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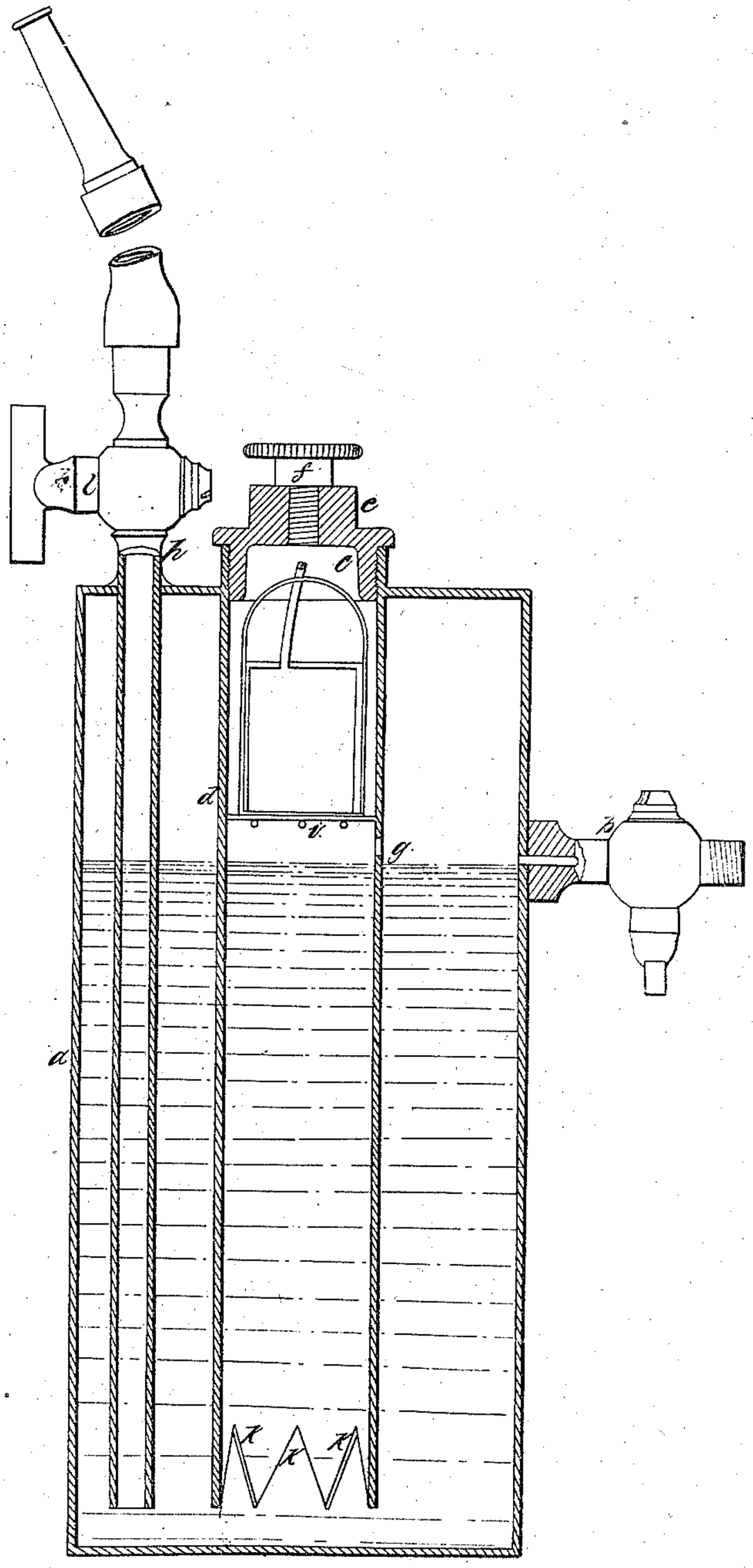
J. F. BABCOCK.

APPARATUS FOR EXTINGUISHING FIRE.



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IMPROVEMENT IN APPARATUS FOR EXTINGUISHING FIRES.

Specification forming part of Letters Patent No. **80,701**, dated August 4, 1868.

To all whom it may concern:

Be it known that I, JAMES F. BABCOCK, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Apparatus for Extinguishing Fires, &c.; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention, sufficient to enable those skilled in the art to practice it.

My invention relates, primarily, to the construction of that class of apparatus (designed particularly for extinguishing fires) in which a confined body of water or other liquid is operated upon by the pressure of an elastic gas or fluid, confined within the same vessel, the pressure of the gas impelling the water through a suitable outlet and pipe.

My improvement is designed to furnish a cheap and effective apparatus, ready at all times for use, or capable of being used, at any and all times, at a moment's notice, with the aid of but one person, and with no other than the most ordinary skill, the apparatus being capable of throwing any quantity of water, from a few gallons to twenty barrels or more, according to the water-holding capacity of the vessel.

