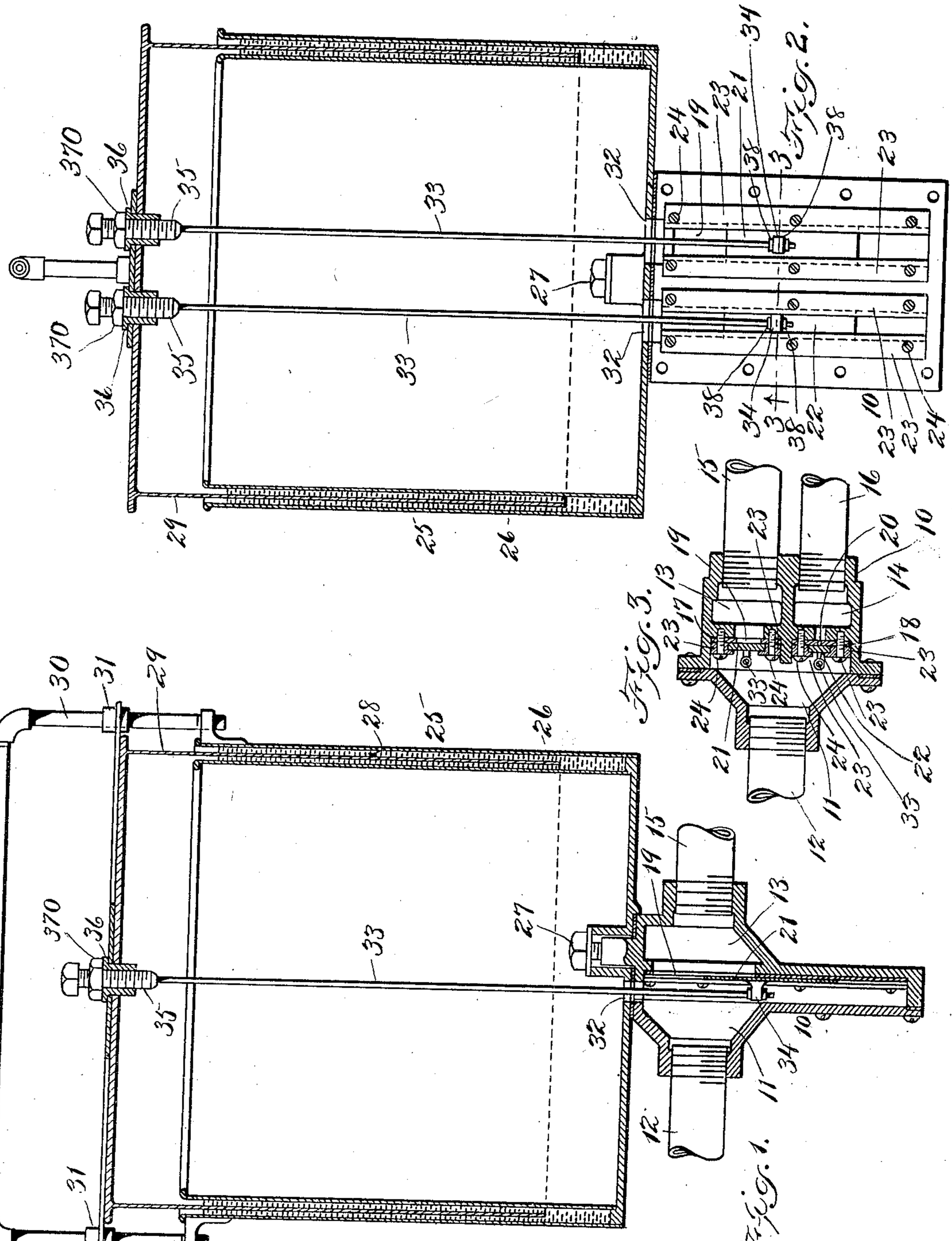
No. 754,303. PATENTED MAR. 8, 1904.

E. A. HALL.

AIR AND GAS REGULATING APPARATUS.

