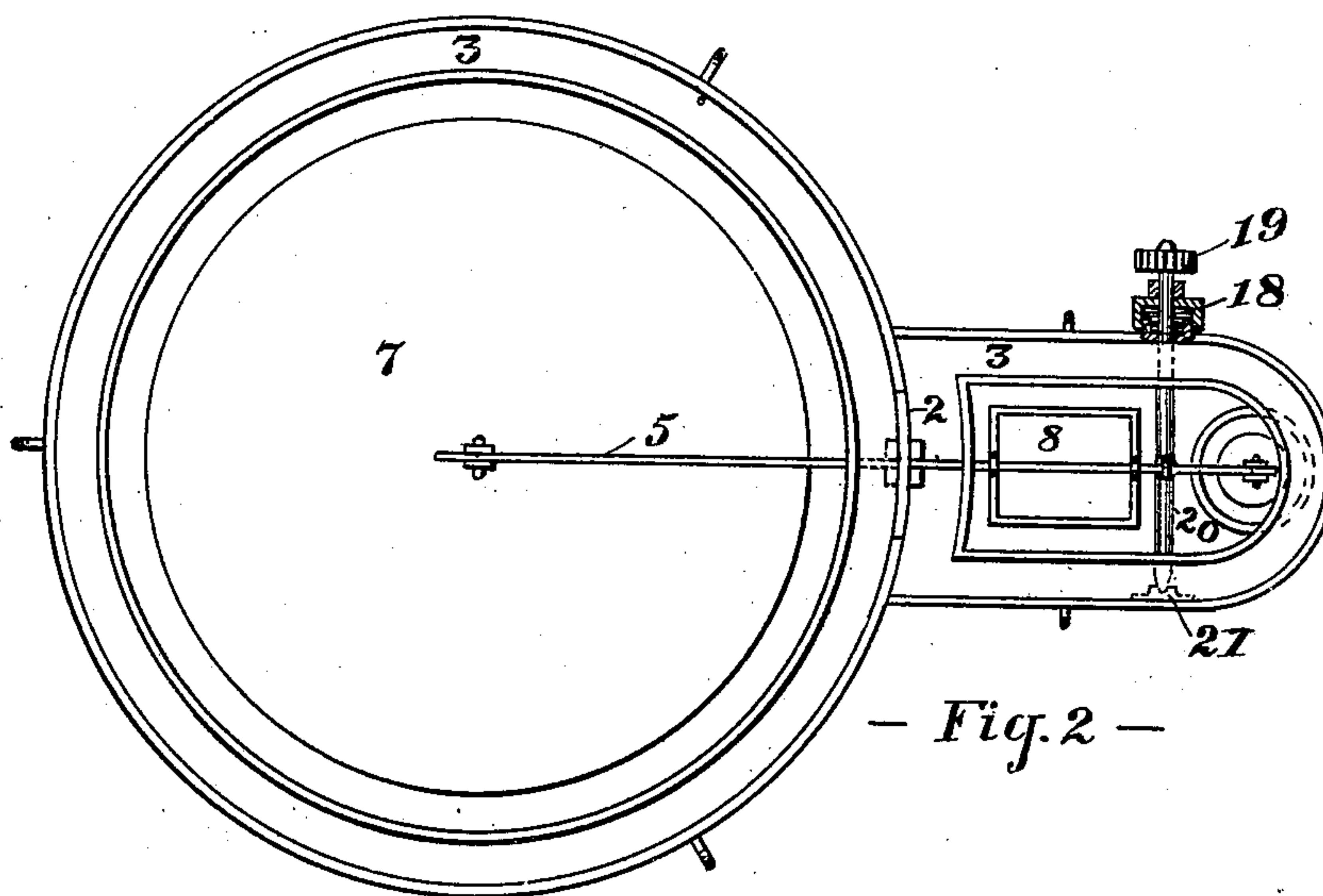
