C. W. McGONIGLE.

AUTOMATIC PUMP.

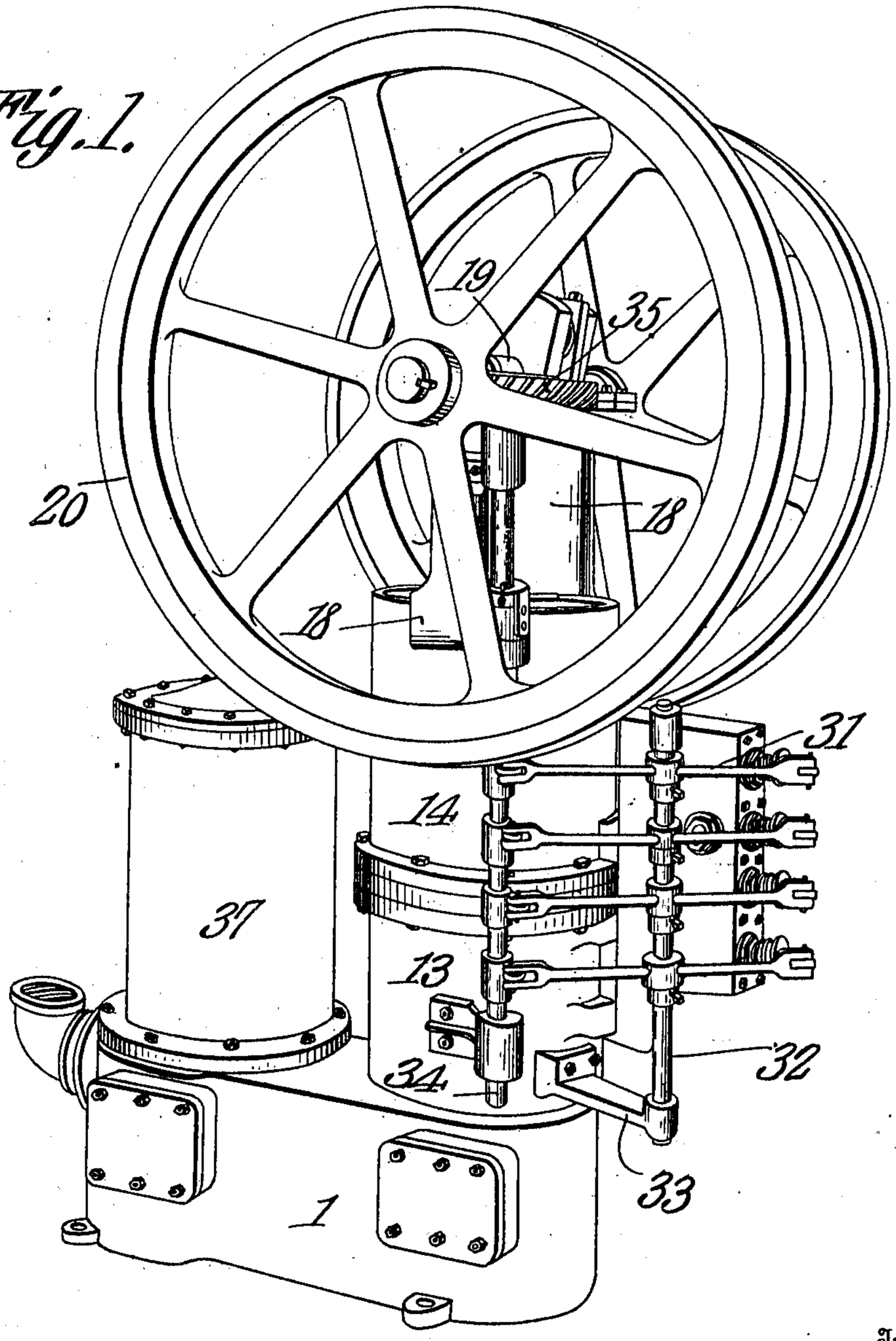
APPLICATION FILED SEPT. 13, 1909.

