

J. H. STEINER.
Chemical Fire-Extinguishers.

No. 147,442.

Patented Feb. 10, 1874.

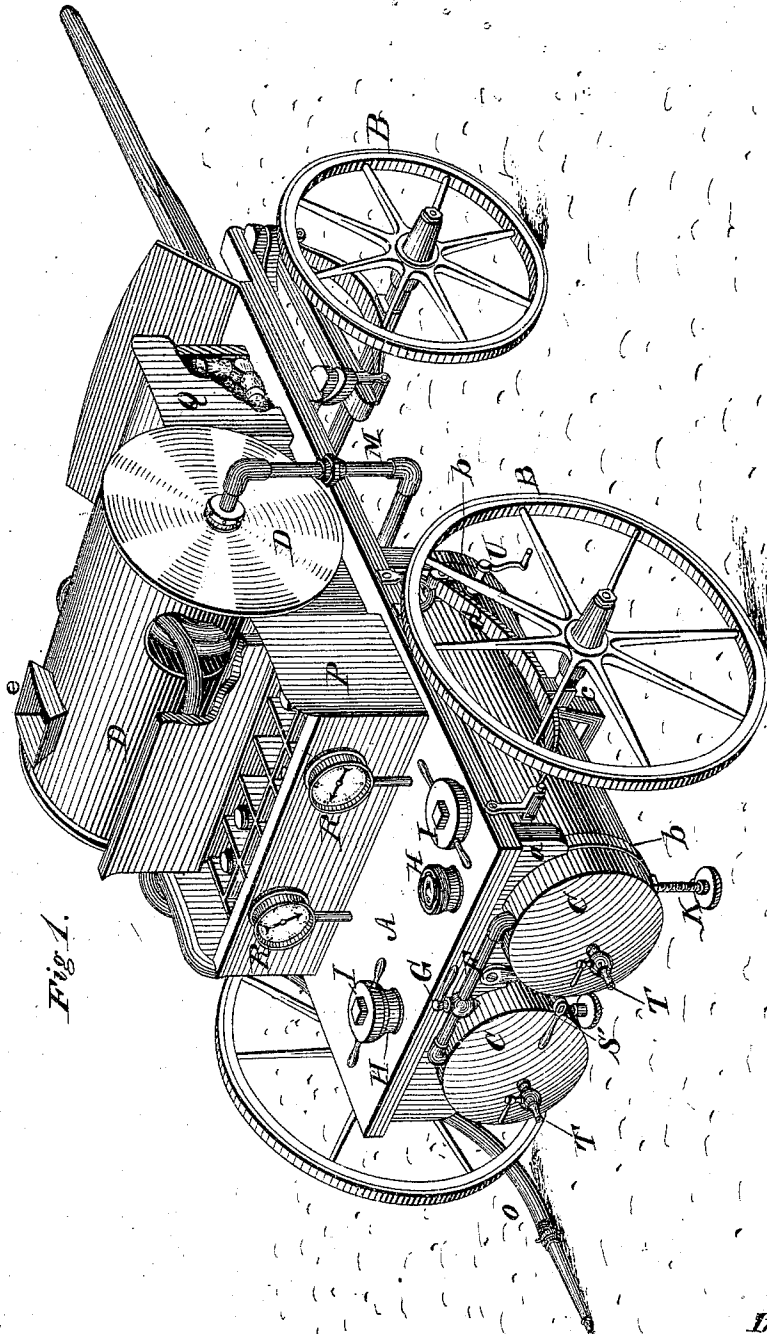


Fig. 1.

Witnesses.

Harry King.
H. H. Dodge.

Inventor.