APPLICATION FILED MAR. 7, 1903.

NO MODEL. 3 SHEETS—SHEET 1.



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NO MODEL.

3 SHEETS—SHEET 2.

Fig. 4.

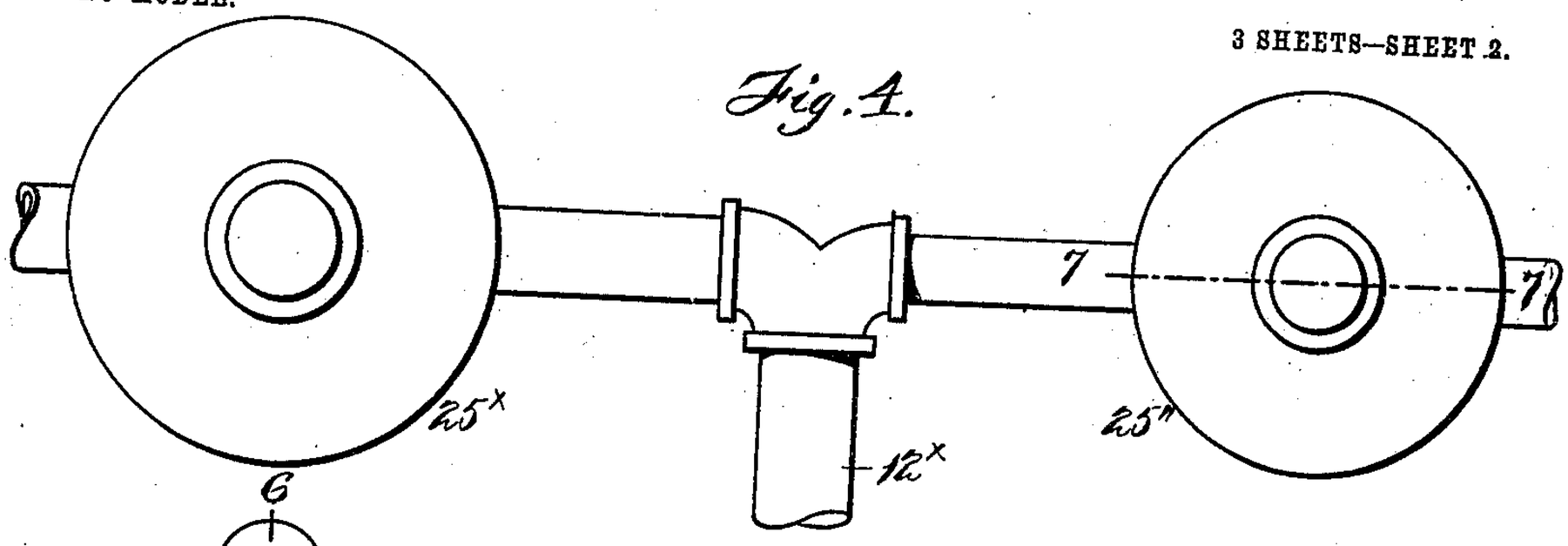


Fig. 5.

Fig. 8.

