

(No Model.)

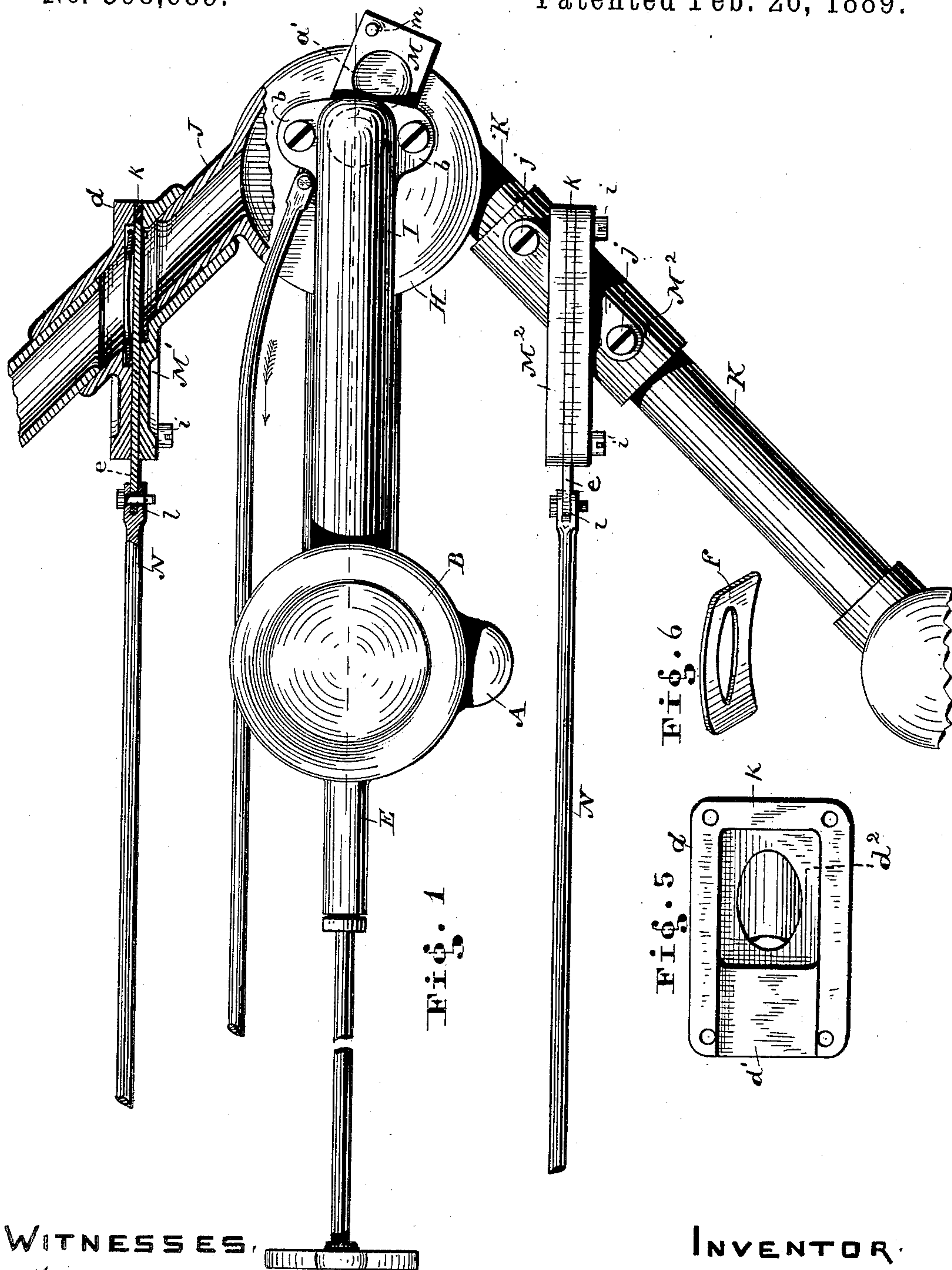
2 Sheets—Sheet 1.

G. W. BILLINGS.

VAPOR BURNER.

No. 398,689.

Patented Feb. 26, 1889.



