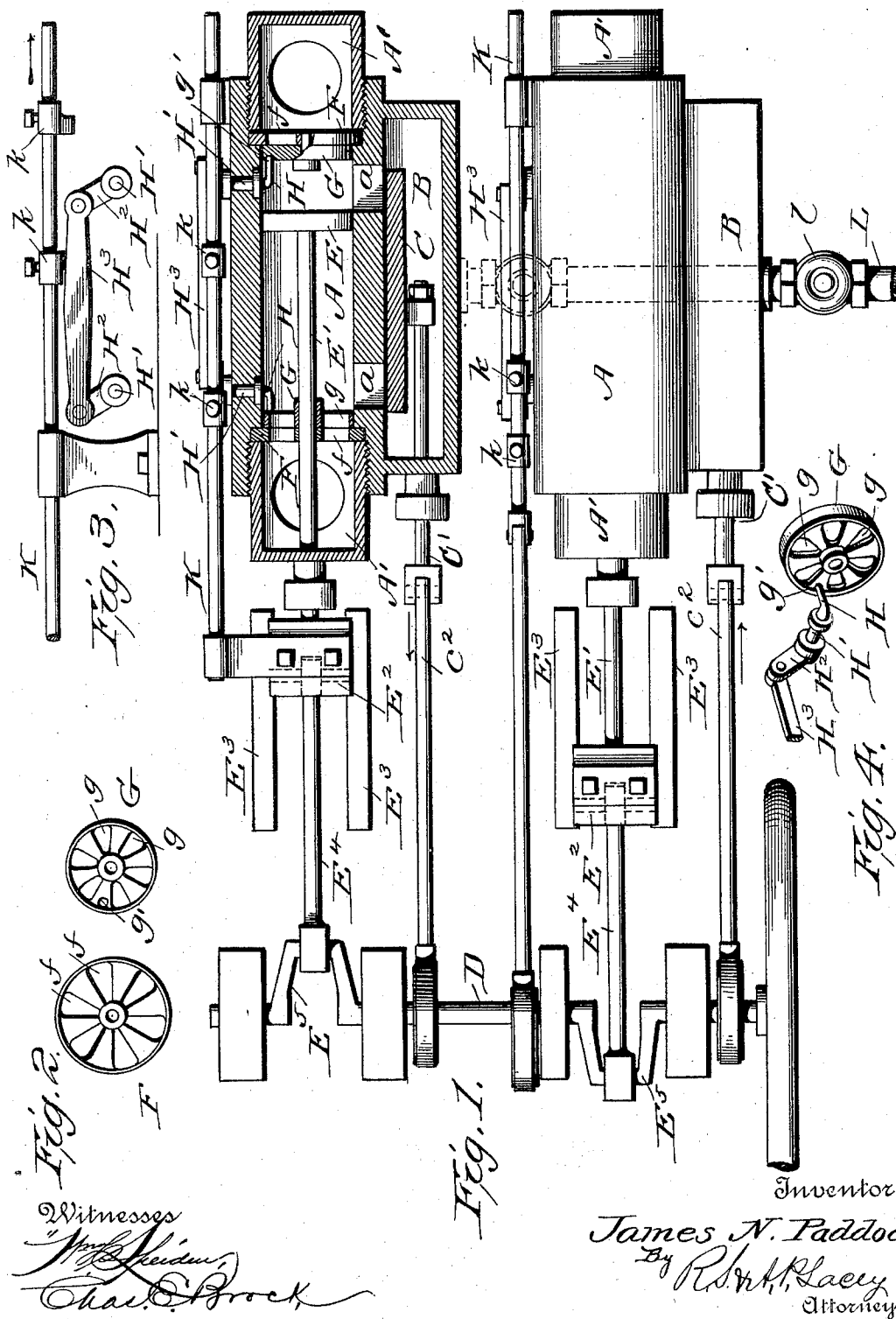


(No Model)

J. N. PADDOCK.
HYDRAULIC ENGINE.

No. 586,202.

Patented July 13, 1897.



UNITED STATES PATENT OFFICE.

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BY MESNE ASSIGNMENTS, TO NORMAN A. JOHNS, OF HUNTINGTON,
VERMONT.

HYDRAULIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 586,202, dated July 13, 1897.

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To all whom it may concern:

Be it known that I, JAMES N. PADDOCK, a citizen of the United States, residing at Atlantic Highlands, in the county of Monmouth, State of New Jersey, have invented certain new and useful Improvements in Hydraulic Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is an improved hydraulic engine, the object being to provide a novel form of exhaust-valve and also improved means for operating the same.

