

No. 746,100.

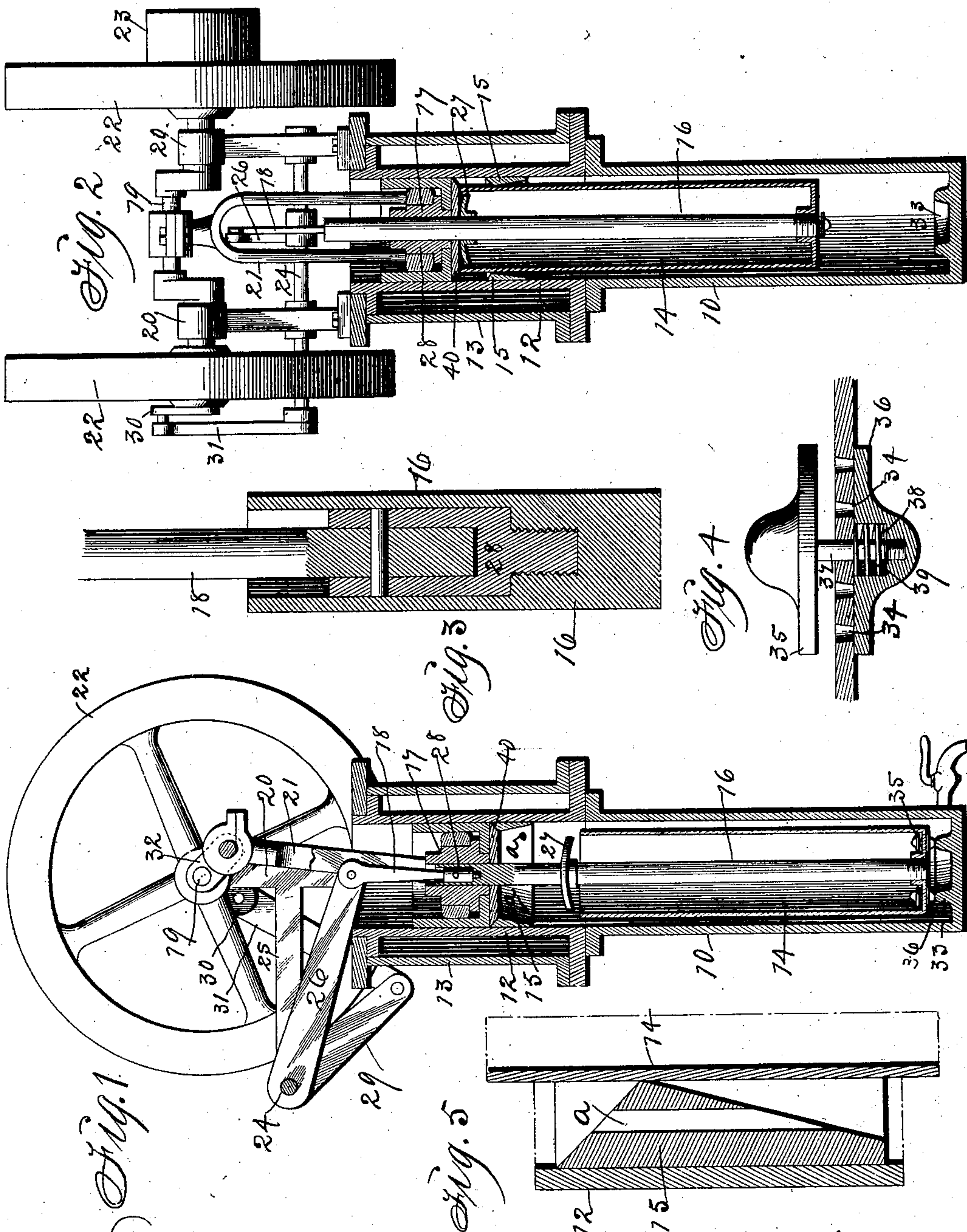
PATENTED DEC. 8, 1903.