982,843.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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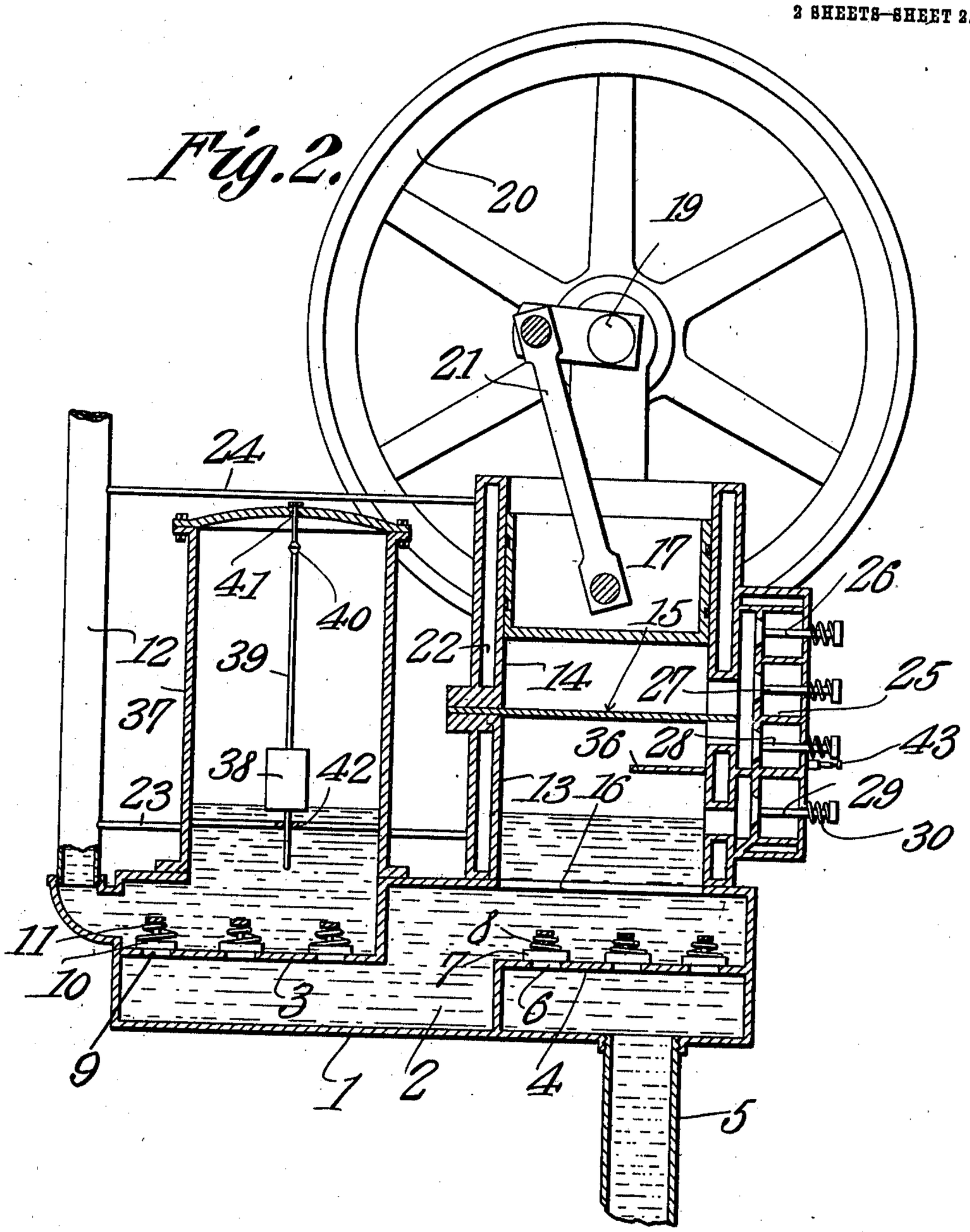
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

CHARLES W. McGONIGLE, OF SEATTLE, WASHINGTON, ASSIGNOR TO AUTOMATIC GAS PUMP COMPANY, OF SEATTLE, WASHINGTON.

AUTOMATIC PUMP.

982,843. Specification of Letters Patent. **Patented Jan. 31, 1911.**

Application filed September 13, 1909. Serial No. 517,376.

To all whom it may concern:

Be it known that I, CHARLES W. McGONIGLE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Automatic Pump, of which the following is a specification.

This invention has reference to improvements in automatic pumps and is designed to utilize the force generated by the ignition of an explosive mixture for causing the elevation of water or other liquids and at the same time the generation of motive power by the said explosive mixture.

In accordance with the present invention there are provided communicating explosion chambers in one of which is located a piston capable of reciprocation and utilized for the driving of a suitable shaft whereby power may be generated and transmitted to the point of utilization, and the other explosion chamber is in operative relation to pumping mechanism whereby the force of the explosion is utilized to cause the raising of water or other suitable liquid of which water may be taken as typical, to a desired height.