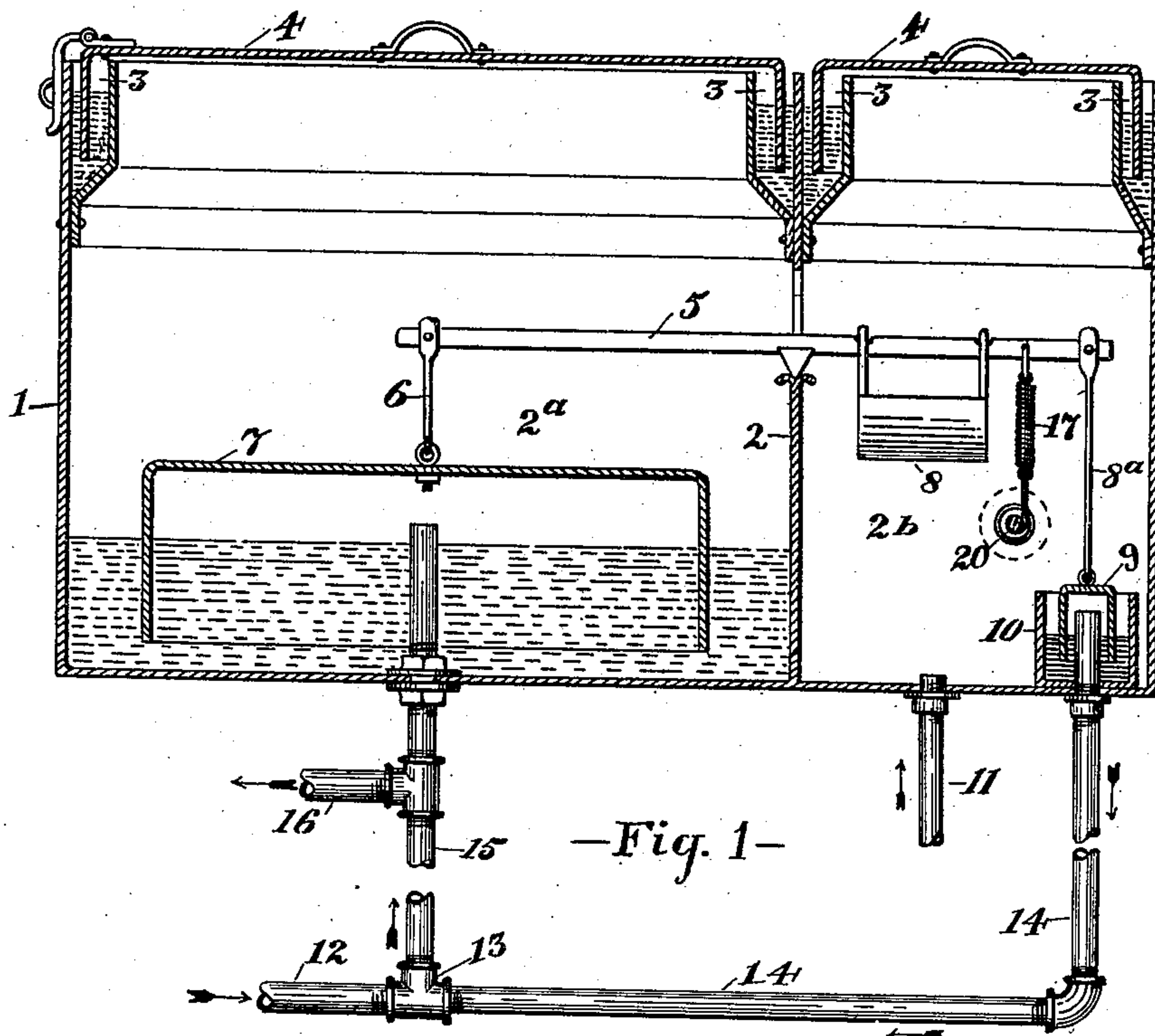