WITNESSES,

William B. Weil,  
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**INVENTOR.**

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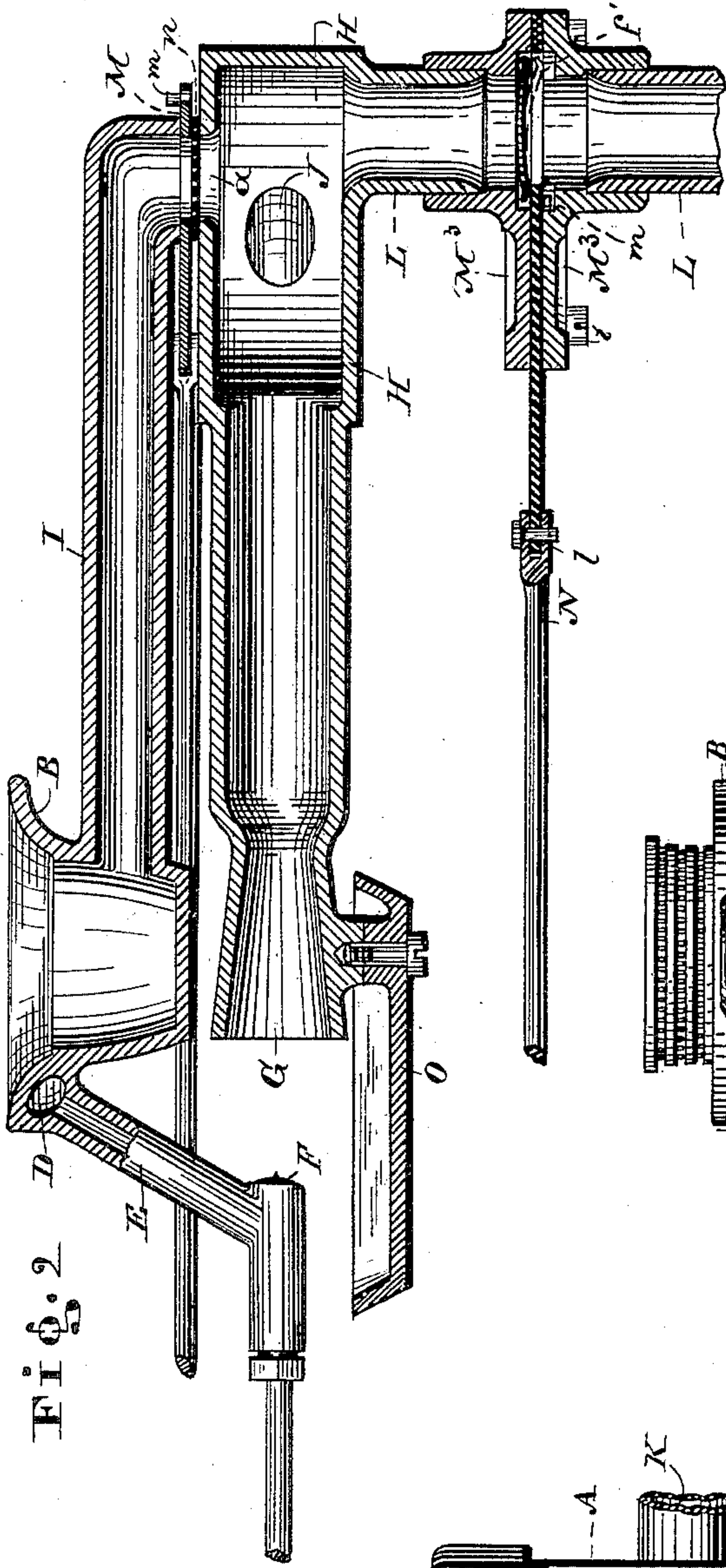


