

No. 773,599.

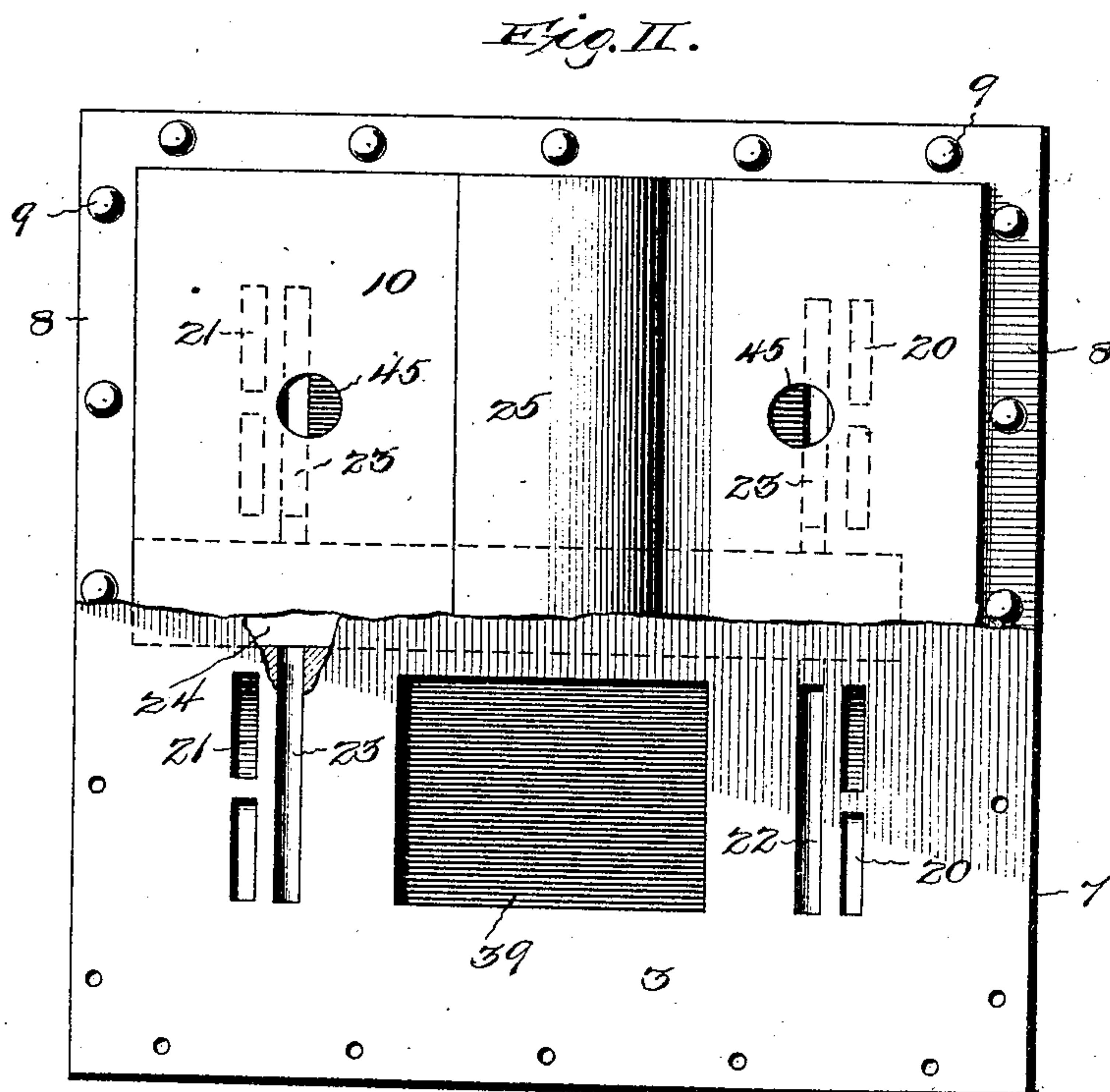