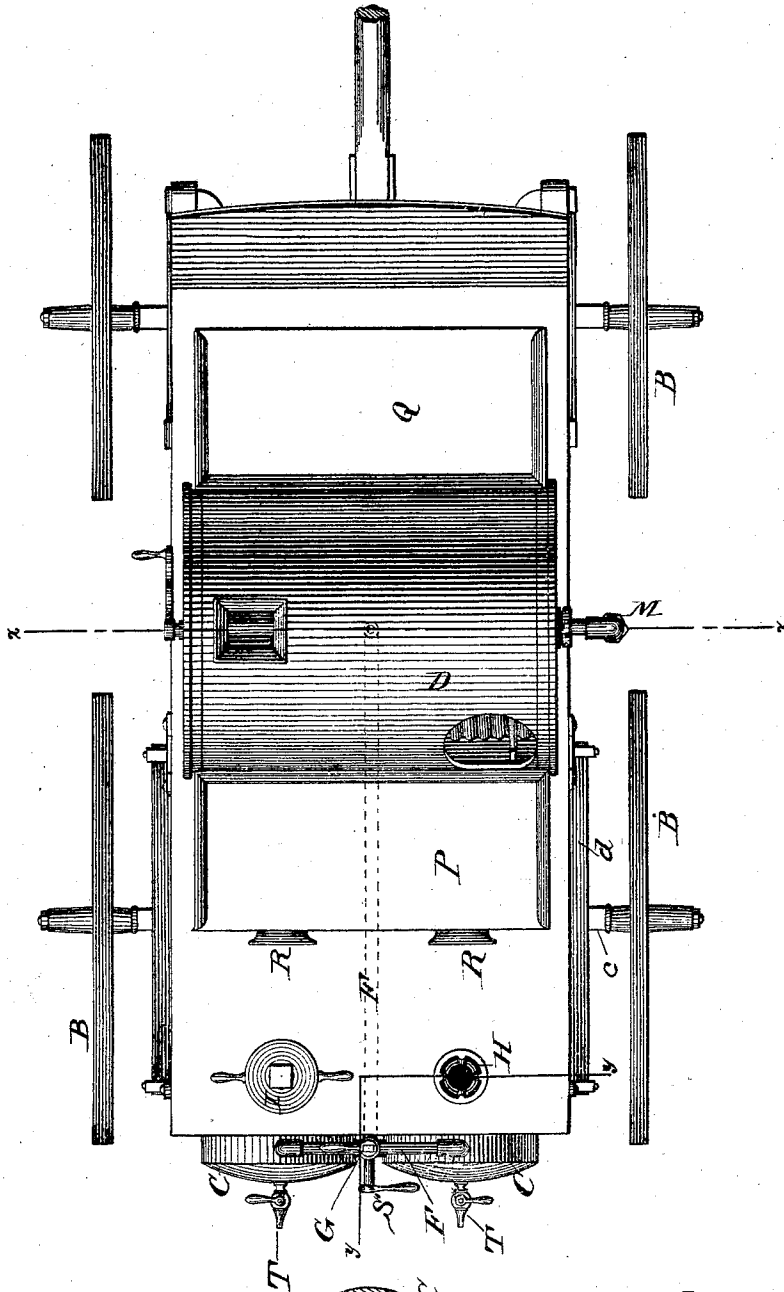
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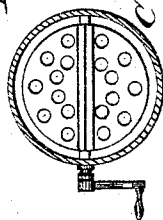
Fig. 2.



Witnesses.

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Fig. 4.



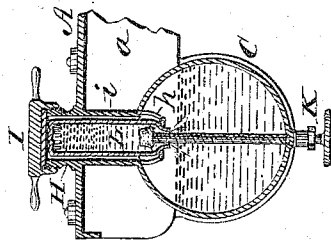
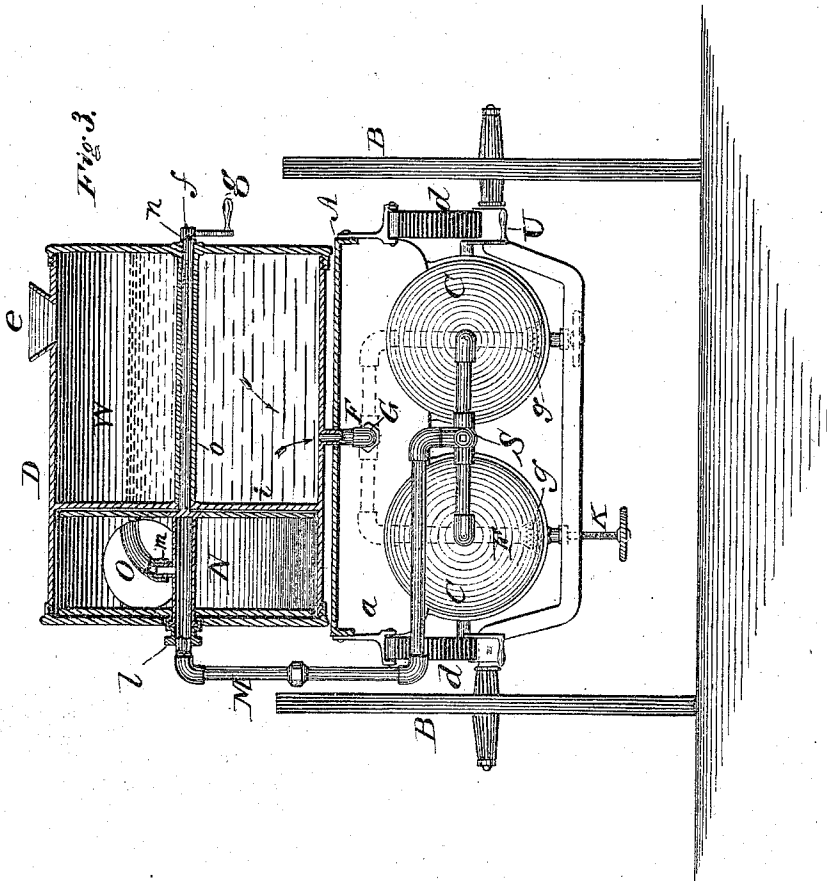
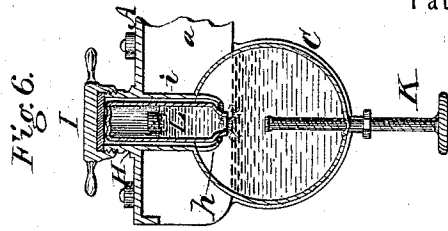
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UNITED STATES PATENT OFFICE.