FIG. 2

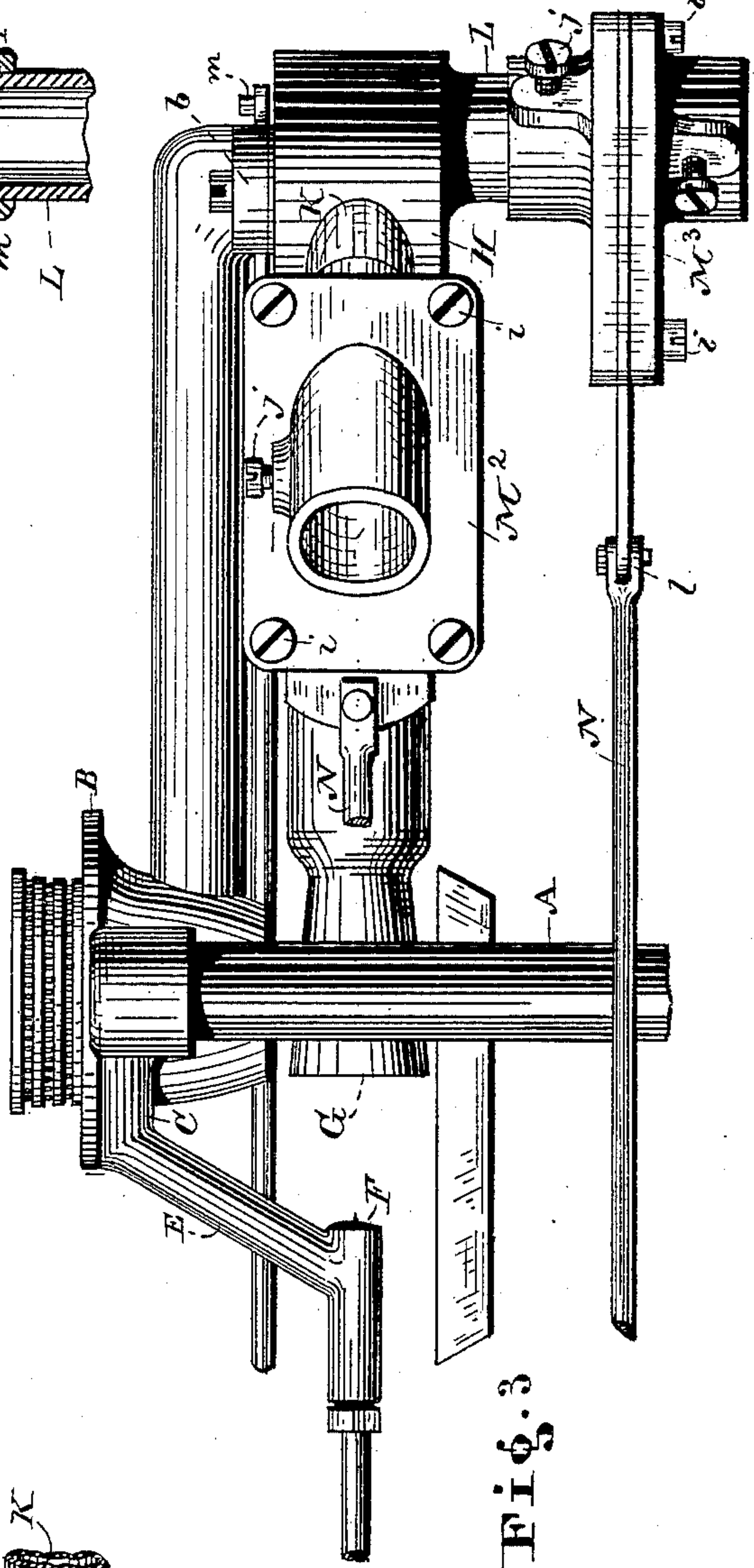


FIG. 3

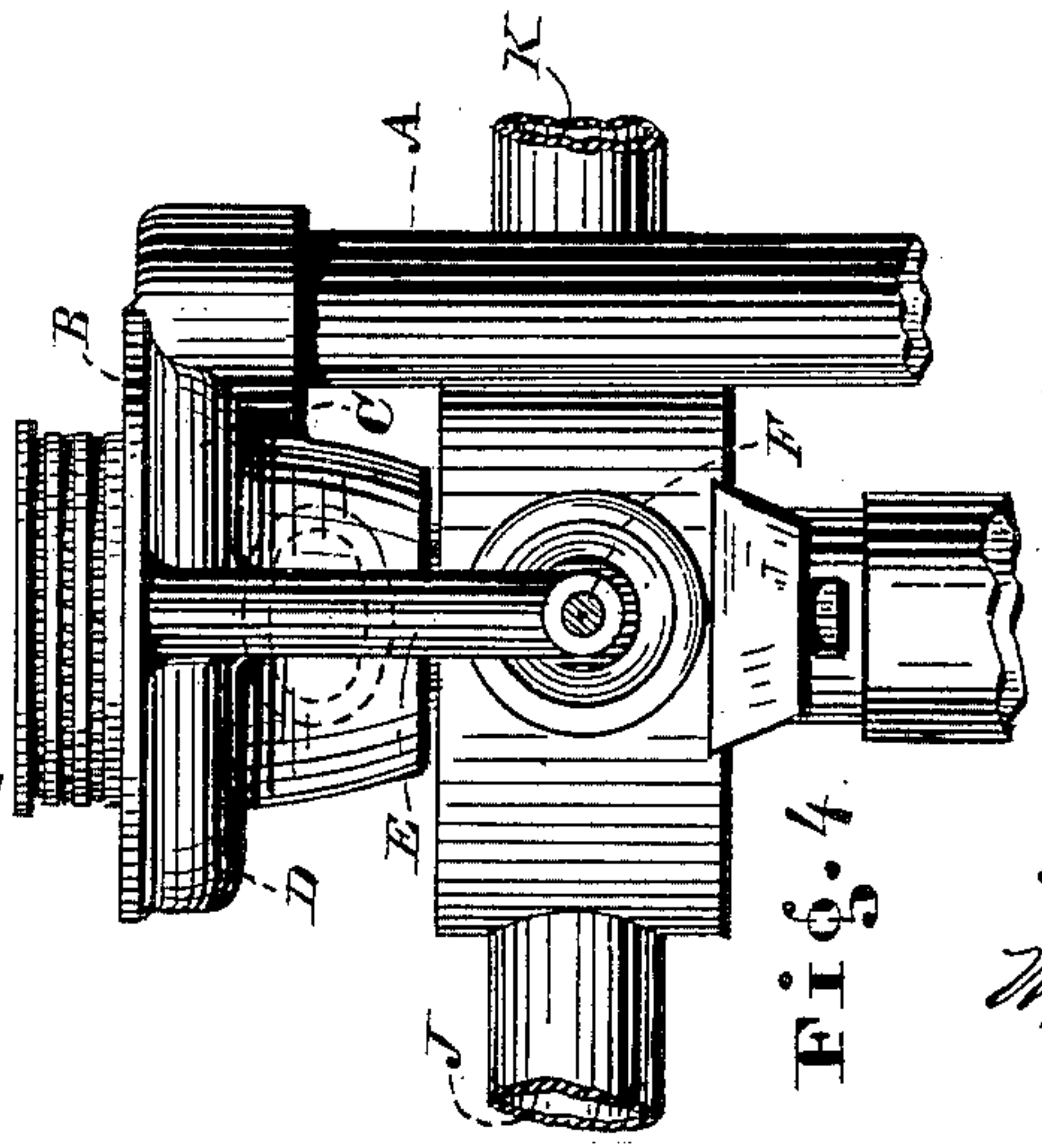


FIG. 4

WITNESSES,  
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# UNITED STATES PATENT OFFICE.

GEORGE W. BILLINGS, OF CLEVELAND, OHIO.

## VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 398,689, dated February 26, 1889.

Application filed April 6, 1888. Serial No. 269,845. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. BILLINGS, of Cleveland, county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Vapor-Burners; and I do hereby declare that the following is a full, true, and exact description thereof.

My invention consists in the means employed for supplying two or more burners with vapor from the vapor-generator controlled by a single needle-valve mechanism and an intermediate commingling-chamber provided with separate and controllable conduits leading to the combustion-chamber of every burner arranged in connection with one and the same stove-frame.