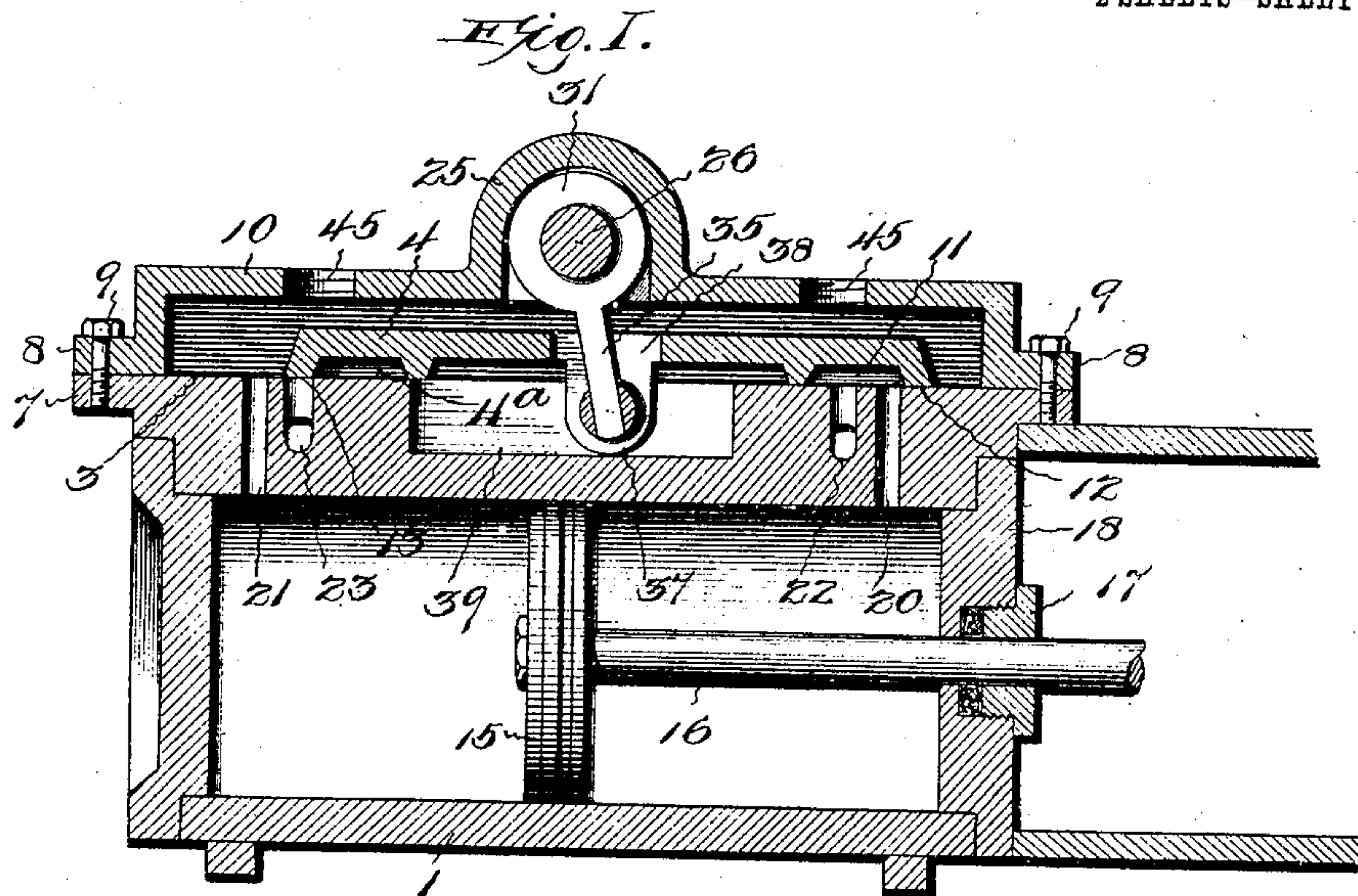
PATENTED NOV. 1, 1904.

