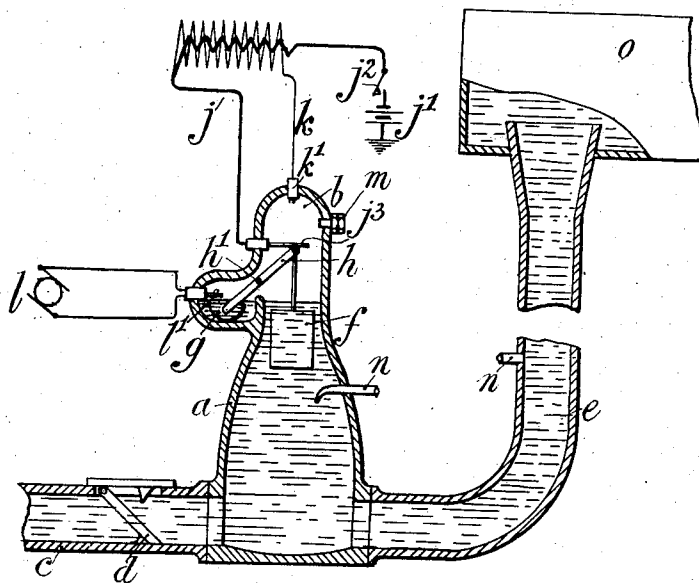


1,027,430.

Patented May 28, 1912.



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EXPLOSION APPARATUS FOR RAISING AND FORCING WATER.

1,027,430.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, GRAYDON POORE and HERBERT ALEXANDER HARVEY, subjects of George V. King of Great Britain and Ireland, and residents of 45 Allfarthing Lane, Wandsworth, in the county of London, England, and Norfolk House, Laurence Pountney Hill, in the county of London, England, respectively, have invented certain new and useful Improvements in Explosion Apparatus for Raising and Forcing Water, of which the following is a specification.

This invention relates to that class of pumping apparatus in which the delivery column of water is alternately driven upward by an explosion of a gaseous mixture acting directly on the surface of the water in the body of the pump and then, when its energy is exhausted, is allowed to fall back again into the body of the pump, compressing any air or mixed gas and air which may be there. In pumps of this class it has been necessary, up to the present to suck in a fresh charge of gaseous mixture from an outside source after each operation and this has necessitated gas and air connections which are impracticable in the case of pumps for use in mines and in many other cases:

Our apparatus is an electric one and produces its own gas. It consequently requires no pipe connections except those used for the suction and delivery of the water to be raised.

A pump constructed according to this invention conveniently comprises a body portion having an explosion chamber and connected with a suction-pipe and a delivery-pipe, the suction-pipe being provided with a suction-valve. A float supported by the liquid to be pumped may be provided for the purpose of controlling the time of firing of the explosive mixture and the time during which the water is decomposed, but other means may be employed for controlling these operations. Suitable means, for example, a water spray, are employed for condensing the vapor formed in the body of the pump by the explosion.

A sectional elevation of an apparatus constructed according to this invention is shown in the accompanying drawing in which:—

a is the body of the pump, *b* the head which forms the explosion chamber, *c* the

suction-pipe, *d* the suction-valve, and *e* the delivery pipe.

f is the float which operates the electric switch or contact for controlling the firing circuit, and *g* is a chamber or receptacle in which water is decomposed electrically for producing the explosive mixture, and which also acts as a switch for controlling the decomposing circuit.

h is a lever pivoted at *h'* and carrying the float *f* at one end and the chamber *g* at the other end.

As shown in the drawing the ignition circuit comprises a primary winding *j* and secondary winding *k* of a sparking-coil, a battery *j'*, switch *j''* and contact *j'''* in the primary winding and a sparking plug *k'* in the secondary winding. The decomposing current is shown in the drawing as being supplied from a dynamo *l*. The inner ends of the leads from the dynamo comprise a pair of contacts *l'*, *l''* (of which one only appears in the drawing) adapted to make sliding contact at two points with the chamber *g* at prearranged periods of time.

m is an air-valve opening inward, *n* a cooling pipe, and *o* a tank or the like into which the water is pumped.