The essential and most important part of my invention is the application of a mixing or commingling chamber, into which, by means of a comparatively long tube, vapor from the orifice of a needle-valve is directed to enter under pressure of the gasoline in the reservoir. The current which is thus created within and by said long tube causes a large volume of air to be drawn in by the vapor and to thoroughly mix with the same within said chamber. This aerated vapor or gas has the property of being practically non-condensable and of being conveyable in that condition to the various burners arranged in connection with the stove. This gas or mixture of vapor and air is distributed to the various burners, and by the peculiar arrangement of the openings in the mixing-chamber the frictional resistance of the said gas is reduced to a minimum in its passage through the pipes. As above stated, the tubes or conduits leading from the mixing or commingling chamber are controllable—that is, they are provided with cut-off valves, which allow when opened the vapor to pass unobstructed through said tubes to the burners, thus avoiding friction and waste in vapor to a marked extent. Furthermore, there is another advantage in the arrangement of the single needle-valve by which the escape of gasoline from the reservoir is prevented. By my arrangement there is but one orifice through which gasoline can ever pass, and that orifice is controlled by a single needle-valve, the closing of which absolutely prevents all escape of gasoline.

To enable others skilled in this art to fully understand the nature of this invention, reference will be had to the following specification and annexed drawings, making part of the same.

Figure 1 represents partly a plan view and partly a horizontal section of a compound vapor-burner provided with the improvements above referred to. Fig. 2 is a vertical section of the center burner on line *x x*. Fig. 3 is a side elevation of the same, and Fig. 4 is a partial front view of Fig. 1. Fig. 5 represents the inner face view of one-half of a cut-off valve used in connection with the mechanism above referred to. Fig. 6 illustrates a perspective view of a spring or tension plate used in connection with said gate-valve.

Like letters of reference refer to like parts in the drawings and specification.

In the drawings, A represents the stand or feed-pipe shown in Figs. 1 and 3, which is attached to the center or primary burner, B, to convey the gasoline from the reservoir, with which said pipe is connected, to the vapor-generators C D, which are arranged on the exterior wall of the combustion-chamber of the center burner, B. In the chambers C D the gasoline is generated into vapor by the action of the heat from the center burner. The pipe E is in open relation with said chambers C D and leads the vapor to the orifice of the needle-valve F. On opening the valve F the vapor escapes into the tube G. Said needle-valve F is of the usual construction, as seen in Figs. 1 and 2; also the generators C D, which form, with the pipe E and burners B, an entirety.

The tube G, above referred to, is funnel-shaped at the front end thereof, and the rear end is connected and in open relation with the case H, the interior of which serves as a commingling-chamber for the vapor and air, the latter being drawn in by the force under which the vapor enters the tube G, and the funnel-shaped end of the tube G is for the purpose of increasing the current of air—that is, capacity of the tube G.

Owing to the comparatively large diameter and great length of the tube G enough air is given ample space to follow the inflowing va-



por and mix or commingle with the same within the case H. The result is that both the air and vapor unite and form a practically non-condensable combustible gas.

5 From the case H or commingling-chamber are leading, respectively, the tubes I, J, K, and L, Figs. 1 and 3, to the various burners, which are arranged in connection with one and the same stove-frame. Each of said  
10 tubes is provided with a cut-off valve, as seen at M M' M<sup>2</sup> M<sup>3</sup>, so that one or all at the same time may be in open relation with the commingling-chamber and furnish vapor for the combustion-chamber of the respective burn-  
15 er with which they are connected. The cut-off M is arranged in relation to and with the pipe I. By said slide M the opening *a* on top of the case H is controlled, and the flanges *b* of the pipe I guide and retain said slide over the opening *a*. A similar opening, *a'*, is also in  
20 the slide M, so that on drawing said slide in direction of the arrow the position of the opening *a'* may be moved, whereby it may partially register with the opening *a*, or be in  
25 line therewith, so as to allow of a full and free flow of gas from the case H to the combustion-chamber of the burner B. As shown in Fig. 1, the opening *a* is entirely covered by the slide M, and no communication is had  
30 between the tube I and the case H. The heat developed from the burner B can be so controlled by the described means that when only one fire is used a marked saving of gaso-  
line is the result. By this arrangement the  
35 burner B is or can be used for cooking purposes by generating vapor for its own use only as well as for that of the others connected therewith, as set forth. The tubes J and K  
40 lead the vapor from the case H to the combustion-chamber of the side burners, as indicated in Fig. 1, wherein a part of one of said side burners is shown in connection with the tube K. Through the tube L is conveyed the  
45 supply of vapor to a burner generally arranged in connection with an oven located below the top of the stove. Substantially the cut-off valves used in connection with the tubes J, K, and L are all alike. The tubes J  
50 and K, however, require the branches of said valves to run in an angular direction with the slide thereof, owing to the angular direction in which the pipes J and K extend to their respective burners. Fig. 5, for instance, illus-  
trates the inner face view of the side plate, *d*, of valve-casing M', wherein the slide *e* is  
55 fitted into the recess *d'*, and into the recess *d<sup>2</sup>* is inserted the tension-plate *f*. By this means the slide *e* is slightly pressed against the plain face of the adjoining side plate of the valve-casing M', as seen in Figs. 1 and 2.  
60 The side plates of all the casing's cut-off valves are connected by means of the screw-bolts *i*, and the valves are connected with the pipes by means of the set-screws *j*. (See Figs. 1 and 3.)