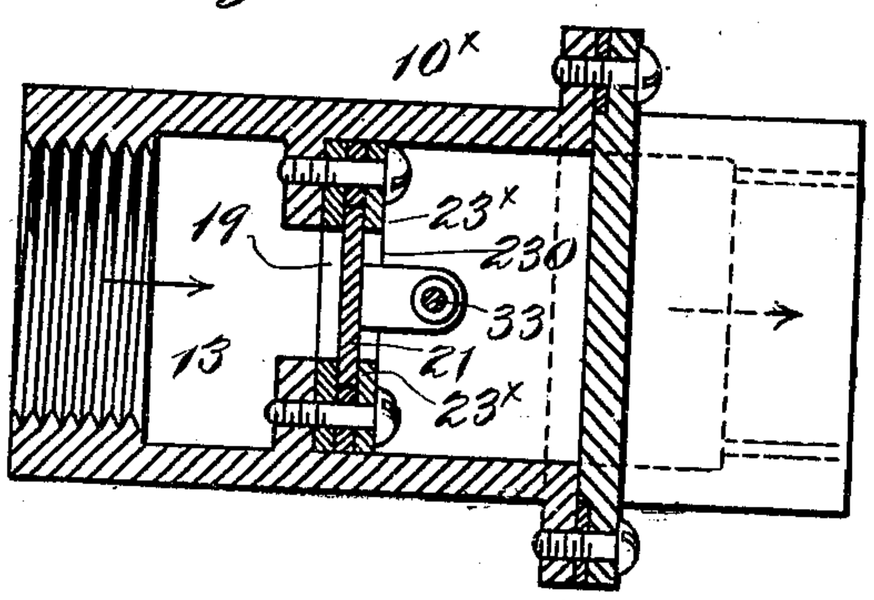
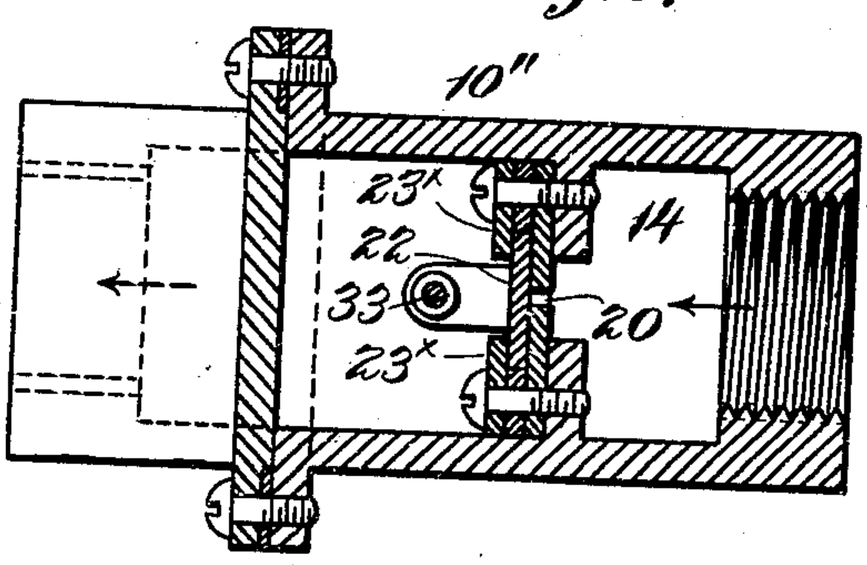


Fig. 9.



