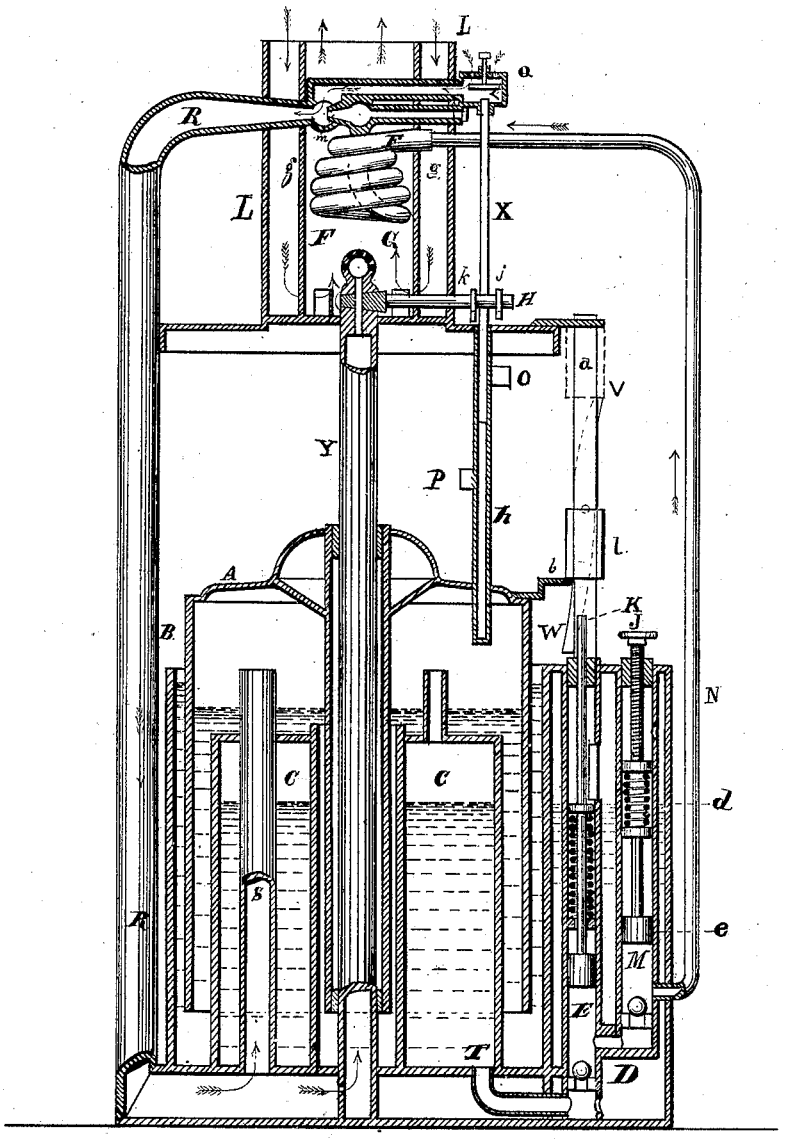
3 Sheets—Sheet 1.

H. S. MAXIM.

Carbureter

No. 212,857. Patented Mar. 4, 1879.

Fig. 1.



