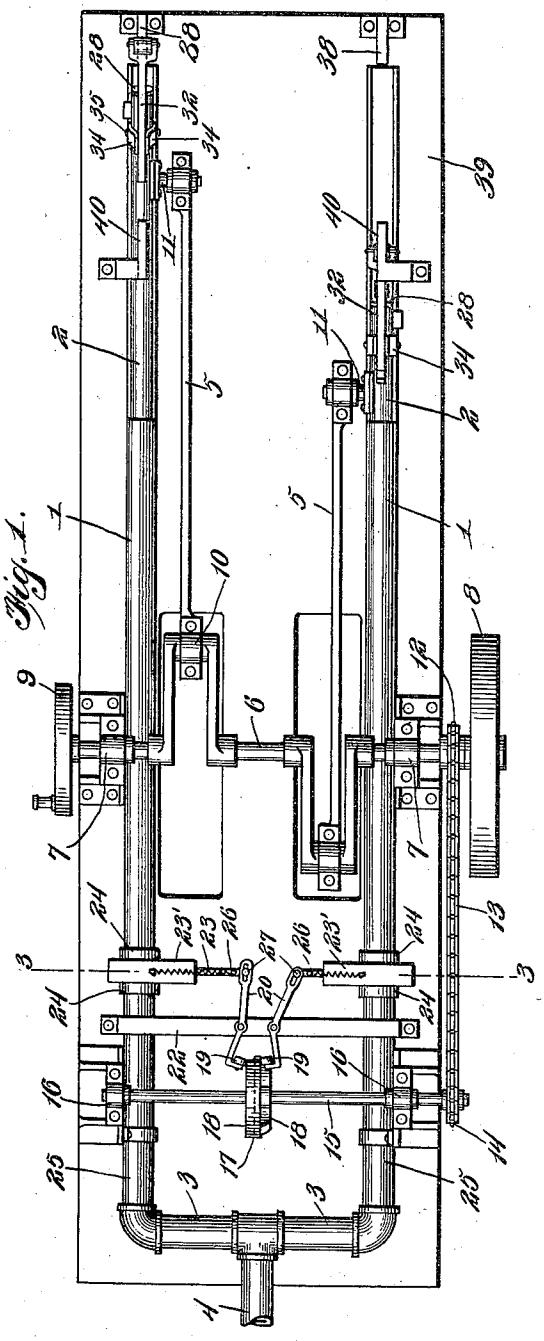
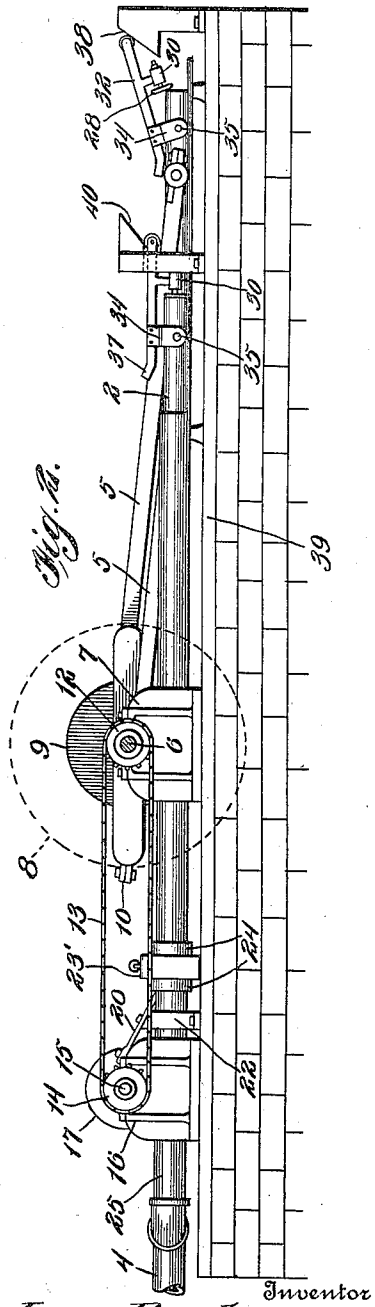


Fig. 1a.