JOHN H. STEINER, OF ALBANY, NEW YORK.

IMPROVEMENT IN CHEMICAL FIRE-EXTINGUISHERS.

Specification forming part of Letters Patent No. **117,442**, dated February 10, 1874; application filed January 5, 1874.

To all whom it may concern:

Be it known that I, JOHN H. STEINER, of Albany, in the county of Albany and State of New York, have invented certain Improvements in Chemical Fire Engines or Extinguishers, of which the following is a specification:

My invention relates to the well-known chemical or carbonic-acid-gas engines, in which carbonic-acid gas, generated in a closed water-vessel, is expelled by its own force or pressure, accompanied by the water, upon the fire. The object of the invention is to produce an engine which may be operated continuously for any required length of time, which may be set in operation quickly and with certainty, which shall carry its own hose ready for instant use without making any connections, which may be operated with ease, and which, while possessing the above qualities, shall be cheap, light, simple, and durable. The improvements consist, first, in providing the machine with two generators, and combining therewith a water-reservoir, in such manner that the generators may be filled therefrom alternately; second, in using acid-bottles in an inverted position, and forcing their stoppers upward into them to release the acid; third, in using, with the inverted bottles and the devices for forcing their stoppers inward, stoppers of cork, coated with wax on their smaller end, so that they are protected from the action of the acid, and that when forced inward they will rise and float on the acid or acidulated water which takes its place, and then, finally, as the generator is emptied, settle back in the mouth of the bottle, and be blown therefrom by the expansion of the gas therein; fourth, in combining, with the two generators, a hose-reel having a hollow shaft, with the hose attached thereto in such manner that the contents of the two generators may be discharged through the hose alternately, and while the same is wholly or partially wound on the reel; fifth, in arranging the reel and water-reservoir in opposite ends of a transverse drum or case, whereby the machine is rendered compact and symmetrical, the hose protected, and the machine cheaper in construction; sixth, in various minor details, hereinafter fully explained.

In the accompanying drawings, Figure 1 is

a perspective view of the engine complete and ready for operation; Fig. 2, a top-plan view of the same; Fig. 3, a transverse vertical section of the same on the line *x x*; Fig. 4, a transverse section of one of the generators, showing the agitator, which is sometimes used therein; Figs. 5 and 6, transverse sections through one of the generators, showing the arrangement of the acid-bottles and the devices for discharging them.

In constructing my machine, I build a rectangular bed or frame, A, and mount it in any suitable manner on four wheels, B, and provide it with means for attaching horses to draw it. Lengthwise under the rear end of the bed A, I arrange side by side two long cylindrical generators, C, securing them up against pillow-blocks *a* by means of bands or straps *b*. Springs *d* are arranged between the main axles and the frame, in the manner shown, or in any other suitable manner. In order to afford room for the generators C between the rear axle *c* and the bed or frame A, and to allow the latter to rise and fall as the springs yield, the said axle is bent or arched downward, as shown in Figs. 1 and 3. On the middle of the bed or frame A, I secure a transverse cylindrical drum or body, D, divided by a transverse partition, *i*, into two chambers, one of which forms a water-reservoir, W, while the other contains a hose-reel, N, as shown in Figs. 1, 2, and 3, and as hereinafter more fully described. From the bottom of the reservoir W a pipe, F, extends backward below the bed A to the rear end of the machine, where it branches into two parts, one of which enters the top of each generator C, as shown in Figs. 1, 2, and 3. This pipe is for the purpose of conducting water from the reservoir W into the two generators alternately. At the point where it branches or divides it is provided with a three-way cock, G, which may be set so as to admit water to either one of the generators at will, or to shut it off from both.