Witnesses:
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George H. Hall

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

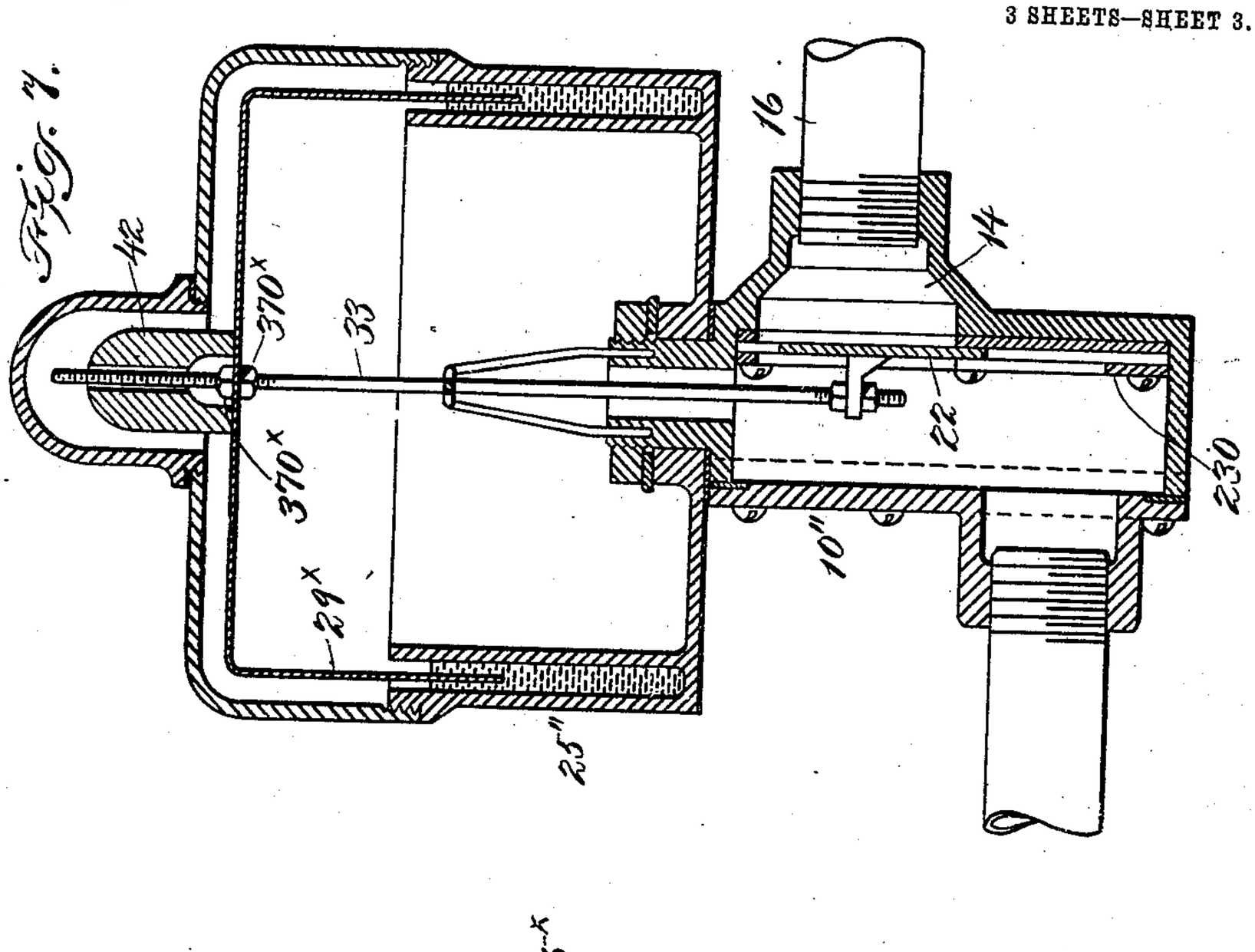
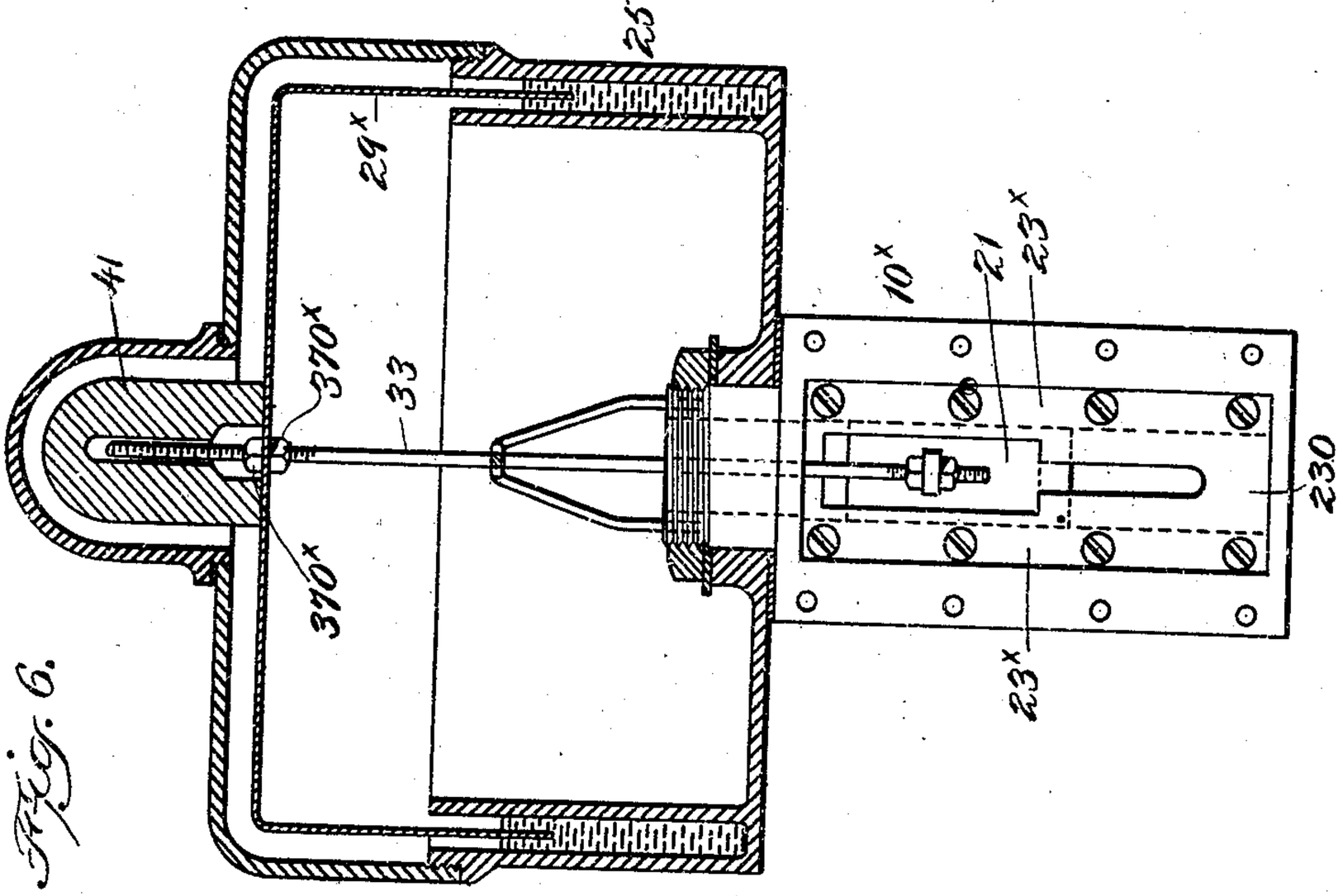


Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWIN A. HALL, OF HYDEPARK, MASSACHUSETTS.

AIR AND GAS REGULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 754,303, dated March 8, 1904.

Application filed March 7, 1903. Serial No. 146,665. (No model.)

To all whom it may concern:

Be it known that I, EDWIN A. HALL, of Hydepark, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Air and Gas Regulating Apparatus, of which the following is a specification.

This invention relates to apparatus for maintaining two fluids, such as air and gas, for supplying burners or other devices in a fixed proportion to each other during variations in the demand and for establishing a uniform pressure of the mixture of said fluids in the supply-pipe leading to the burners or other devices.

The present invention has for its object to provide improved means for independently regulating the fluids or, in other words, varying their proportions, which may be necessary because of some variation in the relative initial pressure of the fluids; and a further object is to provide a construction in which the fit of the valves may be nicely adjusted and, if necessary, varied to make up for wear.

Of the accompanying drawings, Figure 1 represents a vertical section of an air and gas regulating apparatus embodying my invention. Fig. 2 represents a section taken in a plane at right angles to Fig. 1. Fig. 3 represents a section on line 3 3 of Fig. 2. Figs. 4 and 5 represent, respectively, a plan and side elevation; Figs. 6 and 7, two vertical sections, and Figs. 8 and 9 two horizontal sections showing a modification.

The same reference characters indicate the same parts in all the figures.