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2 SHEETS—SHEET 2.

Fig. 7.

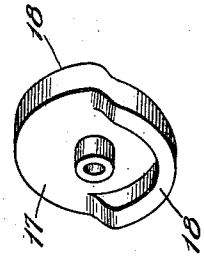


Fig. 3.

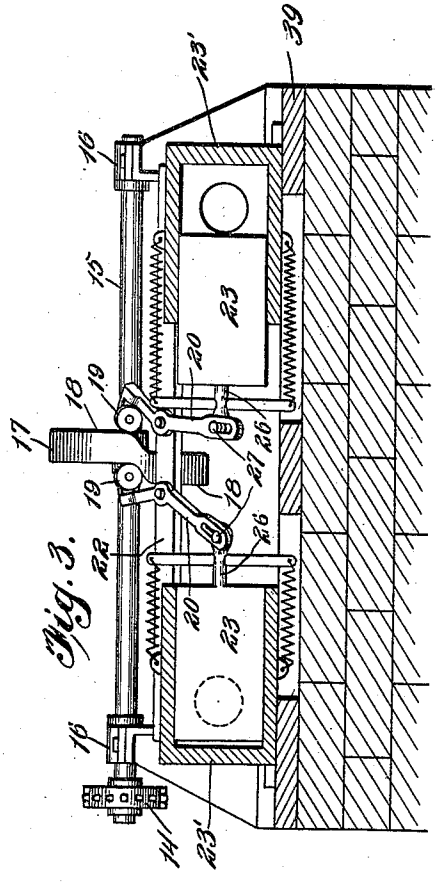


Fig. 4.

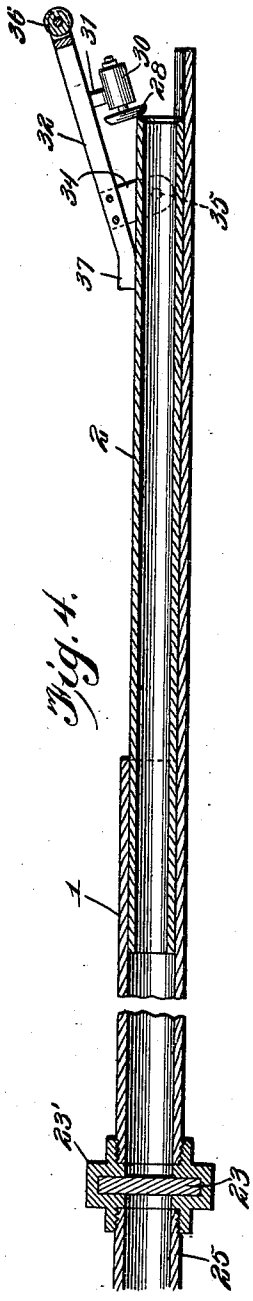


Fig. 6.

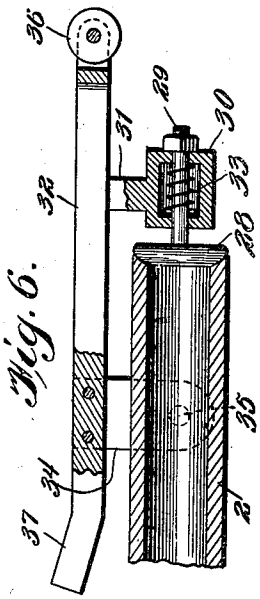
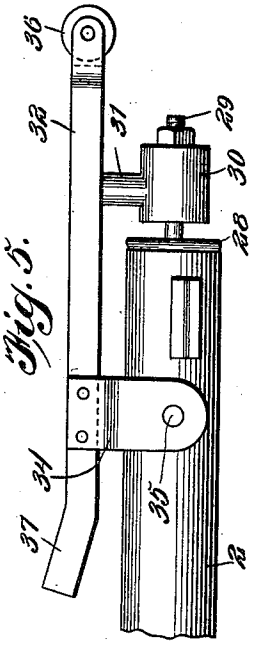


Fig. 5.