L. KESSLER.
HYDROPNEUMATIC ENGINE.

APPLICATION FILED FEB. 24, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
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Inventor: Louis Kessler,
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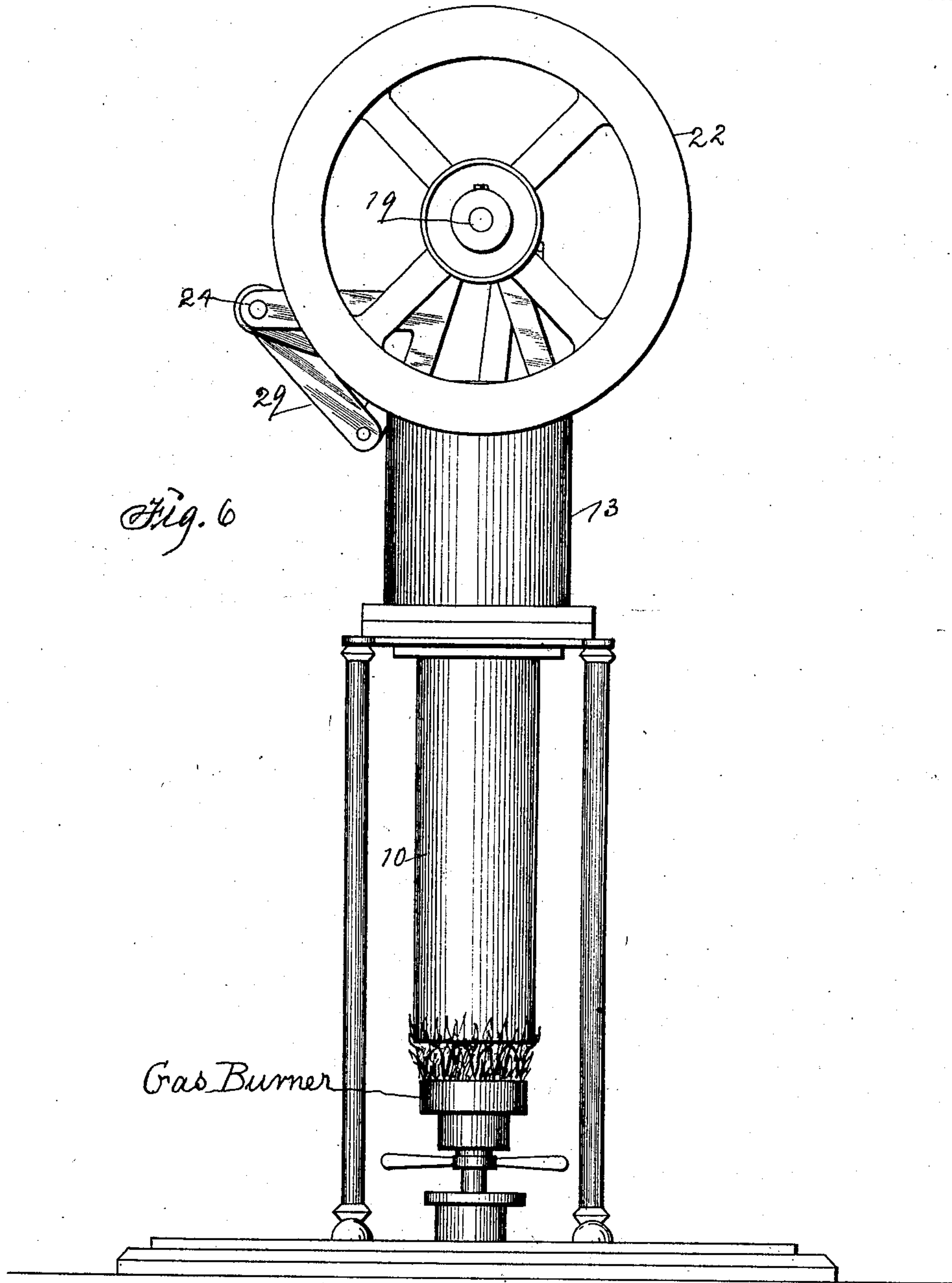
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Witnesses:
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Inventor: Louis Kessler,
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UNITED STATES PATENT OFFICE.

LOUIS KESSLER, OF DES MOINES, IOWA.

HYDROPNEUMATIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 746,100, dated December 8, 1903.

Application filed February 24, 1903. Serial No. 144,902. (No model.)

To all whom it may concern:

Be it known that I, LOUIS KESSLER, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have
 5 invented a new and useful Hydropneumatic Engine, of which the following is a specification.

My invention relates to the hydropneumatic engine for which Letters Patent No.
 10 368,952, August 30, 1887, and No. 451,824, May 5, 1891, were granted to me; and my object is to provide means for increasing the capacity, efficiency, and power of the engine as required to adapt it for heavy work; and
 15 my improvement consists in the construction, arrangement, and combination of automatic valves in the bottom of the float, means for directing the water of condensation into the top of the float, means for closing the annular chamber between the float and the boiler,
 20 and means for flexibly connecting a pitman-rod with the float, as hereinafter set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

25 Figure 1 is a vertical central sectional view of the boiler, the condenser, the cylinder, the piston, and the float and shows the forms and relative positions of the operative devices connected therewith as required to simultaneously reciprocate the piston and float.
 30 Fig. 2 is a corresponding sectional view taken in a line at right angles to the line of Fig. 1, but shows the float and piston elevated to its limit. Fig. 3 is an enlarged sectional view
 35 that shows the pivotal connection between the pitman-rod and a stem fixed to the bottom of the float. Fig. 4 is an enlarged sectional view of one of the automatic valves in the bottom of the float. Fig. 5 is an enlarged
 40 sectional view of the valve-seat provided with steam-ports. Fig. 6 is a side elevation of the engine and shows a gas-burner at the bottom of the boiler for generating heat to produce steam in the boiler.