In the drawings the recess *d'* is shown as formed by means of the liner *k*, which is in-

laid between the side plates of the valve and cut out, so as to enable the operation of the slide *e*. The pressure with which the plate *f*  
70 bears against the slide *e* causes the slide to remain in whatever position it may be set in adjusting the fires. The slides *e* are oper-  
ated by means of the rods N, which are con-  
75 nected with said slides, as seen at *l*, Figs. 1 and 3, the free ends thereof extending out in a direction to be of easy access for the op-  
erator.

The valve M<sup>2</sup>, Fig. 1, is shown as closed, whereas the valve M<sup>3</sup>, Fig. 2, is drawn open.  
80 The pin *m*, which is secured to the inner end of the slides, prevents the same from being drawn back farther than necessary to attain an unobstructed passage through said valve.  
The hole in the plates *f* is of a corresponding  
85 diameter with the bore of the valve for the same reason.

The above-described compound burner is operated in the following manner, viz: First  
90 of all, all valves are closed, and the drip-cup O, which is attached to the tube G, is supplied with gasoline and ignited to heat the pipe E and the generators C and D. As soon as sufficient vapor is generated, then the valve  
95 F is opened and the vapor escapes into the mixing-chamber. On withdrawing the slide M the vapor will return in the tube I to the center burner, B, which burner is then ignited to continue the generation of vapor, not  
100 only for its own use, but also for that of all the other burners connected therewith, and which can be started on opening the respective cut-off valves. By the center burner, B,  
105 vapor is generated for all the burners; hence the same must be kept in operation as long as any one of the others shall burn. If, for in-  
stance, the stove has been in full operation—that is, the needle-valve F and all intermedi-  
110 ate valves are wide open—and it is desired to extinguish the flame of the lower burner, the force of the remaining burners is then regulated directly by the needle-valve F.

Interposed between the outlet *a* of the case H and the valve M at the elbow of the pipe I is a diaphragm of wire-gauze, *n*, the purpose  
115 of which is to prevent the explosion of vapor, which would be the result if the vapor should accidentally be ignited. The wire-gauze *n* will allow the vapor to pass through the same; but flames of burning vapor will  
120 not extend beyond the gauze.

What I claim, and desire to secure by Letters Patent, is—

1. In a vapor-stove, a generating-burner, a  
125 mixing-chamber, branch pipes leading therefrom to supplemental burners, an induction-tube leading to the mixing-chamber, a single valve for controlling the vapor in line with the induction-tube, and an eduction-tube from the mixing-chamber to the generating burner,  
130 whereby the generating and the supplemental burners are controlled by a single valve, substantially as described.

2. In a vapor-stove, a generating-burner, a



mixing-chamber, an induction-tube leading to the mixing-chamber, a vapor-supply pipe with a valve for controlling the same, supplemental non-generating burners, and pipe-connections  
5 between said burners and the mixing-chamber, and a connection between said chamber and the generating-burner, substantially as described.

3. In a vapor-stove, a generating-burner, a  
10 mixing-chamber, an induction-tube, a pipe leading from the mixing-chamber to the gen-

erating-burner, a vapor-supply pipe, a valve controlling the same, supplemental burners with pipe-connections to the mixing-chamber, and independent valves for each burner, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE W. BILLINGS.

Witnesses:

W. H. BURRIDGE,

WM. STOLL.