Witnesses

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UNITED STATES PATENT OFFICE.

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HYDRAULIC ENGINE.

1,083,186. Specification of Letters Patent. Patented Dec. 30, 1913.

Application filed January 18, 1913. Serial No. 742,815.

To all whom it may concern:

Be it known that I, LEE BRUTON, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Hydraulic Engines, of which the following is a specification.

This invention relates to hydraulic engines, the object in view being to provide a simple, practical and powerful engine of the class described, which is adapted to be driven by water under pressure from any suitable source of supply, such as an elevated water tower, or any body of water located at a higher elevation than the engine, or by city pressure.

A further object of the invention is to provide an engine of the character described which will be economical in the consumption of water, and which embodies, in connection with a plurality of pistons and cylinders, valve mechanism which is controlled and timed by the crank shaft, so that the water is distributed at the proper intervals to the different cylinders, and also exhausted therefrom at the completion of the active strokes of the pistons.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereunto appended.

In the drawings: Figure 1 is a plan view of a hydraulic engine, embodying the present invention. Fig. 2 is a side elevation of the same. Fig. 3 is a cross section on the line 3—3 of Fig. 1. Fig. 4 is a vertical longitudinal section through one of the cylinders and pistons, showing also the inlet and outlet valves. Fig. 5 is an enlarged detail side elevation of one of the outlet or exhaust valves shown in its relation to one of the pistons. Fig. 6 is an enlarged detail longitudinal section through the same. Fig. 7 is a detail perspective view of the cam which controls and operates the inlet valves.

In the preferred embodiment of this invention, the engine comprises two parallel cylinders 1, in which a corresponding number of hollow pistons 2 reciprocate. It may be observed at this point, however, that any desired number of cylinders and pistons may be provided, in accordance with the power desired.

At one end, the cylinders 1 are connected by an intake manifold having the branches 3 leading to the cylinders, said manifold being provided with a single inlet nozzle 4, through which the water is directed to the cylinders.

Each cylinder is in the form of a long tubular barrel of any desired size, in accordance with the power to be generated, and each piston 2 is also in the form of a tubular barrel which is open at its inner end, and provided at its outer discharge end with a controlling valve, which will hereafter be described in detail. The piston 2 is made of a length proportionate to the length of the cylinder, and is adapted to reciprocate back and forth therein. The pistons 2 are coupled by means of connecting rods or straps 5 to a common crank shaft 6 which is journaled in suitable bearings 7. This crank shaft is provided at one end with a fly wheel 8, and at the other end with a band wheel 9 adapted to receive a suitable belt for delivering the power generated by the engine. The connecting rods 5 have bearings 10 on the cranks of the crank shaft, and the opposite ends thereof are pivotally connected to the pistons 2 at the points 11, so that in the back and forth movement of the pistons, the motion thereof is transmitted to the crank shaft.

The crank shaft 6 has fast thereon a sprocket wheel 12, from which a chain 13 extends around a sprocket wheel 14 on a cam shaft 15 mounted in bearings 16 and arranged parallel to the crank shaft 6. Fast on said shaft 15 is a cam 17 which is provided at its opposite sides with substantially semi-circular cam faces 18 which engage rollers 19 on a pair of rocker arms 20 pivotally mounted, at 21, intermediate their ends on a supporting bar 22 which is shown as connecting the cylinders 1, although it will, of course, be apparent that the rocker arms may be fulcrumed on any suitable support.