45 The numeral 10 designates the boiler, adapted to be subjected to furnace heat as required to produce steam. An open-ended cylinder 12 is fixed on top of the boiler, and
 50 a condenser-cylinder 13 is fixed in concentric position relative to the steam-cylinder and boiler as required to produce an annular

water-tight chamber between the cylinder 12 and condenser-cylinder 13.

A hollow float 14, open at its top and provided with valves in its closed bottom, is fitted
 55 in the boiler 10 and a bearing 15 fixed to the inside face and bottom portion of the cylinder 12.

A piston-rod 16 is fixed to the bottom of the float 14, and a piston 17 is fixed to the
 60 top of the said rod, and to the rod is pivotally connected a link 18, as shown in Fig. 3.

A crank-shaft 19 is mounted on bearers 20, fixed on top of the condenser and cylinder by means of bolts or in any suitable way,
 65 and the piston 17 is connected with the crank of said shaft by means of a yoke 21, as shown in Fig. 2, in such a manner that the yoke will perform the function of a link for transmitting power and motion from the piston to
 70 the said crank, adapted to be utilized as a driving-shaft for operating extraneous machines connected therewith.

Balance-wheels 22 are fixed to the shaft 19, and 23 is a belt-wheel on one end of said shaft.
 75

A rock-shaft 24 is mounted in bearings 25, fixed to the bearers 20, to extend parallel with the shaft 19 in a lower plane, and has an arm
 80 26 connected with the piston-rod 16 and float 14 by means of the link 18, pivoted to the end of the arm 26, and a coupling 28, fixed in the bore in the top of the stem 16, as shown in Fig. 3.

An arm 29 on the end of the rock-shaft 24 is connected with an arm 30 on the end of the
 85 crank-shaft 19 by a link 31 in such a manner that when the float 14 rises it will impart force to the rock-shaft 24 to be transmitted therefrom to the crank driving-shaft 19 at the instant that the piston 17 has completed its
 90 upward stroke and the crank 32 of said shaft is at the dead-center of its orbit, so that the upward steam-pressure upon the float is applied at the proper time required to force said crank past the dead-center before a vacuum occurs in the cylinder 12 and the piston
 95 17 is forced downward by atmospheric pressure.

On the bottom of the boiler 10 is a circular concentric rib 33, and in the bottom of the
 100 float are spring-actuated valves adapted to be automatically actuated as required to open

and close ports 34 in the fixed bottom of the float. Each valve is composed of two disks 35 and 36, rigidly connected by means of stems 37, as shown in Fig. 4, and each disk 5 has a central enlargement, and the lower one has a chamber 38, in which is fitted a coil-spring 39, that will normally press downward as required to keep the ports 34 closed and to prevent steam generated in the bottom of the 10 boiler from entering the float and as required to force the float upward by steam-pressure, and when the float descends to the bottom of the boiler and the enlarged centers of the parts 36 contact with the circular rib 33 the 15 ports 34 will be opened by the upward motion of the two parts 35 and 36 long enough to allow the water of condensation to enter the boiler through the ports 34, and the instant the float rises again the ports will be closed 20 by the spring 39 as required to prevent steam entering the float.

To the upper portion of the stem 16 is fixed a conoidal deflector 27, that will direct the water of condensation from the steam-cylinder 12 into the open top of the float, and 25 when the float descends and its lower valve members 35 contact with the fixed rib 33 in the bottom of the boiler 10 the valves will be opened automatically as required to allow 30 the water of condensation to pass from the float into the boiler. The small quantity of water in the boiler is thus successively converted into steam to be condensed in the cylinder when the piston has risen therein and 35 the water of condensation returned through the float to the bottom of the boiler, and as the water is condensed in the cylinder a vacuum occurs and the piston is forced down by the natural pressure of the atmosphere to 40 which it is exposed to produce the downward stroke and to operate the driving-shaft as required to complete its revolution and start a succeeding revolution.