When the machine is in operation, the cock G is turned in such position as to fill one generator while the other is being emptied, and then reversed in order to fill the empty one while the first is being discharged, and so on alternately.

The reservoir may be filled by a hose from a reservoir, pump, or hydrant; or, when they are not available, it may be filled by hand with buckets, a hopper, *e*, being placed on its top, as shown, to receive the water.

By using the reservoir, and connecting it with the two generators, as shown, I am enabled to fill the latter with ease and expedition, and to collect and retain a supply of water constantly on hand.

By having both generators and the reservoir filled beforehand, the engine may be kept in operation for a considerable length of time in places where no water can be obtained, or where it could not be obtained by the time that that in the generators is exhausted.

As the filling of the generator is done at the side of the machine, it does not interfere with the operators, who stand at the rear.

The machine is operated, as usual, by dissolving bicarbonate of soda in the generators, and then adding sulphuric acid to cause the generation of carbonic-acid gas. The soda and acid are introduced into the generators through vertical tubes or necks *H*, formed thereon near their rear ends, and closed by means of screw caps or covers *I*, as shown in Figs. 1, 2, 5, and 6. The caps or covers are provided with arms or handles, and also with a square boss to receive a wrench for turning them. In order that the soda, which is thrown loosely into the generators, may be thoroughly dissolved, the ends of the water-pipe *F* are carried down nearly to the bottom of the generators, and each provided with a rose or sprinkler, *g*, as shown in Fig. 3, so that the water entering the generators is sprayed directly upon the soda, which is washed or carried about by the water into all parts of the generators. As an additional measure, rotating dashers or agitators *U* may be mounted in the generators, and provided with an outside crank, by which to turn them, as shown in Fig. 4; but when the parts are arranged as above, I find that the agitators are not necessary. The sulphuric acid is held in bottles *L*, generally made of lead, which are adapted to fit within the necks or tubes *H*. In order to support the bottles, which are inserted upside down, each neck *H* is provided at its lower end with a skeleton-frame, *h*, to encircle and support the neck of the bottle, as shown in Figs. 5 and 6. The screw-caps *I* are removed, the bottles inserted, and then the caps again applied to close the generators and hold the bottles in place. The release of the acid from the bottles is effected by means of vertical hand-screws *K*, which extend up through the under side of the generators in such position as to enter the mouths of the bottles, and force their stoppers inward, as shown in Figs. 5 and 6. The stoppers are made of cork, tapered to fit the mouths of the bottles, and coated with wax on the inner or small ends to protect them from injury by the acid. As soon as these stoppers are forced into the bottles they rise and float on the acid, leaving the mouths of the bottles unobstructed,

and permitting the free escape of the acid, the screws being also turned down at once out of the way. As the waxed end of the corks is heavier than the other, they turn over and float on the acid with the small end down, and, as the acid falls, they settle down closely into the neck of the bottle. At this time there is a pressure of about seventy pounds to the inch in the generators and bottles, and consequently, as the generators are discharged and the pressure in them decreases, the gas in the bottles expands and blows the corks out. Thus it will be seen that the corks are removed from the bottles automatically, and the only objection which could be urged against them overcome. By using common corks and forcing them inward, as described, I produce an exceedingly simple, cheap, and reliable means of discharging the acid. The contents of the generators are discharged through a pipe, *M*, the lower end of which divides into two arms or branches, leading into the rear ends of the respective generators, as shown in Fig. 3. At the point where the pipe *M* divides or separates, I apply a three-way cock, *S*, by which either generator may be allowed to discharge through the pipe *M*, while the other is closed, or, when desired, both generators cut off from communication with the pipe. The cock *S* is provided with a rod, *S'*, extending back to the rear end of the machine, and provided with a handle, as shown in Figs. 1 and 2. In operating the machine, the cock is turned in such manner as to allow the two generators to discharge alternately through the pipe *M*, thereby keeping up a constant stream from the machine. The upper end of the discharge-pipe *M* is coupled to the end of the hollow shaft or journal of the hose-reel *N*, which, as before stated, is mounted in one end of the drum or cylinder *D*. The reel is constructed in the customary manner, except that its shaft or journal is made hollow, and provided with two couplings, *l* and *m*, the former on the outer end to receive the pipe *M*, and the latter inside of the reel to receive the end of the hose *O*, which remains permanently coupled thereto. The contents of the generators, escaping through the pipe *M*, pass through the hollow shaft of the reel and escape through the hose. As the hose used with this class of engines is of such stiffness that it does not flatten or collapse, it may be filled while wound on the reel, or while being unwound therefrom. In bringing the engine into use, it is only necessary to draw off so much of the hose as is required. No connections require to be made, and no time is spent in making adjustments. The charge always passes through the entire length of the hose, whether it be partially wound on the reel or not.