R. M. SHAFFER.
ENGINE.

APPLICATION FILED AUG. 19, 1902.

NO MODEL.

2 SHEETS--SHEET 1.



Witnesses

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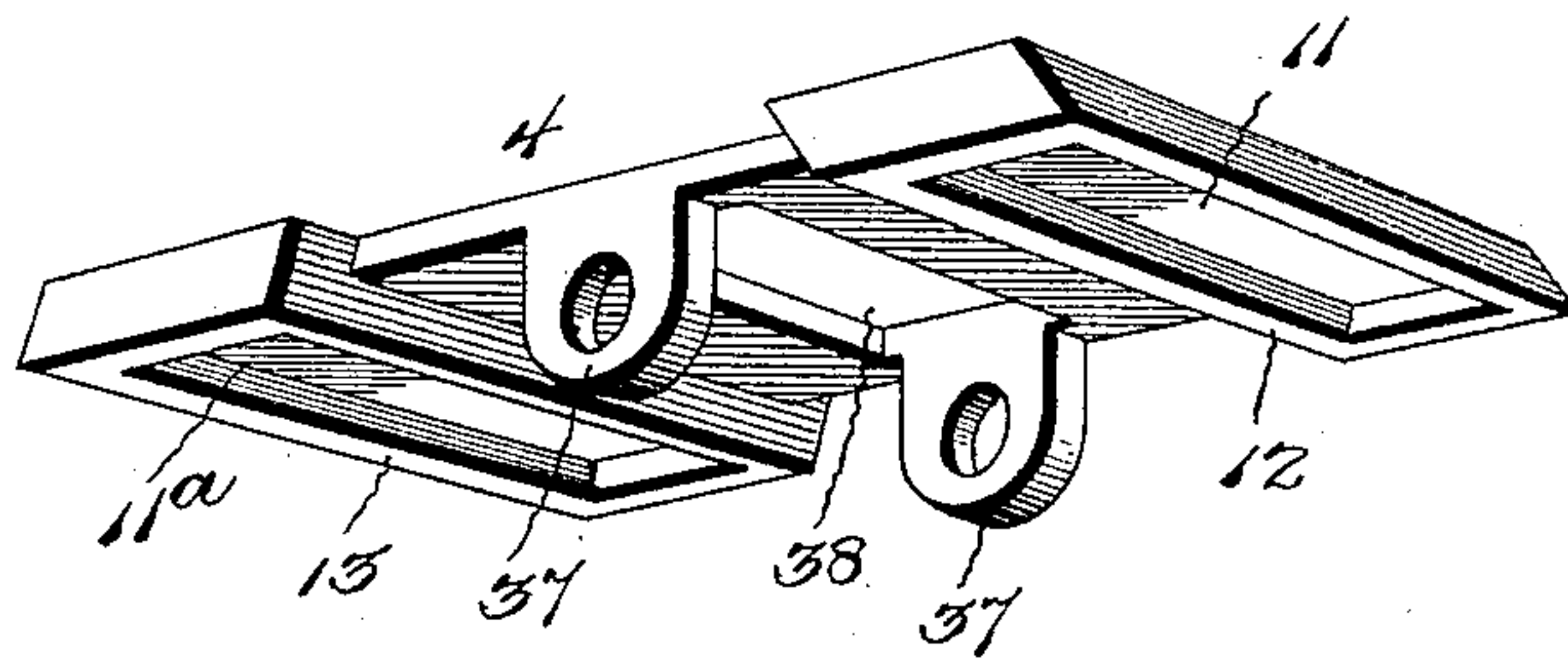
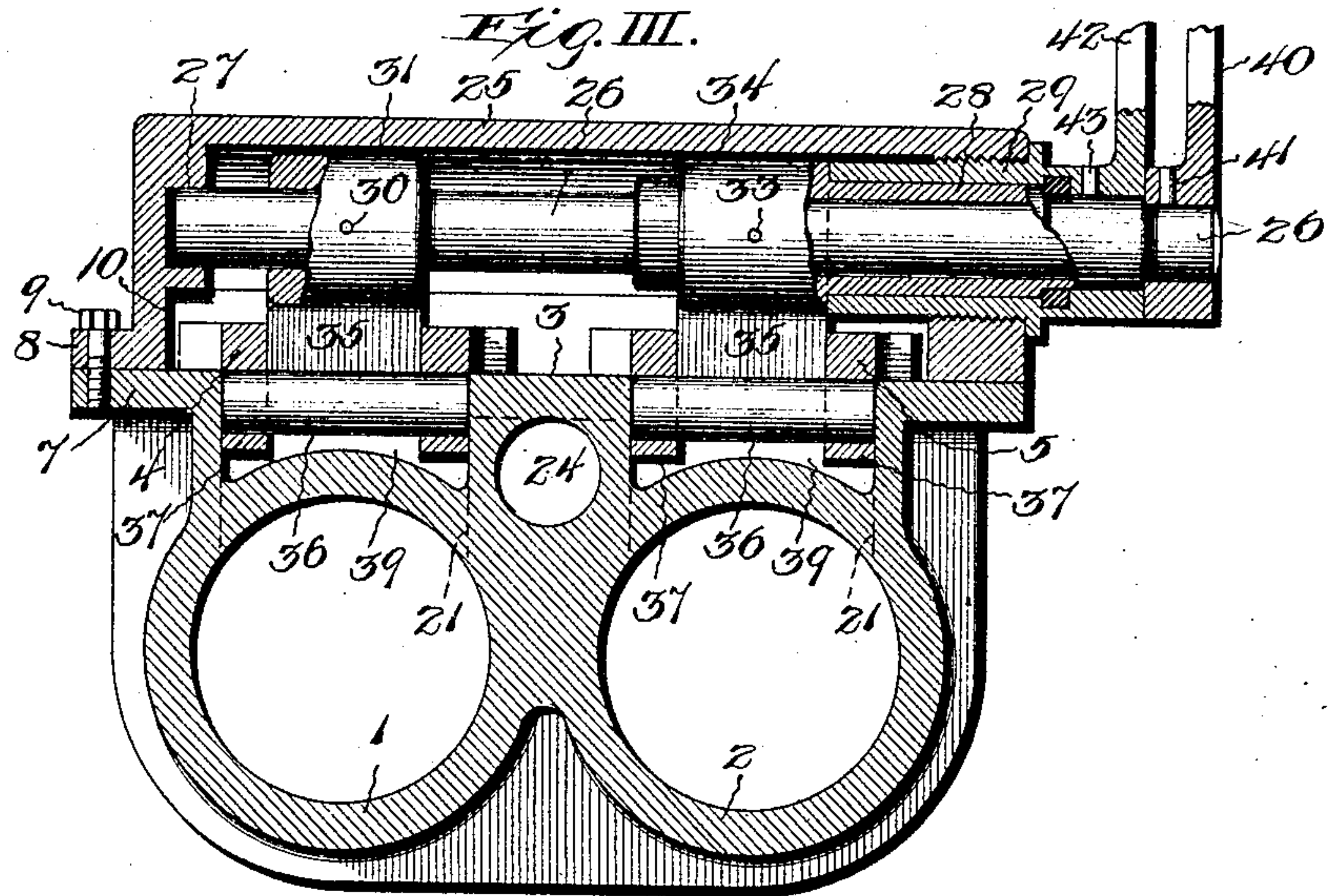


