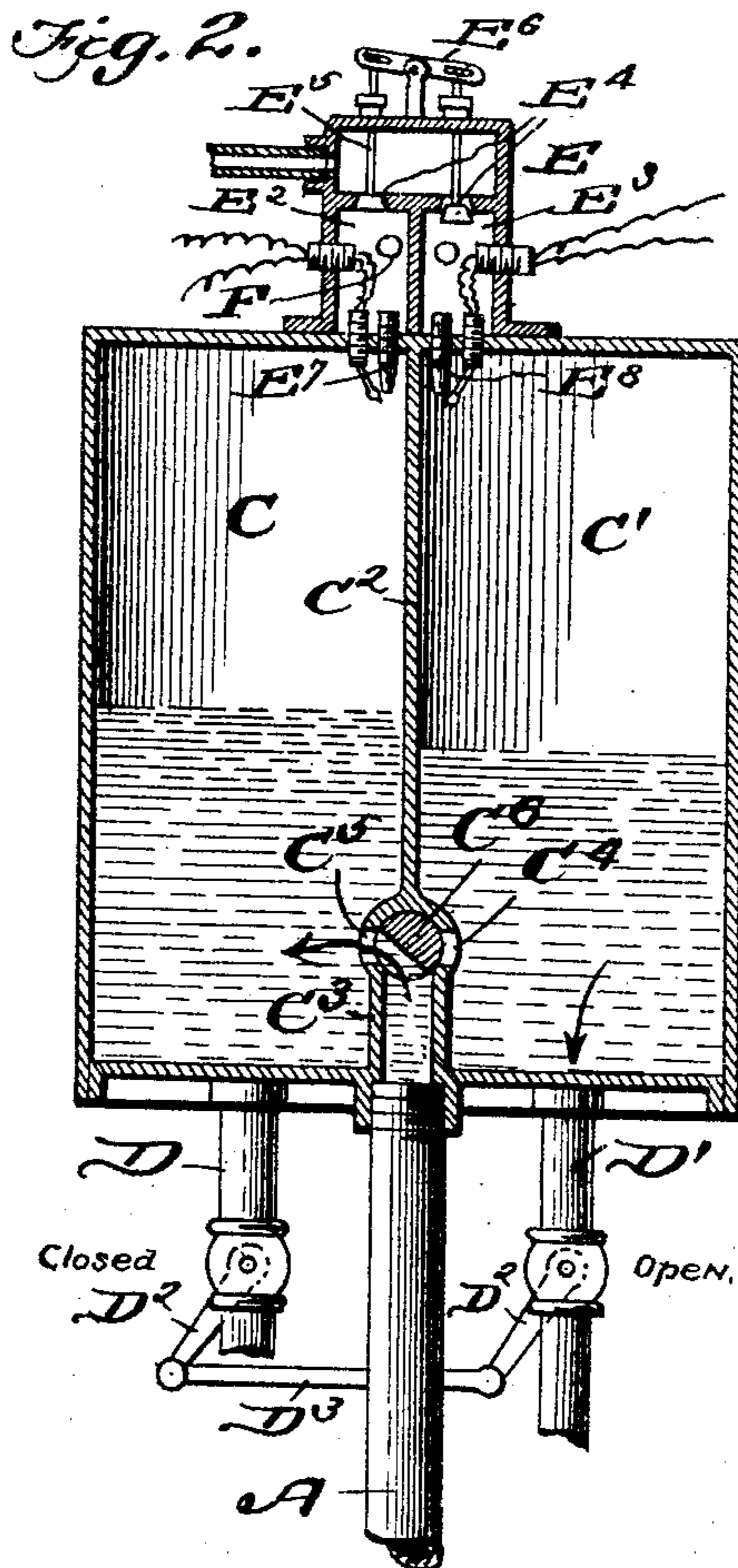
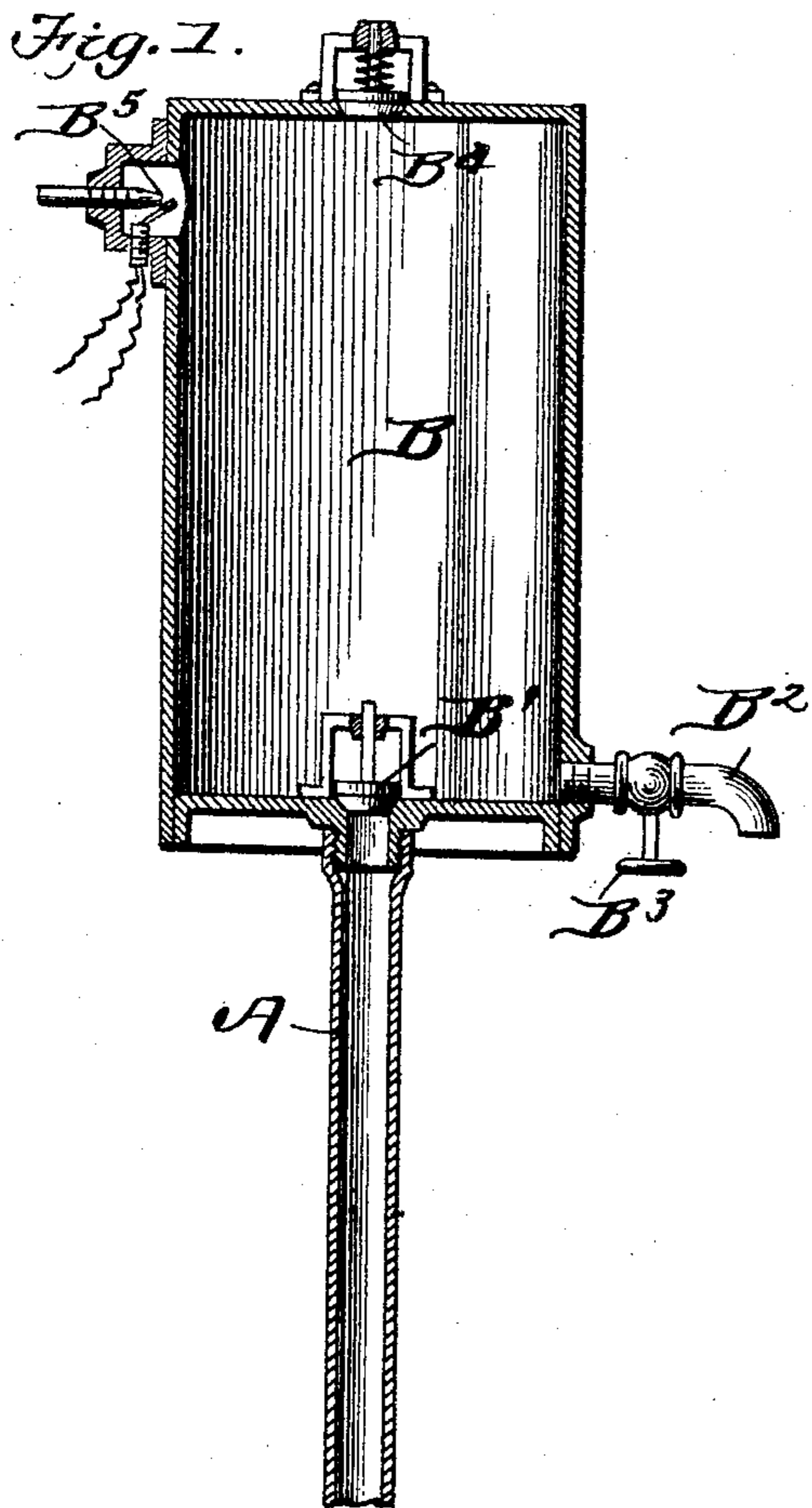