By combining the reel constructed as above with the hose and the two generators, I produce an engine which may be brought into instant use, and which will throw a continuous stream through a hose for any required length of time.

In order to permit the escape of the gas remaining in the generators after the water is discharged and the outlet closed, I provide each generator at its rear end with a blow-off cock, T, as shown in Figs. 1 and 2. It is when these cocks are opened, and the pressure in the generators suddenly reduced, that the expansion of the gas in the acid-bottles forces the corks therefrom, as before described. On the bed of the machine, against opposite sides of the drum or cylinder D, I secure two boxes, P and Q, provided with hinged lids and divided into cells or compartments. In one of these boxes I carry acid-bottles, and in the other charges or cartridges of soda. The boxes also serve as seats for the operators or attendants who ride on the machine. To each generator I connect, by means of a vertical pipe, a pressure-gage, R, both of which are mounted on the rear side of the box P, in plain view of the attendants. It will be observed that all the operative devices are at the rear end of the machine, in convenient positions to be operated by the attendants. The reel N is provided with a solid shaft, *n*, which extends centrally through the reservoir W, and has a crank applied to its end, as shown in Figs. 2 and 3, so that by turning the crank the hose may be wound on the reel within the drum or case. This solid shaft is inclosed in a tube, *o*, to prevent leakage. The drum conceals the hose from sight, and gives the engine a better appearance, and also protects the hose from the rain, snow, and dust, which would otherwise accumulate thereon.

The engine constructed as above operates as follows: Supposing the engine to have just arrived at a fire, with both generators filled with water having soda in solution, and with one generator in communication with the outlet-pipe, but shut off from the water-reservoir, the cap or lid I of said generator is removed, a bottle of acid inserted upside down, and the cap replaced and screwed down tightly in place. The hand-screw K is then turned up, so as to open the bottle, and turned down again out of the way. The instant that the acid is released, gas is generated and the discharge commences. While the charging of the machine is going on, the end of the hose is seized by the attendants, and the hose drawn from the reel to the required point, when its stream may be brought to play instantly. While the one generator is being discharged, an acid-bottle is inserted in the other, and then the instant that the first one is exhausted the second one is started and the cocks G and S reversed, thereby opening communication between the second generator and the hose, and admitting water from the reservoir into the first and empty generator. While the second generator is being discharged, the empty acid-bottle is removed from the first one, and a charge of soda and a bottle of acid introduced. By the time that the second gener-

ator is exhausted, the first is filled with water and again ready for operation, and it is started as soon as the other is exhausted.

Thus it will be seen that by providing the machine with the two generators, and using them alternately, I am enabled to keep it in constant operation for any required length of time.

My machine is cheap, light, and simple, is readily operated, is not liable to derangement, is quickly brought into operation, and is very neat and ornamental in its appearance.

It is obvious that in constructing the machine the details may be changed in many respects without materially changing the machine. For example, the arrangement of the water and discharge pipes may be varied. Instead of using the screws K to force the stoppers into the bottles, sliding rods or stems operated by hand-levers may be used. Instead of having the reel and reservoir arranged in the case D, they may be arranged in any other suitable manner, provided the proper connections are made with the other parts of the apparatus. The ends of the discharge-pipes may also be provided with strainers on their ends.

I am aware that a hollow journaled reel, such as used by me in this engine, is not new, and, therefore, I lay no claim thereto, except in connection with the generator and the connecting-pipe, as shown.

Having thus described my invention, what I claim is—

1. In a chemical fire-engine, a water-reservoir, and two generators or extinguishers connected therewith, so that they may be filled therefrom alternately, as set forth.

2. In combination with the inverted acid-bottles L, the vertical screws K, or their equivalents, arranged to force the stoppers into the bottles, as shown and set forth.

3. In combination with the acid-bottles and the screws K, or their equivalents, arranged to operate as described, the cork stoppers coated on one side with wax, as and for the purposes described.

4. A chemical fire-engine, consisting of a wheeled frame provided with a generator or extinguisher, and with a hollow journaled reel, N, the latter having its journal connected permanently to the generator by a pipe, M, and provided with a hose, O, coupled to it, as shown and described.

5. The drum or cylinder D, having the water-reservoir formed in one end and the hose-reel mounted in the other, as shown and described.

6. The reel N, having its shaft *n* extended through the water-reservoir, and surrounded by a tube, *o*, secured to the latter, as and for the purposes described.

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Witnesses:

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