**No. 686,418.**

**Patented Nov. 12, 1901.**

**B. MURRAY.**  
**GAS AND AIR MIXER.**  
(Application filed May 8, 1901.)

(No Model.)



Witnesses—  
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# UNITED STATES PATENT OFFICE.

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## GAS AND AIR MIXER.

SPECIFICATION forming part of Letters Patent No. 686,418, dated November 12, 1901.

Application filed May 8, 1901. Serial No. 59,340. (No model.)

*To all whom it may concern:*

Be it known that I, BUFORD MURRAY, a resident of Fairfield, in the county of Jefferson and State of Iowa, have invented certain new and useful Improvements in Air and Gas Mixers or Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved air and gas mixer or regulator, the object of the invention being to provide an apparatus of this character which will automatically maintain a proper mixture of air and hydrocarbon supplied to the burners.

With this object in view the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in section, illustrating my improvements; and Fig. 2 is a top view with the covers removed.

1 represents a casing divided by a perforated partition 2 into two chambers 2<sup>a</sup> and 2<sup>b</sup> and provided on opposite sides of said partition 2 at its upper end and around the inner face of the sides of the casing with troughs 3 for water, into which flanged edges on removable tops or covers 4 are disposed to make gas-tight joints, a top being preferably provided for each chamber formed by the partition 2, and secured in place by straps or any approved means, so as to prevent their being raised by the pressure in the casing.

The partition 2 is provided centrally between its end and about midway between its upper and lower edges with an opening in which a lever 5 is fulcrumed between its ends and projects into the chambers 2<sup>a</sup> and 2<sup>b</sup>. The end of the lever 5 which projects into chamber 2<sup>a</sup> is connected by a rod 6 with a bell or float 7, having its edges immersed in water in the bottom of chamber 2<sup>a</sup>, and the other end of lever 5, which projects into chamber 2<sup>b</sup>, is provided with an adjustable weight 8 to counterbalance the weight of the bell 7, and is connected by a rod 8<sup>a</sup> with an inverted-

cup-shaped valve 9, which latter is normally held immersed in mercury contained in a cup 10. The end of the lever 5 projecting into the chamber 2<sup>b</sup> is also provided with an adjustable spring 17, which is fastened to the side arm of the said lever 5 at any suitable point and is connected with a cross-rod 20, terminating in the recess 21 in the side of the chamber 2<sup>b</sup> and entering the said chamber through the packing-ring 18 and having upon the outer end a milled head 19 to permit of suitable adjustment by means of winding the flexible end of the spring 17 around the side cross-bar 20. This spring 17 may be employed in lieu of or in connection with the weight 8 to quickly effect a nice adjustment of the lever and the parts to which it is connected.

An air-supply pipe 11, connected with the air-pump which supplies the carbureter, communicates with the bottom of chamber 2<sup>b</sup>, and the carbureted air or gas, which is forced from the carbureter by the same pump above referred to, is conveyed by a pipe 12 to a T-coupling 13, where it is joined by an air-pipe 14, projecting up above the mercury-level in cup 10 and normally inclosed in the cup-shaped valve 9. Another pipe, 15, for the gas or carbureted air communicates with the T-coupling 13 and projects above the water in chamber 2<sup>a</sup> and into the bell 7 and is provided below the casing 1 with a pipe 16 for conveying the gas to the burners.

It is a well-known fact that air impregnated with hydrocarbon is heavier than air free from the same, and upon this principle my improved apparatus operates, as will now be explained.

The operation of my improvements is as follows: The carbureter must be located in a lower plane than the mixer or regulator, and the pump which supplies air to the carbureter also supplies air under the same pressure to the chamber 2<sup>b</sup> by the pipe 11, the air passing freely through the partition 2 and exerting a pressure on top of the bell 7. The gas from the carbureter passes through the pipes 12 and 15 beneath the bell 7 and also through pipe 16 to the burners, the weight 8 being so adjusted as to permit the gas below the bell



7 to hold the same in position to close valve 9 when the gas is in proper proportion of air and hydrocarbon for illuminating or other purpose for which it is intended, and the weight 8 can be adjusted on the lever and as to its own weight to vary the proportion of air and hydrocarbon according to the use to which it is to be put. As soon as the gas contains too much hydrocarbon it will become heavier, and the heavier it is the more work the air-blast behind it has to do to support it and move it on. The more work the air-blast has to perform the more energy is used up, and that loss of energy manifests itself in a loss of pressure. Therefore the pressure below the bell 7 will diminish as the gas increases in content of hydrocarbon, permitting the air-pressure in chamber 2<sup>a</sup> to force the bell down and raise valve 9 and permit air from chamber 2<sup>b</sup> to pass out through pipe 14 and commingle at the T-coupling 13 with the gas and supply the requisite additional amount of air to give it the predetermined proportion, when bell 7 will again rise and close valve 9 or hold it in the proper position to supply the requisite amount of air, thus making the apparatus entirely automatic in its operation and extremely sensitive to the varying degrees of density of the gas, for the valve 9 will be raised and lowered according to the density of the gas and only permit a sufficient amount of air to escape to bring the gas to its proper proportion.