No. 779,499.

PATENTED JAN. 10, 1905.

B. W. RICE.  
PUMP.

APPLICATION FILED MAR. 31, 1903.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## PUMP.

SPECIFICATION forming part of Letters Patent No. 779,499, dated January 10, 1905.

Application filed March 31, 1903. Serial No. 150,419.

*To all whom it may concern:*

Be it known that I, BENJAMIN WM. RICE, a citizen of the United States, residing at Payette, in the county of Canyon and State of Idaho, have invented a new and useful Pump, of which the following is a specification.

My invention is an improvement in pumps, and has for its object the construction of a simple apparatus whereby a vacuum is quickly produced and water is drawn upward into the chamber in which the vacuum is formed and subsequently discharged therefrom.

Briefly considered, the invention consists of an air-tight casing mounted on the upper end of a suction-pipe, said pipe extending downward into the water from which the supply is to be drawn. This casing has a valve-controlled discharge pipe or faucet. A fuel-reservoir is connected with the cylinder and means provided for burning said fuel within the cylinder, thereby exhausting the oxygen in said chamber and creating, by forming a partial vacuum, a difference between the pressure within the chamber and the pressure of the atmosphere upon the body of water from which the supply is drawn.

In the accompanying drawings, Figure 1 is a sectional view showing my improvement as applied to a single-acting pump. Fig. 2 is a sectional view showing my improvement as used in a double-acting pump.

In the above figures, A represents the suction-pipe of a pump, which pipe may extend into a well, mine, hold of a vessel, or into any place from which water is to be lifted.