In carrying out my invention, I employ a strong and tight metallic vessel, inclosing a smaller vessel or tube, the latter extending nearly to the bottom of and opening at bottom into the main vessel, and being closed at top by a screw-cap, this cap being outside of the top of the main vessel, the main and smaller vessel being united at top.

Besides communicating with the main vessel at bottom, the tube has an aperture through it, about quarter way down from the top, and just above this aperture is a wire or open partition for supporting a charge, by combustion of which a gas is evolved, the pressure of which will eject the water from the vessel through an aperture and pipe provided for that purpose.

This description will serve to define in general terms the construction constituting (primarily) my improvement.

The drawing represents a vertical central section of the apparatus.

a denotes the main fluid-containing vessel, made of size to hold any desirable quantity of water, from a gallon or less to a number of barrels. This vessel is made perfectly tight, except that it is provided with a waste-cock, *b*, and a screw-cap, *c*, and an ejecting-tube, *h*, that control the induction and eduction of fluid. The cap *c* is immediately screwed into the top of the tube *d*, which extends down into the main chamber and nearly to the bottom thereof. This screw-cap has an aperture, *e*, through it, and this aperture is tightly closed by a screw-plug, *f*. Toward the top of the tube *d* is an orifice, *g*, leading from the interior of tube *d* into the main chamber, and at or about in line wit this aperture is the waste-cock *b*, leading from the main chamber. Across the tube *d*, at a little distance above the orifice *g*, is a wire or open partition, *i*, which is for the purpose of holding a basket containing the compound to be burned. Leading from the top of the main chamber is a tube, *h*, entrance into which is controlled by a cock, *l*, and to this tube is attached the hose or pipe by which the water in the vessel *a* is to be conducted to and ejected upon the fire to be extinguished.

The composition to be burned in the tube *d* may be ignited, and then placed directly on the partition *i* by removing the cap *c*; but generally I prefer to use the plug *f*, keeping the cap *e* closed, and leading a fuse from the composition to the aperture *e*, so that it may be fired by removing plug *f*, the composition being, preferably, contained in a small pasteboard case, which is placed in a basket, and this basket upon the partition.

The gas-generating charge to be burned may be composed of charcoal or sulphur, with silicate of potassa or soda, and substances capable of furnishing oxygen in proper proportions to produce carbonic acid, carbonic oxide, nitrogen or sulphurous acid, either mixed or separately, according to the nature of the mixture, and with such composition I prefer to use a fuse saturated with a hot solution of nitrate of potassa, or other suitable substance, and gum water, properly dried, such fuse connecting at one end with the composition in the basket, its other end being passed through the hole in the screw-cap.

The apparatus is charged and used as follows: The vessel *a* and tube *d* being empty, and the cap *b* removed, water is poured into

tube *d*, and passes under bottom of tube and up into outer chamber, until it reaches the aperture *g*. As the close of this aperture, by rise of water in the tube, prevents escape of air from the vessel *a*, (the cock *h* being closed,) the water will rapidly rise in the tube *d*, indicating that the vessels are sufficiently charged with water. The cock *h* being then opened, the water will adjust itself in both chambers to the level of the cock and the orifice *g*, and the cock is then closed, the composition-charge being then placed in the basket with its fuse in position, and the basket upon the partition, the cap is screwed upon the tube, and the apparatus is ready for use.

In using it, the screw-plug is removed, the fuse is lighted, and the plug then replaced in position. (Instead of this plug, a cock may be used having a hole through the key large enough for the fuse to extend through it, and when the fuse is lighted the key is turned, thus closing the passage through it into the vessel.) The fuse ignites the composition, which consumes quietly and regularly, without flame or explosion, producing one or more of the gases previously mentioned, the elastic force of which serves to eject the water through the hose communicating with the tube. The gases pass down the tube *d*, through the water, the bottom of the tube being made with notches or serrations *k*, through the upper part of which the gas escapes from the tube into the main chamber in small bubbles. If they consist of carbonic acid or sulphurous acid, they dissolve in the water; if of nitrogen or carbonic oxide, they rise into the one-fourth space at the top of the vessel, where, being compressed, they exert a pressure upon the water sufficient to propel it from the hose-pipe to a distance of fifty to seventy-five feet, according to the pressure. When the water is expended, the basket is taken out, the remains of the first charge are removed, and replaced by a second charge; the barrel is again filled with water, and the charge is lighted as before. This may be done continuously, the time required for charging the machine being from thirty to sixty seconds.