Witnesses;-
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Inventor;
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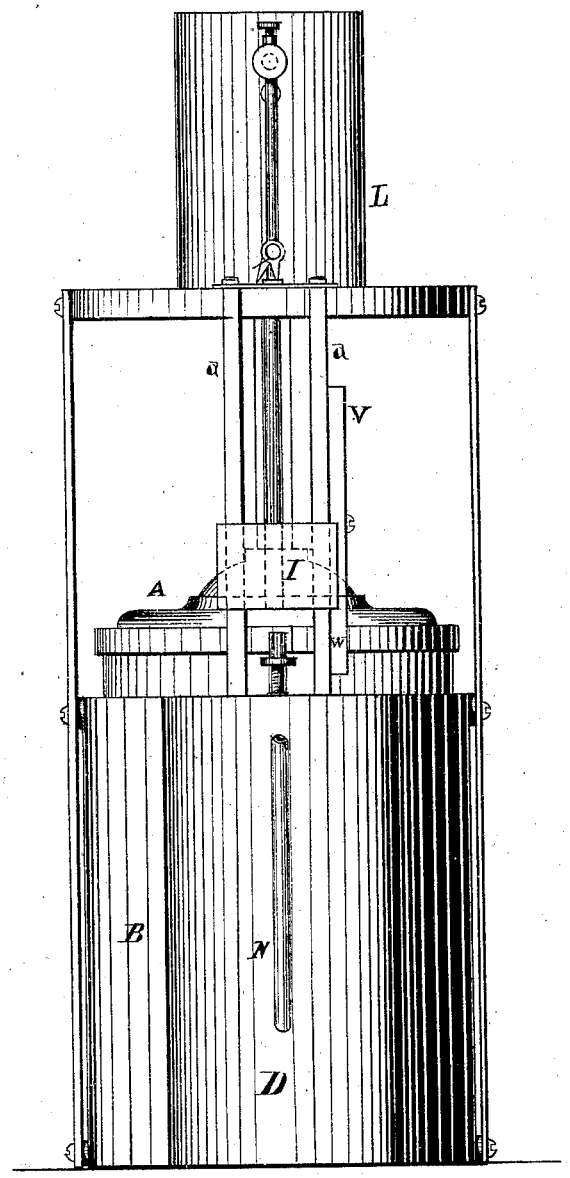
3 Sheets—Sheet 2.

H. S. MAXIM

Carbureter.

No. 212,857. **Patented Mar. 4, 1879.**

Fig. 2.



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3 Sheets—Sheet 3.

H. S. MAXIM.

Carbureter.

No. 212,857. Patented Mar. 4, 1879.

Fig. 6.

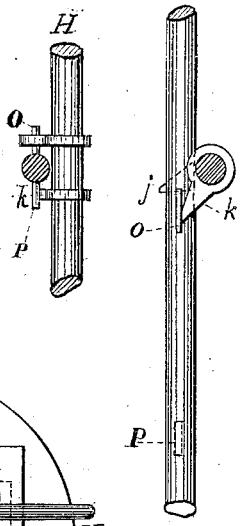

Fig. 5.

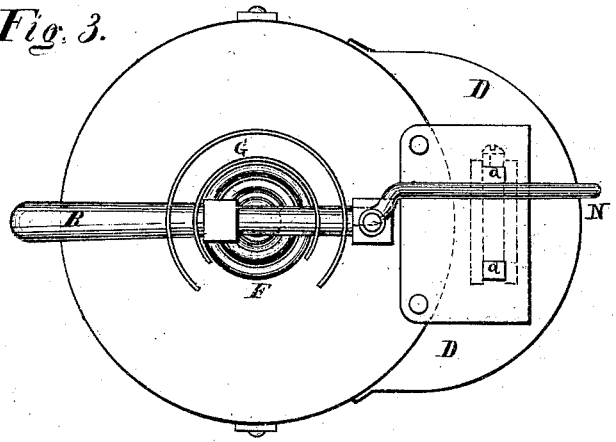

Fig. 3.

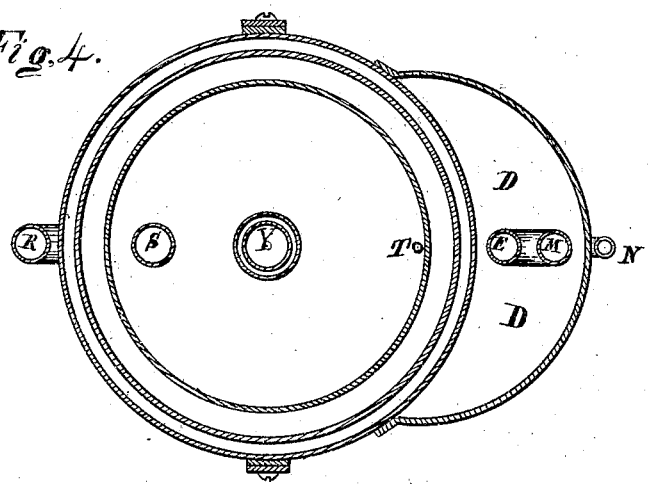

Fig. 4.