Fig. IV.

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UNITED STATES PATENT OFFICE.

RICHARD M. SHAFFER, OF BALTIMORE, MARYLAND, ASSIGNOR TO
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ENGINE.

SPECIFICATION forming part of Letters Patent No. 773,599, dated November 1, 1904.

Application filed August 19, 1902. Serial No. 120,170. (No model.)

To all whom it may concern:

Be it known that I, RICHARD M. SHAFFER, of Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in Engines, of which the following is a complete specification, reference being had to the accompanying drawings.

The object of my invention is to produce improvements in engines adapted to be driven by steam or the like, and more especially with respect to the valve mechanism thereof, whereby the bulk of the mechanical structure as a whole is reduced without diminishing the operative efficiency of the machine.

By reason of the comparatively small size and weight of my machine or engine it is adapted especially for employment in self-propelled light vehicles and in light pleasure-boats, but may be employed for a variety of uses in which engines of other types could be used.

In the accompanying drawings, Figure I is a central vertical longitudinal section of an engine-cylinder equipped with my valve mechanism, the piston and its rod being shown in elevation. Fig. II is a top plan view of both of the cylinders, of which one is shown in Fig. I, part of the steam-chest being illustrated and part broken away to show the arrangement of the ports. Fig. III is a section on the line III III of Fig. I, both cylinders being illustrated, but with the pistons and rods omitted. Fig. IV is a perspective view of one of the valves detached.

Referring to the numerals on the drawings, 1 (see particularly Fig. III) indicates one cylinder, and 2 the other. These cylinders have parallel longitudinal axes and are preferably incorporated in a single casting provided with a flat top or table 3, which is properly finished to a level or levels in order to constitute seats for a pair of valves 4 and 5, respectively.

The table 3 is surrounded by a flange 7, against which, as by means of an abutting flange 8 and a series of screw-bolts 9, the steam-chest 10 is secured by a steam-tight joint.