The composition in the pasteboard cases consists of mixtures of chlorates or nitrates of potassa or soda, with charcoal or sulphur and silicates of soda or potassa, in liquid form, in varying proportion, according to the object for which the mixture is used. If for raising or propelling water simply, gases insoluble in water are required, such as nitrogen or carbonic oxide. The last of these is produced by a mixture of one hundred and twenty-two parts chloride of potassa, thirty-six parts charcoal, both in fine powder, and made into a paste with liquid silicate of soda or potassa, and carefully dried.

Another mixture for the same purpose, furnishing both nitrogen and carbonic oxide, consists of, nitrate of soda, one hundred and seventy parts; charcoal, sixty parts. Nitrate of potassa, two hundred and two parts, may be substituted for the nitrate of soda. These ingredients are to be in fine powder, and mixed with silicate of soda or potassa, as before.

If it is desired to produce carbonic-acid gas, the following compounds may be used: chlorate of potassa, one hundred and twenty-two parts; charcoal, eighteen parts, mixed with silicate of soda or potassa; or nitrate of soda, one hundred and seventy parts; charcoal, thirty parts, mixed with silicate of potassa or soda; or nitrate of potassa, two hundred and two parts; charcoal, thirty parts, mixed with silicate of potassa or soda. Chlorate of soda may in all cases be substituted for the potassa salt, according to its chemical equivalent. Where nitrates are used, nitrogen gas is produced at the same time as the carbonic acid.

For producing sulphurous acid, mixtures of chlorate of potassa, one hundred and twenty-two parts; sulphur, forty-eight parts, mixed with silicate of potassa or soda. Nitrate of potassa or soda may be substituted in this case in proportion according to its chemical equivalent.

These mixtures should be made and handled with care, the ingredients powdered separately, and mixed on a flat surface, or by sifting. After the addition of the silicate of soda there is no special precaution to be taken, as they are then non-explosive, and take fire with some difficulty. A quantity of powder, for example, being placed upon some of the paste, it may be fired without lighting the mixtures. Friction or percussion does not affect them. Being thus prepared, the charges will remain unaltered for any length of time, being always ready for use.

The weight of the material required for charging a machine will vary, according to its size and the pressure required, and should be determined by experiment for each mixture for each different-sized machine. Having determined the amount for a machine of a certain size, the amount found to give the requisite pressure should always be adhered to for the same sized machine. For a machine holding eight gallons of water, from four to six ounces of either mixture will be found sufficient, producing a pressure varying from forty-five to seventy-five pounds. By using a larger charge, a greater pressure may be obtained.

For extinguishing fires, there should be added to the water in the machine: of liquid silicate of soda or potassa, one or two pounds or more, the whole to be well mixed by agitation before the charge is inserted. Silicate of soda or potassa should be added only in those cases where charges producing nitrogen or carbonic oxide are used, as carbonic acid under pressure decomposes this substance. Aqua ammonia, one or two pounds or more, may be added or omitted, at pleasure, with the silicate of potassa or soda, avoiding it where carbonic acid or sulphurous acid is the only gas produced, as, in these cases, the gases would be wholly absorbed by the water, thus producing

no pressure. Tungstate of soda also may be added to the water in all cases where silicates are admissible.

The silicates of soda or potassa mixed with water have most powerful effects in extinguishing flame, and prevent wood or other substances, once wet with them, from taking fire a second time, even when dry.

Ammonia water, containing as it does so much gas in solution, the gas being driven out by the slightest heat, and possessing so great a diffusive power, is also a very powerful agent in extinguishing flame, while the ammonia and the silicate of soda together, when thrown with water upon fire, produce one of the most efficient agents possible for rapidly and completely extinguishing fires, and rendering at the same time those substances wet with the mixture incapable of further combustion.

The cost of materials for producing the effects described is very slight, thus enabling the invention to be carried out on a large scale by connecting a tank holding from ten to twenty barrels of water with suitable pipes, which may be carried upon each story of a building, having stop-cocks at various points, to which a hose may be attached as required, thus furnishing a large amount of water almost instantly, which can be thrown to a great distance or height.

The machine does not require to be charged beforehand; but, being filled with water and the composition inserted, is ready at a moment's notice by lighting the fuse. On this principle, cheap fire-engines for country towns, having great efficiency, and requiring but one person to operate them, may be constructed, the operation of the invention being equally satisfactory in large or small machines.

Though I have described the composition of the charges which I prefer to burn to generate the impelling gas, I do not limit myself to the employment of such compositions; neither do I herein claim such compositions, masmuch as, so far as they may be new, I intend to make them the subject of an independent patent or patents.

I claim—

A liquid-ejecting apparatus, having a main water or liquid chamber or reservoir, *a*, and a gas-generating tube, *d*, this tube having provision at its upper part for holding the gas-generating composition to be burned, and the tube and main chamber being constructed and arranged, substantially as described.

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