B represents a receptacle, preferably, though not necessarily, cylindrical in form. This receptacle is air-tight and is connected in any suitable manner with the upper end of the pipe A, which discharges into it. A check-valve B', of any suitable construction, is arranged in such manner as to permit water to discharge from the pipe into the receptacle, but to prevent water from flowing from the receptacle back into the pipe. In the lower part of the receptacle, which may be of any suitable size, is arranged discharge-pipe B<sup>2</sup>, closed by a suitable valve operated by a handle B<sup>3</sup>. Any suitable means may be provided for introducing a fuel—as, for example, gaso-

lene—into the receptacle B, and any means may be employed to ignite said fuel, the most convenient means being an electric spark produced by an igniter B<sup>5</sup>, any well-known form of which may be used. A spring-pressed check-valve B<sup>4</sup> is arranged in the receptacle and is adapted to allow the escape of the products of combustion and also to relieve the walls of the receptacle from the strain caused by the explosion of such a fuel as gasoline. The valve B<sup>4</sup>, however, prevents the introduction of air into the receptacle, as any outside pressure tends to force it more firmly in its seat.

In the operation of the pump above described a small amount of gasoline is admitted into the receptacle and exploded by means of an electric spark, and the combustion of such gas consumes the oxygen in the receptacle, while the force of the explosion lifts the valve B<sup>4</sup> and the products of combustion escape into the outer air, leaving a partial vacuum in the receptacle. The valve B<sup>4</sup> lifts and water is discharged from the pipe A into the receptacle, from whence it can be drawn off at any time through the pipe B<sup>2</sup>.

In Fig. 2 the receptacle is divided into two compartments C' C' by means of a central partition C<sup>2</sup>. The upper end of the pipe A connects with the lower end of a pipe-section C<sup>3</sup>, extending centrally into the lower portion of the receptacle and having two apertures C<sup>4</sup> C<sup>5</sup> communicating, respectively, with compartments C' C<sup>2</sup>, and a valve C<sup>6</sup> is arranged in said pipe and adapted to cover one of said openings at a time. Discharge-pipes D D' lead from the respective compartments and are fitted by oppositely-formed valves, the stems D<sup>2</sup> being connected by a valve-rod D<sup>3</sup>, so that when one valve is opened the other is closed. A suitable fuel-chamber E is arranged above the receptacle and is supplied with any suitable explosive liquid or gas through a supply-pipe E'. Beneath the fuel-chamber are two smaller chambers E<sup>2</sup> E<sup>3</sup>, each of which communicates through pipes E<sup>7</sup> E<sup>8</sup> with one of the compartments and contains igniting devices extending down into the upper portion of the compartments. Valve-controlled passages give communication between the smaller

chambers  $E^2$   $E^3$  and the chamber  $E$ , the valves  $E^4$  having their stems  $E^5$  connected to the ends of a walking-beam  $E^6$ , so that as one valve is opened the other is closed. Any desired means  
5 may be used for operating these valves. All of the valves mentioned may be connected and actuated by common means or they may be separately manipulated. When gas is admitted through the pipe  $E^7$  and exploded in  
10 compartment  $C$ , a vacuum will be formed exactly as heretofore described in connection with the form shown in Fig. 1, and the compartment will fill with water. The discharge-pipe  $D$  is then opened and gas exploded in  
15 compartment  $C'$ , and this will fill in the same manner, the valve  $C^6$  being turned as soon as compartment  $C$  is filled, so that opening  $C^5$  is closed and  $C^4$  is opened. While water is being discharged from one compartment, the  
20 other will be filling. The force of the expanding gas will operate the valve  $E^4$ , and the current will be turned on either by hand or automatically when the water has been discharged. Valves  $F$  are arranged in each com-  
25 partment similar to the valves  $B^4$  and for the same purpose.

It is obvious that this invention can be

utilized in many forms and that there are many changes that can be made in same without departing from the spirit of this inven- 30  
tion.

No claim is made herein for any particular valve or specific form of igniting device.

Having thus fully described my invention, what I claim as new, and desire to secure by 35  
Letters Patent, is—

The combination with a suction-pipe, a receptacle at the upper end of the pipe, said receptacle being divided into compartments, a pipe connected to the upper end of the suc- 40  
tion-pipe and extending into the lower portion of the receptacle, said pipe having apertures opening respectively into the various compartments, a valve arranged in said pipe and adapted to close said openings alternately, 45  
discharge-pipes leading from the compartments and provided with oppositely-acting valves, means connecting said valves, and means for admitting and igniting an explosive in the compartments.

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Witnesses:

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