The invention also includes an air bell with means for maintaining the air pressure therein constant.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings, forming a part of this specification, in which drawings,

Figure 1 is a perspective view of the improved automatic pump, Fig. 2 is a central vertical section therethrough with parts shown in elevation.

Referring to the drawings there is shown a basic member 1 designed to be set on a suitable foundation and this basic member incloses a chamber 2 divided into a series of compartments by webs or diaphragms 3—4.

Entering the compartment inclosed by the web 4 is a pipe 5 coming from any suitable source of water supply. Through the web 4 are formed a series of perforations 6 each normally closed by a valve 7 pressed to its seat by a spring 8 so that each valve 7 will yield to a force superior to the strength of the spring to unclose the respective opening or passage 6.

Through the web 3 are like passages 9 each normally closed by a valve 10 held to its seat by a spring 11 and only yielding to uncover the passage 9 by the exertion of a force superior to the strength of the spring.

In the particular showing of the drawings the valves open upwardly so that water entering through the pipe 5 will find its way into the main chamber 2 through the valves 6 and from the chamber 2 water will find its way through the passages 9 to the compartment inclosed by the web 3. Leading from the last named compartment is a pipe 12 which may rise to any height within the capacity of the apparatus and there discharge into a reservoir or be otherwise utilized.

Rising from the base 1 at a point above the web 4 is a cylinder 13 and secured to the upper end of this cylinder is another cylinder 14 in alinement therewith but separated therefrom by a dividing web or diaphragm 15.

The lower end of the cylinder 13 is coincident with a passage 16 of equal diameter leading into the chamber 2 through the top of the casing while the upper end of the cylinder 14 is open.

Within the cylinder 14 there is housed a piston 17 of the ordinary trunk type and rising from the upper end of the cylinder 14 are standards 18 in which are formed journal bearings for a crank shaft 19 carrying at each end balance wheels 20 while the crank shaft is connected to the piston 17 by a pitman 21, all these parts being similar to those used in explosive engines. So far as the explosion engine side of the device is concerned it may follow the usual practice in four-cycle engine construction.

Both cylinders 13 and 14 are provided with water jackets 22 which jackets may be intercommunicating and are connected near their lower ends by a pipe 23 to the lower end of the pipe 12 and near their upper ends by a pipe 24 entering the pipe 12 at an appropriate height, this arrangement providing circulation sufficient to maintain the cylinders workably cool. At one side of the two cylinders 13 and 14 is a valve chest 25 having in the present instance four valves 26, 27, 28 and 29 each valve being held to its seat by a respective spring 30.

The several valves are under control of operating levers 31 independently mounted on a post 32 rising from a bracket 33 secured to the cylinder 13 and these arms 31

are operated in proper sequence and phase relation by a cam shaft 34 journaled in bearings on the cylinders 13 and 14 and receiving motion through an appropriate gear 35 driven by the crank shaft 19.

The valves 26 and 29 are exhaust valves while the valve 27 is an inlet valve for the explosive mixture for the chambers within the cylinders 14 and 13 respectively, and the valve 28 is provided for a purpose which will presently appear.

Within the cylinder 13 between the ports of the valves 28 and 29 is a deflector plate 36 such as is commonly used in two-cycle engine cylinders.

Above the web 3 the base 1 carries an air bell cylinder 37. In the structure shown in the drawings the cylinder 37 is in free communication with the compartment above the web 3 and within this cylinder there is mounted a float 38 on the lower end of a stem 39, the upper end of which latter projects through the upper end of the cylinder and inside the latter carries a valve 40 adapted to enter a valve seat 41 on the inner face of the top of the cylinder. The lower end of the valve rod 39 projects below the float 38 and there passes through a guide 42 appropriately supported in the cylinder or air bell. There is also provided a suitable igniter which is diagrammatically typified at 43.

Let it be assumed that the head of water coming through the pipe 5 is sufficient to cause the water to reach the level in the cylinder 13 about that indicated in the drawings, and let it also be assumed that the shaft 19 is rotating and the piston 17 is reciprocating.

At a certain period during the reciprocatory movement of the piston 17 an explosive mixture is drawn in through the valve 27 which at this instant is positively opened by the appropriate lever 31 and the cam on the cam shaft 34. The next movement of the piston in the direction contrary to that causing the inflow of the explosive mixture will compress this mixture in the cylinders 13 and 14 and during this time the valve 28 is open. At the proper time the igniter 43 is caused to operate and the mixture is ignited, the flame passing through the opening at other times closed by the valve 28 and from this opening into the cylinders 13 and 14.