The valves are identical in construction, as illustrated in detail in Fig. IV, and each is provided at its opposite extremities with oblong boxes 11 and 11^a, whose faces 12 and 13, respectively, make a close fit against the valve-seat upon the table 3, upon which it reciprocates. The portion of each valve which connects its respective boxes 11 and 11^a is elevated above the table 3 for the admission of steam between it and the table, thereby affording relief of pressure upon the valve.

15 indicates a piston, and 16 its rod working in a stuffing-box 17 through the cylinder-head 18.

In Fig. I, I illustrate the details of one of the cylinders, its piston, piston-rod, ports, and valves, and as both cylinders are substantially identical the illustration of one suffices for the illustration of both. As shown in that figure, the cylinder is provided near its opposite ends, respectively, with oblong ports 20 and 21, which penetrate the wall of the cylinder and are in close juxtaposition to oblong recesses 22 and 23, respectively, depressed below the surface of the table 3. The recesses 22 and 23 respectively communicate with a common discharge-port 24, formed in the body of the casting, in which the cylinders 1 and 2 are incorporated.

The valve 4 or 5, surmounting its respective cylinder, is of such longitudinal extent and is provided with boxes 11 and 11^a of such dimensions as to cover one of the ports 20 or 21 and both of the recesses 22 and 23 at the same time and is adapted in its reciprocatory movement over its seat to constitute the ports 20 and 21 alternately into supply and discharge ports, respectively. When the port 20, for example, is constituted into a discharge-port, it makes its discharge underneath its box 11 through the recess 22 into the common discharge-port 24, and when the port 21 is constituted into the discharge-port it makes its discharge into the same common discharge-port through the recess 23.

In order to provide for the reciprocal and reciprocatory operations of the valves 4 and 5, respectively, I provide a special and com-

compact arrangement of mechanisms adapted for the purpose, whereby the actuation of the valves is adapted to be applied thereto between the path of the valve and the cylinder.

5 To that end within a shell 25, formed in the wall of the chest 10, I prefer to provide a rock-shaft 26, supported at its inner end in a bearing 27, provided for it in the end of the shell 25. Near the opposite end it is supported by a hollow rock-shaft 28, working in a bushing 29, threaded into the end of the shell 25. The shaft 26 is secured, as by means of a pin 30, to a collar 31, and to the shaft 28 is secured, as by means of a pin 33, a collar 34.

15 The shafts 26 and 28, respectively, being coaxial and disconnected are adapted to impart independent movements to their respective collars 31 and 34. The means of operatively uniting the said respective collars are preferably substantially identical in construction and include (compare Figs. I and III) a lug 35, which works loosely in a slotted shaft 36, loosely mounted in a pair of dependent lugs 37, depending from the valve, which is provided with an aperture 38 for the accommodation of said lug.

39 indicates a chamber or depression in the table 3 for the accommodation of the shaft 36 and its lugs 37. The sides of the chamber 39 afford means for holding the shaft 36 in place when the parts described are operatively assembled.

40 indicates a crank secured, as by a pin 41, to the shaft 26, and 42 indicates a crank secured, as by a pin 43, to the shaft 28. These cranks are adapted to impart the requisite throw to the valves 4 and 5, respectively, the timing and the length of the throws of the respective valves being determinable by the relative adjustments of the said cranks, their shafts, and the collars 31 and 34 already specified.

Motion is adapted to be imparted to the respective cranks 40 and 42 through the movement of the several pistons and rods with which in any ordinary or preferred manner (unnecessary to illustrate) the said cranks may be operatively connected.

The chest 10 is provided with threaded apertures 45, one being located above each of the respective ports of the respective cylinders, four being the number required in the form of embodiment of my invention shown in the drawings.

55 In practice all but one of the apertures 45 are plugged, the one constituting the means of connection for the supply-pipe (not illustrated) and the engine. The office of the several apertures 45 is to afford ready and convenient means for rendering the ends of each of the valves 4 and 5 visible for the purpose of fixing the adjustments of the said valves with respect to their respective shafts and cranks.

65 In operation the adjustments of the valves

4 and 5 having been properly made and a propulsive fluid under pressure having been admitted into the chest 10, motion is imparted first to one piston and then to the other in alternately reciprocatory directions. Through the mechanism specified a highly efficient power may be developed and applied within the exceedingly simple, durable, and compact structure described, and shown in the drawings.