At the heads of the cylinders 1, beyond the extreme movement of the inner ends of the pistons 2, are inlet valves 23 in the form of slide valves, the same being mounted to slide in box-like valve casings 23′. Each of said valve casings is provided with oppositely extending nipples 24, one nipple having the cylinder screwed into the same, as shown, while the other nipple receives the adjacent end of the pipe 25 connecting

with the adjacent manifold branch 3. The valve 22 is provided with an inwardly extending stem 26 which has a jointed connection, at 27, with the adjacent rocker arm 20. Therefore, as the cam 17 revolves, the rocker arms 20 are simultaneously moved in the same direction, causing one of the inlet valves 22 to close, and the other to open simultaneously, the effect of which is to shift the incoming water from one cylinder to the other. By thus cutting off the flow of water to either cylinder, the piston of that cylinder is allowed to return to its initial point of movement, without resistance from the water. Each piston is controlled at its outer end by means of an independent valve 28. This valve is provided with an outwardly extending stem 29 mounted in a sleeve 30 on a laterally projecting arm 31 of a valve operating lever 32, the valve 28 being pressed into engagement with the end of the piston, so as to close the same by means of an expansion spring 33 arranged behind the valve, as clearly illustrated in the drawings.

The lever 32 is provided with a fork 34 which embraces the end portion of the piston, and is pivotally connected thereto, at 35. At the outer free end of the lever, the latter is provided with an anti-friction roller 36, while the inner end of the lever is slightly upturned, as shown at 37.

As the piston 2 moves outwardly in its active stroke, under the pressure of the water in the cylinder 1, the roller 36 comes into contact with a fixed inclined surface 38 supported by the engine bed 39, on which the engine as a whole is mounted, thereby lifting the valve 28 and uncovering the end of the piston, which allows the water to discharge therefrom as the piston is retracted by the connecting rod 5 and the crank shaft 6. As the piston reaches the inner end of its throw, in the return movement thereof, the roller 36 comes into contact with another fixed inclined surface 40, which causes the outer end of the lever to again move toward the plane of the piston, thereby returning the valve 28 to its closed position. It will thus be seen that the valve 28 automatically closes, as the piston reaches the inner limit of its return movement, and automatically opens when the piston reaches the outer end of its active stroke. Just as the outlet valve 28 opens, the corresponding inlet valve 22 of that cylinder closes, and therefore the water contained in the piston is allowed to discharge from the end of the piston, during the return movement thereof. When the piston reaches the inner end of its throw, the outlet valve 28 closes, and the corresponding inlet valve 22 opens, with the result that the water pressure is directed with its full force against the valve closed end of the piston, and the piston is again driven outwardly.

From the foregoing description, it will be seen that the engine operates with great economy, practically all of the water being used, and there being a very small percentage of waste. This makes the engine particularly valuable for use in the country, where only a limited water supply is available.

What is claimed is:

1. In a hydraulic engine, parallel cylinders, tubular pistons working therein, a crank shaft, rods connecting the crank shaft and pistons, a water manifold feeding into the ends of the cylinders, a cam shaft driven by the crank shaft, a cam on said shaft, inlet valves for the cylinders operated by said cam, outlet valves at the ends of the pistons, and means for opening and closing said outlet valves at the outer and inner ends of the piston strokes.

2. In a hydraulic engine, parallel cylinders, tubular pistons working therein, a crank shaft, rods connecting the crank shaft and pistons, a water manifold feeding into the ends of the cylinders, a cam shaft driven by the crank shaft, a cam on said shaft, inlet valves for the cylinders, rocker arms connected with said inlet valves and actuated by said cam, outlet valves at the ends of the pistons, and means for opening said outlet valves at the outer and inner ends of the piston strokes.

3. In a hydraulic engine, parallel cylinders, tubular pistons working therein, a crank shaft, rods connecting the crank shaft and pistons, a water manifold feeding into the ends of the cylinders, crank shaft controlled inlet valves for the cylinders, outlet valves at the ends of the pistons, and means for opening and closing said outlet valves at the outer and inner ends of the piston strokes, embodying valve shifting levers carried by the pistons, and fixed surfaces with which said levers coöperate in their outward and inward strokes, the outlet valves being yieldingly supported and urged toward their seats.

In testimony whereof I affix my signature in presence of two witnesses.

LEE BRUTON.

Witnesses:
W. E. Doyle,
E. L. Stapp.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."