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UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN CARBURETERS.

Specification forming part of Letters Patent No. **212,857**, dated March 4, 1879; application filed July 16, 1878.

To all whom it may concern:

Be it known that I, HIRAM STEVENS MAXIM, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Machines for Carbureting Air, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a vertical central section. Fig. 2 is a side elevation; Fig. 3, a plan; Fig. 4, a horizontal section; Fig. 5, a plan of the cams that open and close the burner-cock, and Fig. 6 a side view of same.

The object of my invention is to produce a machine for carbureting air for illuminating purposes that is completely automatic in its operation, and which shall be cheap to construct, easy to understand and operate, safe in its use, and from its small size requiring but little room.

It relates to that class of machines in which gasoline is first converted into vapor by heat under pressure, and thus made, by its escaping force, to inject sufficient air to reduce it to the proper density for illuminating or mechanical purposes.

I am aware that a pump has been operated by gas generated in the apparatus, and that an oil-supply pump has also been used operated automatically by the gas generated; but this apparatus is subject to derangement from friction. It is found that when the feed of gasoline is supplied by compressed air, on the accidental going out of the fire or the derangement of the parts, all the gasoline in the supply-tank will be forced through the machine and be lost, or, should a leak occur in any of the pipes, the full contents of the tank will soon be discharged through such leak to the great danger of life and property. In places where the machine is inside of a building and supplied from a large tank situated on the outside, any slight derangement of the parts causes all the gasoline to be discharged within the building. Moreover, a slight fire may melt or break off a pipe leading from the tank, when the whole contents of the tank will be discharged into the fire. Another danger and annoyance in the use of compressed air is from the leakage of such air from the pump or tank connections, as a reduction in pressure to a point so low that the gasoline vapors will not induce air in the holder produces a rich smoky gas liable to condense in the pipes and smoke ceilings. Moreover, when compressed air is used, such air becomes densely carbureted and has to be blown off, which is not only a waste, but also dangerous and annoying. It is also found that very strong and expensive tanks are necessary to confine the air and gasoline under a high pressure, and that any neglect or lack of skill on the part of the attendant may result in great loss and danger, and all gas machines or carbureters on the injection plan heretofore made have been provided with an expensive intermitting valve-gear, which is often a source of trouble.

To obviate all these troubles is the aim of my present improvement.

In my apparatus I employ a gas-holder, a pump for injecting the gasoline into the vaporizing portion of the apparatus, and a weight that is raised by the gas-holder, and remains supported until the gas-holder descends and liberates the weight, and it falls to actuate the pump.

There is a small flame burning when the apparatus is partially or entirely at rest, and the sudden action of the pump drives the gasoline into a chamber provided with a piston and spring, so that the supply to the retort is gradual.

Many of the parts made use of by me have before been employed. My invention relates to the arrangement, combination, and peculiar construction of the several parts, as hereinafter set forth.

In the drawings, A represents a gas-holder working freely on the rod (tubular guide) Y, and in the water-tank B. C represents an inside chamber, in which gasoline may be kept. D is a projecting chamber connected to chamber C by pipe T. E represents a pump-plunger; F, a coil of pipe; G, a burner; H, the stem or extended key of a gas-cock; I, a weight operating freely on the rods *a a;* J, a thumb-nut to change the tension of the spring *d;* K, the rod of piston E; L, the outer case of the burner and coil-chamber; N, a tube for conveying gasoline from the chamber M to the coil F; O and P, projections on the rod-tube

h; Q, the air-inlet valve; R, a pipe for conveying the carbureted air from the injector to the holder; S, a pipe for passage of gas from the bottom to the top of the water-tank and into the holder; T, a small tube to supply the outer chamber, D, from the inner chamber, C C. V is a catch or upper end of a lever, on which the weight I rests when elevated. W is the lower end of the same.