What I claim is—

1. The combination with a cylinder, its piston, rod, ports, and valve, of means for actuating the valve, said actuation being applied thereto by means of a slotted shaft working within a depression in the cylinder.

2. The combination with a cylinder, its piston and rod, of a rock-shaft deriving motion from said piston, ports communicating with the interior of said cylinder and with a discharge-port, a reciprocatory valve controlling said ports and deriving motion from the rock-shaft, said motion being applied to the valve between the plane of the path of the valve and a parallel plane cutting the cylinder.

3. The combination with a plurality of cylinders and their respective pistons and rods, of rock-shafts deriving motion from said pistons respectively, ports communicating with the interiors of the respective cylinders and with a common discharge-port, a plurality of reciprocatory valves controlling the ports of the respective cylinders and deriving motion from the respective rock-shafts, and means for applying said actuation to the valves, respectively, between the planes of the paths of the valves and parallel planes cutting the cylinders.

4. The combination with a plurality of cylinders, their respective pistons and rods, of coaxial rock-shafts deriving motion from said pistons respectively, ports communicating with the interiors of the respective cylinders and with a common discharge-port, a plurality of reciprocatory valves controlling the ports of the respective cylinders and deriving motion from the respective rock-shafts, and means for applying said actuation to the valves between the planes of the paths of the valves and parallel planes cutting the cylinders, respectively.

5. The combination with a pair of cylinders, their respective pistons and rods, of a steam-chest, ports communicating between the interiors of the respective cylinders and the chest, and a common discharge-port, valves controlling the communication through said ports, rock-shafts deriving motion from the respective pistons and communicating motion to the respective valves, and means for applying said actuation to the valves between the planes of the paths of the valves and planes cutting the cylinders, respectively.

6. The combination with a plurality of cylinders incorporated in a single casting, their

respective pistons and rods, a flat top or table thereon, and a steam-chest surmounting the table, of ports communicating with the interiors of the respective cylinders and with a
5 common discharge-port, a plurality of valves controlling the ports of the respective cylinders, coaxial rock-shafts actuating the respective valves, deriving motion from the respective pistons, and means for applying said
10 actuation to the valves, respectively, between the paths of the valves and the cylinders.

7. The combination with a plurality of cylinders incorporated in a single casting, their respective pistons and rods, a flat top or table
15 thereon, and a steam-chest surmounting the table, of ports communicating with the interiors of the respective cylinders and with a common discharge-port, a plurality of valves controlling the ports of the respective cylinders, coaxial rock-shafts superimposed above
20 the valves for actuating them respectively, and deriving motion from the respective pistons, and means for applying said actuation to the valves, respectively, between the paths
25 of the valves and the cylinders.

8. The combination with a plurality of cylinders, their respective pistons, rods, ports and valves, of apertured dependent lugs on the respective valves, a slotted shaft loosely
30 mounted in each pair of lugs, a piston-controlled rock-shaft superimposed above each valve, and a lug upon each rock-shaft working in the aforesaid slotted shaft.

9. The combination with a plurality of cyl-

inders, their respective pistons, rods, ports 35 and valves, of apertured dependent lugs on the respective valves, a slotted shaft loosely mounted in each pair of lugs, piston-controlled coaxial rock-shafts superimposed above the
40 respective valves, and a lug upon each rock-shaft working in the aforesaid slotted shaft.

10. The combination with a plurality of cylinders, pistons and rods, of a steam-chest and shell, ports communicating between the interiors of the respective cylinders and the chest, 45 and a common discharge-port, reciprocatory valves controlling the communication through said ports, a pair of lugs upon the respective valves, a slotted shaft in each pair of lugs, rock-shafts deriving motion from the respective
50 pistons, collars upon the respective rock-shafts and lugs upon the respective collars engaging the respective slotted shafts.

11. The combination with a plurality of cylinders, piston, rods, reciprocatory valves adjustable means of actuating the valves, and
55 ports, of a steam-chest, apertures in the steam-chest opposite to the respective ports, whereby the valves may be rendered visible for adjustment, and means of opening and closing said
60 apertures as required.

In testimony of all which I have hereunto subscribed my name.

RICHARD M. SHAFFER.

Witnesses:

CURTIS KING,
HARRY PORTER.