In the drawings, 10 is a casing containing a mixing-chamber 11 for the air and gas, from which leads a pipe 12, adapted to supply the mixture of air and gas to the burners, and air and gas chambers 13 14, connected with air and gas supply pipes 15 16. Plates 17 18, covering the inner sides of the chambers 13 14, are formed with apertures 19 20, which constitute outlets from the air and gas chambers into the mixing-chamber 11. The air-outlet 19 is several times larger than the gas-outlet 20, so as to preserve a certain desired proportion between the air and gas in the mixture. The openings 19 and 20 are controlled by flat sliding valves 21 22, by whose vertical movement more or less of the openings 19 20 is uncovered, said valves being mounted in vertical guides 23, secured to the casing by screws 24, which pass through holes in the guides and in the plates 17 18. By the removal of thin packings, such as strips of paper, between the guides 23 and plates 17 18 or by reducing the guides slightly on their inner faces said guides may be adjusted and taken up for wear between them and the valves if this should prove necessary after long-continued use of the apparatus. An adjustment of this character is of course not easily attainable on other forms of valves, such as cylindrical valves.

25 is an expansible or telescopic chamber consisting of a fixed vessel having an annular trough 26 and secured by a bolt 27 to the casing 10, said trough containing a liquid seal 28 and an inverted bell or float 29, having its edges in the liquid seal between the walls of the trough. The bell 29 is guided in its vertical movements by the side arms of a frame 30, occupying sleeves 31 on the bell. Apertures 32 32 connect the interior of the telescopic chamber 25 with the mixing-chamber 11, and through these apertures are passed vertical rods 33 33, connecting the valves 21 22 with the roof of the bell 29. The lower ends of the rods are rotatably mounted in lugs 34 34 on the backs of the valves, but held from axial movement with respect to the valves by collars 38 38, and their upper ends are formed with threaded enlargements 35 35, screwing in bushings 36 36, mounted in the roof of the bell. The screws are adapted to be locked by nuts 370 370.

It is evident that the position of the bell 29 is determined by the pressure of the air and gas mixture in chamber 11 and service-pipe 12. Therefore when the pressure tends to fall, because of an increased demand for the air and gas mixture, the bell 29 will drop and by uncovering a greater area of the ports or apertures 19 20 will admit increased quantities of air and gas in equal proportion to the mixing-chamber 11. A rise in pressure in said mixing-chamber, due to decreased de-

mand, will elevate the bell and impart a closing movement to the valves. It will be seen that by adjusting the valves with respect to the bell or float 29 through a rotation of the rods 33 the pressure attainable in the mixing-chamber 11 may be varied, as such adjustment will vary the weight which has to be sustained by the mixture for a given position of the valves. As the position of the two valves 21 and 22 may be varied independently by the means described, it is possible to obtain a difference in the proportions of air and gas in the mixture or maintain a desired proportion should there occur a variation in the relative proportions furnished through the pipes 15 16.

Figs. 4 to 9, inclusive, represent a modification, in which the air and gas are contained in two separate expansible inclosures $25^{\times}$ $25''$, having the same essential features of construction as the single expansible chamber 25, hereinbefore described. In this case the valves 21 22 are mounted in separate casings $10^{\times}$ $10''$ and the service-pipe $12^{\times}$ constitutes the mixing-chamber. The valve-guides $23^{\times}$ $23^{\times}$ for each valve are shown as formed on a single plate 230.

The above construction of separate spaces for the air and gas would obviate any real or supposed danger from explosion arising from having a large body of air and gas mixture under storage in one chamber. It also allows the relative travel of the valves to be varied, which may be done by placing weights 41 42 of the desired value on top of the floats $29^{\times}$ $29^{\times}$. The functions of the separate parts of this expansible-chamber mechanism, moreover, are substantially the same as those of the single expansible-chamber mechanism hereinbefore described, and the two valves in this modification have a similar and synchronous though not necessarily an equal movement.

The valve stems or rods 33 33 are threaded and provided with nuts $370^{\times}$ $370^{\times}$ for purposes of adjustment.