The explosion within the chamber 14 causes the forward or power stroke of the piston 17 in a manner such as is common in explosion engines while the explosion in the chamber 13 is exerted against the surface of the water since this chamber is separated from the cylinder 14 by the web or diaphragm 15. The force of the explosion within the cylinder 13 will force the water against the valves 6 closing the same and will also force the water through the openings 9 and past the valves 10 and into the chamber above the web 3, the water passing into the air bell and also into the pipe 12, the action in this respect being similar to that of the ordinary pump. The return stroke of the piston 17 is the scavenger stroke and the cam shaft causes the opening of the valves 26 and 29 which are the exhaust valves of the respective cylinders 14 and 13. On the next forward stroke of the piston 17 a fresh charge is drawn in through the valve 27 and on the compression stroke of the piston this charge is compressed and exploded in both cylinders as before.

More or less air is carried into the compartment above the web 3 by the water and finds its way into the air bell 37. The result of this is that the level of the water in the air bell lowers and the valve 38 follows this lowering level of the water. As the float 38 lowers the valve 40 is drawn away from the valve seat 41 and the air within the air bell finds escape through the passage for the rod 39 through the head of the air bell. The result of this is that the water level in the air bell immediately rises and the float following it causes the closure of the valve 40 against its seat 41 thus preventing the admission or the escape of any more air and this condition continues until air or gases carried over by the water into the compartment above the web 3 accumulates sufficiently within the bell 37 to again cause lowering of the level of the water therein and the opening of the valve 40.

By the apparatus described water may be elevated in quantities depending upon the size and power of the apparatus and at the same time motive power is supplied to the shaft 19 and from thence may be transmitted to any point of utilization so that the device becomes a combined power engine and pump of the explosion type.

The igniter 43 may be of any suitable type and is controlled by the engine after the manner common in explosion engines and so this igniter and means for controlling the same have been omitted from the drawings since both the igniter and the means for causing it to act form no part of the present invention.

The valve 28 serves to prevent the access of water to the igniter should the water splash high enough when entering the cylinder 13. The two cylinders because of the intercommunication between them become practically simultaneously filled with the charge, but because of the small size of the inter-connection each cylinder becomes to a great extent, independent of the other so that the burning of the charge in the cylinder containing the piston causes the power stroke of the latter while the burning of the charge in the cylinder containing the

water operates on such water to drive it out of the cylinder into the air bell and into the conduit leading therefrom.

What is claimed is:—

1. In an apparatus of the class described, a pumping chamber, liquid inlets and discharge openings therefor, an explosion engine, and inlet and exhaust means controlled by the explosion engine for admitting the explosive charge to the engine and to the pumping chamber, and for scavenging both the engine and the pumping chamber.

2. In a pumping mechanism, a pumping chamber having inlet and outlet valves, an explosion chamber communicating with the pumping chamber, an explosion engine having its explosion chamber connected by a constricted passage with the explosion chamber communicating with the pumping chamber, and means controlled by the engine for admitting an explosive mixture to both explosion chambers and for scavenging the same.

3. In a pumping mechanism, a pumping chamber having inlet and outlet ports, a cylinder inclosing an explosion chamber and communicating with the pumping chamber, another cylinder on the first named cylinder in communication therewith, a piston in the last named cylinder constituting the power piston of an explosion engine, and a valve mechanism controlled by the engine, said mechanism including exhaust valves for both cylinders, an inlet valve for the engine, and means also controlled by the engine for causing the ignition of explosive mixtures within the two cylinders.

4. In a device of the character described, a basic member inclosing a pumping chamber, inlet and outlet valves therefor, a cylinder communicating with the pumping chamber and inclosing an explosion chamber, another cylinder mounted on the first named cylinder and separated therefrom by a web or diaphragm, the last named cylinder constituting the power cylinder of an explosion engine, a piston within said cylinder, and a valve mechanism comprising inlet and outlet ports for each cylinder, the first named cylinder receiving an explosive charge from the explosion chamber of the engine cylinder.

5. A pumping mechanism comprising a pumping chamber having inlet and outlet valves, an air bell communicating with the pumping chamber, an explosion chamber also communicating with the pumping chamber, and an explosion engine having its explosion chamber communicating with the explosion chamber in turn communicating with the pumping chamber, and a valve mechanism controlled by the engine for admitting an explosive charge to the engine and from thence to the explosion chamber communicating with the pumping chamber and permitting the escape of burned gases from both chambers.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES W. McGONIGLE.

Witnesses:

DORA C. WALKER,

SHIRLEY O. HOWARD.