The bearing 15 serves to guide the vertical 45 motions of the float and also serves as a valve-seat to be engaged by a valve 40, fitted thereto and fixed to the bottom of the piston 17. Steam-ports *a* in the valve-seat allow steam to ascend from the boiler into the cylinder to 50 aid the float in forcing the piston up and utilizing the expansive power of the steam; and as it condenses and the piston descends the inclined top face of the valve-seat and bearing 15 will direct the water of condensation 55 into the open top of the float, and the valve 40 will close the ports *a* and confine the live steam in the boiler until it again forces the float and piston upward.

Having thus described the purpose of my 60 invention, the construction and functions of each element, and the arrangement and combination of all the parts, the practical operation and utility thereof will be obvious to persons familiar with the art to which it pertains, and 65

What I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-engine, a boiler having an open top and closed bottom, a raised portion on the upper side of the bottom adapted to 70 engage a valve, a float fitted in the boiler and open at its top and its closed bottom provided with ports for discharging water into the boiler and an automatic valve carried by the float for closing the ports, for the purposes 75 stated.

2. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on the top surface of the bottom, a float fitted in the boiler and open at its top and closed 80 at its bottom, a plurality of ports in the float-bottom and spring-actuated valves fitted to the ports, for the purposes stated.

3. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on 85 the top surface of the bottom, a float fitted in the boiler and open at its top and closed at its bottom, a plurality of ports in the bottom and spring-actuated valves fitted to the ports, a stem fixed to the center of the bottom of the 90 float and a deflector fixed to the top portion of the stem, arranged and combined for the purposes stated.

4. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on 95 the top surface of the bottom, a float fitted in the boiler and open at its top and closed at its bottom, a plurality of ports in the bottom and spring-actuated valves fitted to the ports, a stem fixed to the center of the bottom of the 100 float and a deflector fixed to the top portion of the stem, an open-ended cylinder fixed on top of the boiler, and a piston fixed to the top of the stem, arranged and combined for the purposes stated. 105

5. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on the top surface of the bottom, a float fitted in the boiler and open at its top and closed at 110 its bottom, a plurality of ports in the bottom and spring-actuated valves fitted to the ports, a stem fixed to the center of the bottom of the float and a deflector fixed to the top portion of the stem, an open-ended cylinder fixed on 115 top of the boiler, a piston fixed to the top of the stem, a valve fixed to the bottom of the piston and a valve-seat fixed in the bottom portion of the cylinder and provided with steam-ports, arranged and combined for the purposes stated. 120

6. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on the top surface of the bottom, a float fitted in the boiler and open at its top and closed at 125 its bottom, a plurality of ports in the bottom and spring-actuated valves fitted to the ports, a stem fixed to the center of the bottom of the float and a deflector fixed to the top portion of the stem, an open-ended cylinder fixed on 130 top of the boiler, and a piston fixed to the top of the stem, a valve fixed to the bottom of the piston, a valve-seat fixed in the bottom portion of the cylinder and provided with steam-ports and a condensing-cylinder fixed

in concentric position with the steam-cylinder, arranged and combined for the purposes stated.

7. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on the top surface of the bottom, a float fitted in the boiler and open at its top and closed at its bottom, a plurality of ports in the bottom and spring-actuated valves fitted to the ports, a stem fixed to the center of the bottom of the float and a deflector fixed to the top portion of the stem, an open-ended cylinder fixed on top of the boiler, a piston fixed to the top of the stem, a valve-seat fixed in the bottom portion of the cylinder and provided with steam-ports, a condensing-cylinder fixed in concentric position with the steam-cylinder, a crank-shaft mounted on top of the steam-cylinder and a yoke connected with the crank-shaft and with the piston, arranged and combined for the purposes stated.

8. In a steam-engine, a boiler open at its top and closed at its bottom, a circular rib on the top surface of the bottom, a float fitted in the boiler and open at its top and closed at its bottom, a plurality of ports in the float-bottom and spring-actuated valves fitted to the

ports, a stem fixed to the center of the bottom of the float and a deflector fixed to the top portion of the stem, an open-ended cylinder fixed on top of the boiler, a piston fixed to the top of the stem, a valve fixed to the bottom of the piston, a valve-seat fixed in the bottom portion of the cylinder and provided with steam-ports, a condensing-cylinder fixed in concentric position with the steam-cylinder, a crank-shaft mounted on top of the steam-cylinder, a yoke connected with the crank-shaft and with the piston, a rock-shaft in parallel position with the crank-shaft in a lower plane and provided with an arm at its center, a link pivoted to said arm and extended into a bore in the top of the stem that carries the float and pivotally connected with a coupling fixed in said bore, an arm on the end of the crank-shaft, an arm on the end of the rock-shaft and a link pivotally connected with the said two arms, arranged and combined for the purposes stated.

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Witnesses:

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