As will be seen, the mixing-chamber and the expansible chamber or chambers are independent from each other, but communicate by means of the relatively small port or ports 32. This is of advantage in use, for the reason that a steady consumption of the mixed gas after the pressure has been obtained will not cause a "jumping" movement of the bell under the action of a pulsating air-supply, the communicating port not permitting of the rapid passage of the mixed air and gas to an extent which would materially affect the position of the bell and the valves controlled thereby. Where the consumption is cut off, however, the pressure in the mixing-chamber moves the bell rapidly to close the valve. Furthermore, the expansible chamber being substantially independent from the mixing-chamber it can be readily attached or removed—as, for instance, if it be desired to change the size of the expansible chamber.

I claim—

1. In an air and gas regulating apparatus, the combination of a mixing-chamber, air and gas chambers connecting therewith through ports or openings, flat sliding valves controlling said ports, an expansible-chamber mechanism independent of and communicating with said mixing-chamber and having a movable wall structure, the communicating port or passage being relatively small, direct connections between said movable wall structure and the valves, whereby the latter receive synchronous movements so as to similarly vary the aperture through the air and gas ports, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

2. In an air and gas regulating apparatus, the combination of a mixing-chamber, air and gas chambers connecting therewith through ports or openings, independent valves controlling said ports, a liquid-sealed expansible-chamber mechanism independent of and communicating with said mixing-chamber and having a movable float structure, the communicating port or passage being relatively small, direct connections between said movable float structure and the valves, whereby the latter receive synchronous movements which similarly vary the aperture through said air and gas ports, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

3. In an air and gas regulating apparatus, the combination of a mixing-chamber, air and gas chambers connecting therewith through ports or openings, flat sliding valves controlling said ports, an expansible chamber independent of and communicating with said mixing-chamber and having a movable wall, the communicating port or passage being relatively small, direct connections between said wall and both of said valves, whereby the valves are equally moved in the same direction, so as to proportionately vary the aperture through said ports, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

4. In an air and gas regulating apparatus, the combination of a mixing-chamber, air and gas chambers connecting therewith by ports, independent valves controlling said ports, an expansible chamber independent of and communicating with said mixing-chamber, the communicating port or passage being relatively small, connections between the movable wall of said expansible chamber and the valves, said connections having provisions for relatively adjusting the positions of said valves independently with respect to said movable wall, the relative movements of the valves remaining the same regardless of the adjustments, and an outlet-port for said mixing-chamber,

said outlet-port opposing said inlet ports or openings.

5. In an air and gas regulating apparatus, the combination of a casing formed with a mixing-chamber and air and gas chambers connecting through ports therewith, sliding plates, valves controlling said ports, guides engaging the edges of said valves and adjustably secured to the casing, an expansible chamber independent of and communicating with said mixing-chamber, the communicating port or passage being relatively small, rods connecting the movable wall of said expansible chamber with said valves, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

6. In an air and gas regulating apparatus, the combination of a casing formed with a mixing-chamber and with air and gas chambers connecting through ports therewith, independent air and gas regulating valves controlling said ports, an expansible chamber independent of and communicating with said mixing-chamber, and having a movable wall, said communicating port or passage being relatively small, internally-threaded bushings mounted on said wall, rods rotatable but axially immovable with respect to the valves and having enlarged externally-threaded portions screwing in said bushings, said rods extending through said communicating passages, lock-nuts on said portions, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

7. In an air and gas regulating apparatus, the combination of a casing having a mixing-chamber and air and gas chambers communicating through ports therewith, vertically-movable independent valves mounted in said casing and controlling said ports, a vessel mounted above said casing and communicating through its bottom with said mixing-chamber, the communicating port or passage being relatively small, said vessel having a vertical annular trough adapted to contain a liquid seal, an inverted bell or float having its edge mounted between the walls of said trough, independently-adjustable connections between the roof of said bell and the valves, and an outlet-port for said mixing-chamber, said outlet-port opposing said inlet ports or openings.

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

EDWIN A. HALL.

Witnesses:
C. F. BROWN,
E. BATCHELDER.