Various changes might be made in the invention above described without departing therefrom, and hence I consider myself at liberty to make such changes and alterations as fall within the spirit and scope thereof.

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

1. In a gas and air mixer, the combination with a bell and a pipe for conveying gas or vapor thereto from a carbureter situated at a lower level than the air and gas mixer, of means connected with and operated automatically by said bell when said gas or vapor becomes too rich, for supplying air to the latter.

2. In a gas and air mixer, the combination with an air-chamber, a bell therein and a pipe for conveying gas or vapor to said bell from a carbureter situated at a lower level than the air and gas mixer, of an air-pipe for conveying air from the chamber to the gas or vapor pipe, and a valve for the air-pipe connected with the bell and operated by the latter when the pressure of gas or vapor therein diminishes.

3. In a gas and air mixer, the combination with a closed casing and means for conducting air thereto, of a movable bell in said casing and having a closed chamber, a pipe for conducting gas or vapor to the closed chamber of the bell from a carbureter situated at a lower level than the air and gas mixer, an air-pipe connecting said casing with the gas

or vapor pipe and a valve for the air-pipe connected with and operated by the bell.

4. In a gas and air mixer, the combination with an air-chamber, an air-outlet pipe for conveying air therefrom, and a valve for said air-outlet pipe, of an adjustable counter-weighted bell located within the air-chamber and connected with said valve, and a pipe for conveying gas or vapor to said bell from a carbureter situated at a lower level than the air and gas mixer, said pipe also communicating with the air-outlet pipe.

5. In a gas and air mixer, the combination of a bell, a pipe for conveying gas or vapor thereto from a carbureter situated at a lower level than the air and gas mixer, an air-pipe for supplying air to the carbureted air and a valve connected with the bell and operated by the varying pressures therein for increasing the supply of air to the carbureted air when the latter becomes too heavily charged with hydrocarbon.

6. In a gas and air mixer, the combination with a casing and means for supplying air under pressure to said casing, of a lever fulcrumed between its ends in said casing, a bell on one end of said lever, a valve at the other end of the lever, a gas-pipe communicating with the bell for conveying gas or vapor there- to from a carbureter located at a lower level than the air and gas mixer and an air-pipe connecting said casing and gas-pipe and normally closed by the said valve.

7. In a gas and air mixer, the combination with a casing and a lever fulcrumed between its ends in said casing, of a water-sealed bell in said casing connected to one end of the lever, a gas-pipe for conveying gas or vapor to the bell from a carbureter situated at a lower level than the air and gas mixer and for supplying the burners, said pipe communicating with the interior of the bell above the water-level therein, an air-pipe connecting said gas-pipe with the casing and projecting up into the latter, a cup surrounding the upper end of said air-pipe and containing mercury, and a cup-shaped valve connected to the other end of said lever and normally immersed in the mercury and closing the inlet end of said air-pipe.

8. In a gas and air mixer, the combination with a casing, a perforated partition in said casing dividing it into two chambers and water-sealed tops for said chambers, of a lever fulcrumed between its ends in said partition, a bell connected to one end of said lever and having its edges immersed in water in one of said chambers, an adjustable weight on the other end of said lever to counterbalance the weight of the bell, a gas-pipe communicating with the bell above the water-level therein for conveying gas or vapor to said bell from a carbureter situated at a lower level than the air and gas mixer, a pipe supplying air under pressure to the casing, equal pressure being supplied to the air and gas when the latter is

properly impregnated with hydrocarbon, an  
air-pipe connecting the casing and gas-pipe  
and a valve for the last-mentioned air-pipe  
connected to the weighted end of the lever and  
5 adapted to be opened by the fall of the bell  
when the gas below the latter falls owing to  
its too great proportion of hydrocarbon.

In testimony whereof I have signed this  
specification in the presence of two subscrib-  
ing witnesses.

BUFORD MURRAY.

Witnesses:

L. O. GAINES,  
F. D. GAINES.