X is a rod over which the tube *h* slides freely as the gas-holder rises or descends. This rod X reaches to the stem of the valve Q, so as to act against the same and close the air-inlet when the gas-holder rises too high, thereby preventing the ingress of air or the escape of vapors when the gas-holder is full.

The operation of the machine is as follows: The tank B being filled with water, and the chamber C with gasoline, the holder may be raised and the weight I be allowed to drop. This will throw over sufficient gasoline to carburet the air as it passes out of the holder through pipe S and Y. The gas may now be lighted at the burner G, and the weight I be raised again and suspended by the catch V. As the gas is consumed the holder will fall until the projection *b* on the holder A presses the lower end of the lever at W. This will disengage the weight and allow it to fall, when it will strike on rod K, and force the gasoline in the pump below piston E into chamber M. The pressure of gasoline in M will cause it to compress the spring *d* by forcing the piston *e* in M upward. The gasoline will, at the same time, flow with a force equal to the tension of spring *d* through the pipe N, and into the hot coil F, where it will be converted into vapor and forced through the pipe *m* into the enlarged pipe R. This will induce air through the air-check valve Q, and force it with the vapor into the holder. As the holder rises the weight I is raised, and again rested on catch V. By this time all the gasoline in the chamber M will have been evaporated, and the spring *d* extended to its original height.

When the holder rises, and just before it reaches the highest point, it brings the projection P in contact with cam *k*, and closes off the gas-cock, all excepting a small jet, which remains to relight the large burner.

The holder being now at its highest point and full of gas, the gas may be drawn off and consumed, when the holder will descend, the coil being cooled off, and no gas excepting the small jet being used about the machine.

When the holder has so far descended as to bring the projection O against the cam *j*, the gas-cock will be reopened, and the large burner lighted. This will soon heat the coil, and on the further descent of the holder the projection *b* trips the weight, as before, the gasoline is forced into the coil, and another charge of gas manufactured.

It will thus be seen that the escaping force of the hot vapor is not only, as in other machines, made to supply air to the holder, but is also made to supply gasoline to the retort or heater, which, in this case, is a coil of pipe.

Should the holder, at any time when only a few burners are lighted, have a tendency to rise too high, then the rod X is made to close off the air-check valve, thus stopping off the air-supply, which gives volume to the mixture. When no gas is being drawn from the machine, but very little gas will be consumed in keeping the small jet in readiness to ignite the large one. This is a great saving over the old mode.

When the machine is of large size I prefer to dispense with the inside chamber, C C, and use in its place a large storage-tank, which may be placed under the machine, or at a proper height away from it to allow the gasoline to flow into the chamber D.

The air to support combustion is drawn down through the space between the outer casing, L, and the inner casing, *g*, as shown. This saves heat and prevents radiation.

I may, in some cases, extend the two cylindrical casings outside the building or gas-house, thus forming a double funnel and securely inclosing the flame.

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

1. The pump E, piston *e*, chamber M, and spring *d*, combined with the gas-holder A, constructed as and operating in the manner and for the purpose herein shown and described.

2. The combination of the lever W, having catch V, and the weight I, sliding on rods *a*, with holder A, rod K, and pump E, constructed and operating as and for the purpose specified.

3. The combination of pump E, rod K, and weight I, operating in connection with a gas holder and retort, in the manner and for the purpose specified and shown.

4. The combination of screw J, spring *d*, piston *e*, chamber M, pipe N, and pump E, constructed and operated as shown and specified.

5. The combination, with the gas-holder, of a pump, a weight to operate the pump by its fall, the retort F, burner G, regulating-cock H, air-inlet valve Q, and mixing-jet, substantially as set forth.

HIRAM S. MAXIM.

Witnesses:
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