The action of the apparatus is conveniently as follows. Assuming the switch *j''* to be closed, the float *f* to be down, the contacts *l'*, *l''* in contact with the chamber *g*, and the decomposing current turned on, decomposition of water in said chamber proceeds until the rising water in the body *a* of the pump raises the float *f* to such a height that said chamber moves downward out of contact with the contacts *l'*, *l''*. The explosive gaseous mixture which has been formed passes into the head *b* of the pump, where a certain amount of air is contained which mixes with the gaseous mixture and so reduces the violence of the explosion. Continued rising of the water in the body *a* causes the lever *h* to make contact with the contact *j'''*, thereby closing the primary circuit, whereupon the explosive charge is electrically fired by means of a sparking-plug *k'*. The force of the explosion acting on the surface of the water in the body of the pump expels it up the delivery-pipe at a velocity considerably greater than that required to overcome the static head due to the height to which the water has to be raised. The column of water continues to move, drawing a fresh supply after it and delivering it

through the delivery pipe until the whole of the energy has been exhausted. During this time and owing to the float *f* being down, a fresh explosive charge has been made electrically in the head of the pump. When the water has come to rest it will start down again in the reverse direction, compressing the charge of gas and air into the head *b*, and raising the float *f*. This latter closes the primary circuit and then the above-described operation is repeated. The pipe *n* connects the water in the delivery pipe with the body of the pump where it forms a spray for the purpose of condensing the vapor formed by the explosion. After the explosion pressure has been exhausted a slight vacuum is formed in the body of the pump, but by means of the air-valve *n* air flows in to compensate for any loss of air due to absorption by the water. The chamber *g* dips below the surface of the water just as it is reaching its lowest point of travel, and the float *f*, besides controlling the ignition circuit, may also supply the necessary water for the chamber *g* to recoup itself for the amount of water that has been decomposed electrolytically to form the explosive mixture for the previous stroke.

We claim:

1. In an explosion pumping apparatus in combination, a pump body, a suction pipe, a valve in said suction pipe, a delivery pipe, an explosion chamber in said body, means for electrolytically decomposing a portion of the water let into said body for each explosion, means for firing the explosive charge produced by the decomposition of water, and means operated by the rise of water in the pump body for simultaneously controlling the electrolytic decomposition of water and the firing of the explosive charge, substantially as described.

2. In an explosion pumping apparatus, in combination, a pump body, a suction pipe, a

valve in said suction pipe, a delivery pipe, an explosion chamber in said body, an electrical water-decomposing circuit, a cup-shaped receptacle for holding the water to be decomposed, and adapted to have sliding contact with terminal contacts of said decomposing circuit, an electric ignition circuit, and means for simultaneously controlling the water-decomposing circuit and the firing of the explosive charge.

3. In an explosion pumping apparatus, in combination, a pump body, a suction pipe, a valve in said suction pipe, a delivery pipe, an explosion chamber, an electrical water decomposing circuit, an ignition circuit, a pivoted lever supported within said explosive chamber controlling said ignition circuit and having attached thereto a receptacle for holding for decomposition a portion of the water charge let into said body, said decomposing circuit also being controlled by means of the said lever, and a float attached to the lever, said float being acted on by the rise of water in the pump body.

4. In an explosion pumping apparatus, in combination, a pump body, a suction pipe, a valve in said suction pipe, a delivery pipe, an explosion chamber, an electrical water decomposing circuit, an electric ignition circuit, means for simultaneously controlling said water decomposing circuit and said ignition circuit operated by the rise of water in the pump body, and a pipe connecting said delivery pipe with said body of the pump to deliver a spray for the purpose of condensing the vapor formed by the explosion.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

GRAYDON POORE.

HERBERT A. HARVEY.

Witnesses:

FRED. T. MORGAN,
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