My invention consists in certain details of construction and novelties of combination, all of which will be fully described hereinafter and pointed out in the claims.

In the drawings, Figure 1 is a top plan view of a double-cylinder engine embodying my invention, one of the cylinders being shown in sections. Fig. 2 is a detail view of the valve and its seat. Fig. 3 is a detail side view showing the valve-operating mechanism. Fig. 4 is a view from the interior.

Though I have shown my invention applied to a double engine, it is obvious that it can be made single and that the various parts are the same in each section, and a description of one section will suffice for the entire machine.

In constructing an engine in accordance with my invention I employ a cylinder A, having supplemental chambers A' A' at each end, into which the water from the cylinder exhausts. A valve-chest B is arranged at one side of the cylinder A and communicates therewith through the medium of the inlet-ports *a a*, and working past these ports is the slide-valve C, mounted upon the stem C', which stem in turn is connected with a pitman *c*², connected with the rotary driven shaft D. A piston E is arranged within the cylinder upon a rod E', said rod being connected with the cross-head E², sliding in ways E³, said cross-head being connected to the end of a pitman E⁴, which in turn is attached to the crank-arm E⁵ of the power-shaft D. At each end of the cylinder is arranged a valve-seat F, having radial exhaust-ports *f*, and

mounted upon said seats are the vibratory valves G, having radial openings *g*, adapted to register with the ports of the valve-seats. To operate these valves alternately as the piston approaches them, I employ an arm H, mounted upon the ends of the shafts H', which project transversely through the side of the cylinder into the same. The arms H seat in recesses *g'* in the valve S, and as the shafts H' H' rock back and forth the valves are shifted alternately to open and close the ports, so that as the piston approaches the valve it opens, and vice versa.

Upon the outer ends of the shafts H' are the arms H², connected by a rod H³, so that they operate simultaneously, and the moment one is opened the opposite one is closed. To operate the arms H² and shafts H', I employ the shifting rod K, provided with trips *k*, which engage one of the arms H² and rock the shaft H' back and forth. The shifting rod K is preferably connected with the power-shaft by means of a pitman and eccentric, so that it operates in unison with the piston, as shown on the lower engine in Fig. 1, and, if desired, this shifting rod may be connected with the cross-head, as shown on the upper engine in Fig. 1. One or more balance-wheels are mounted upon the power-shaft, and a pulley is also mounted thereon, by means of which power is transmitted to any desired point. The water or other operating fluid is supplied to the chest by means of a pipe L, said pipe being provided with a suitable cut-off valve I, by means of which the supply can be regulated or cut off entirely.

In operation the water is passed through the pipe L into the valve-chest B, and from here it passes into the cylinder and operates the piston E. As the piston moves the shaft D is moved, the slide-valve reversed, and also the vibrating valve G, so that the water passes from the chest to the opposite side of the piston, reverses its movement, and forces the water back of it out through the ports *g* and *f* into the chamber A', whence it escapes. These operations are continued, the piston being forced backward and forward, and as it does so the slide and vibrating valves are also reversed, so that a fresh supply of water can be let in and the exhaust-water let out.

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

1. In a hydraulic engine, the combination
5 with a cylinder of the exhaust-chambers at each end, a pivoted vibrating valve located at each end of the cylinder, the piston and means for operating the same, rock-shafts and fingers for vibrating the valves, and
10 means connected with the piston-operating mechanism for operating the rock-shafts, substantially as shown and described.

2. In a hydraulic engine, the combination
5 with a cylinder and its piston of the exhaust-chambers at each end, the valve-seats having radial ports, the vibrating valves having radial ports, the rock-shafts, arms at each end one of which engages the vibrating valve, the others being connected by a rod, the shifting

rod and trips thereon all of said parts being
20 arranged and operated substantially as shown and described.

3. The combination with the cylinder and piston of the exhaust-chambers, the seats having radial ports, the valves having radial
25 ports, the arms engaging the valves, the rock-shafts to which they are attached, the arms upon the outer end of shafts, the rod connecting said outer arms, the shifting rod and trips, the piston-rod and cross-head, pitman
30 and driven shaft all arranged substantially as shown and described.

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

JAMES N. PADDOCK.

Witnesses:

N. H. ROBERTS,
PERCY FALKINBURG.