S. H. HALE.

AIR AND GAS MIXING DEVICE.

APPLICATION FILED MAR. 2, 1910.

970,919.

Patented Sept. 20, 1910.

2 SHEETS—SHEET 1.

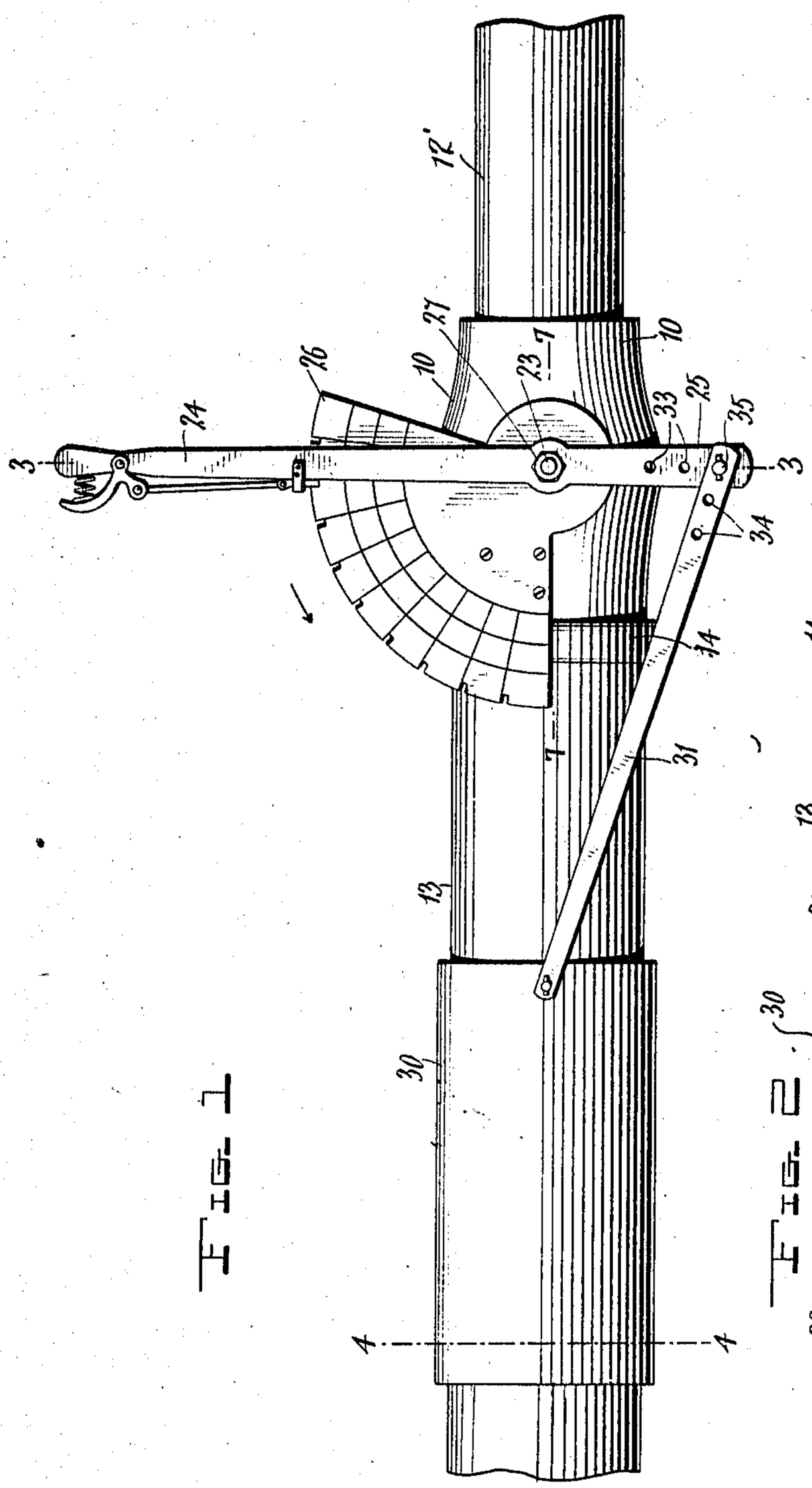

FIG. 1.

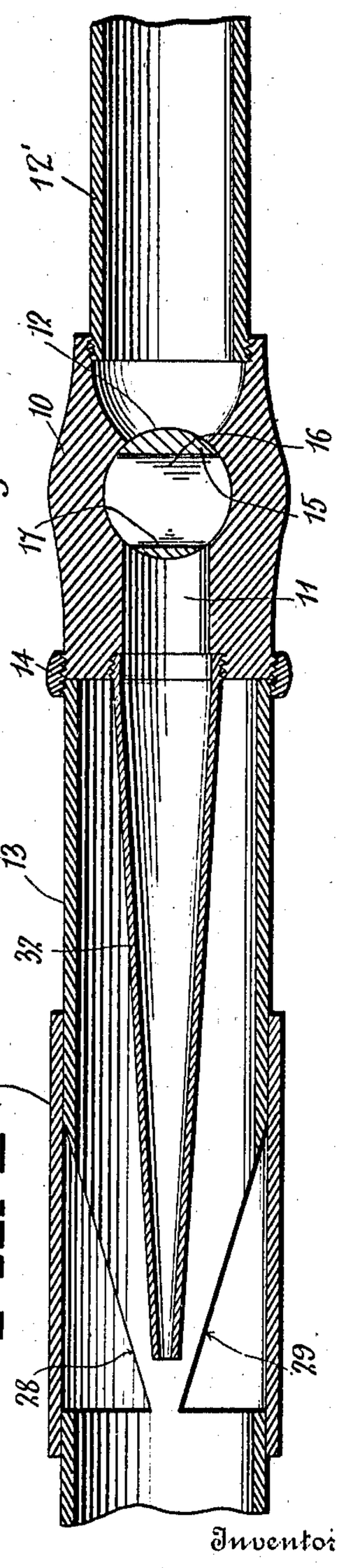

FIG. 2.

Witnesses

D. Z. Gordon

Henry T. Bright

Inventor

Stephen H. Hale

By Howson & Howson

Attorneys

S. H. HALE.

AIR AND GAS MIXING DEVICE.

APPLICATION FILED MAR. 2, 1910.

970,919.

Patented Sept. 20, 1910.

2 SHEETS—SHEET 2.

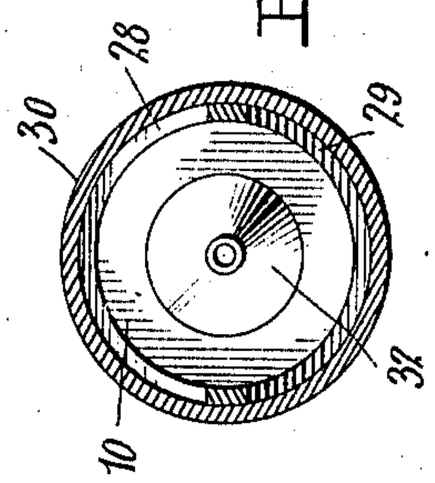

FIG. 4

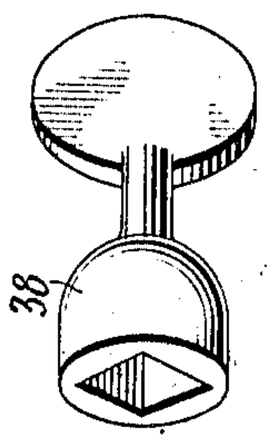

FIG. 6

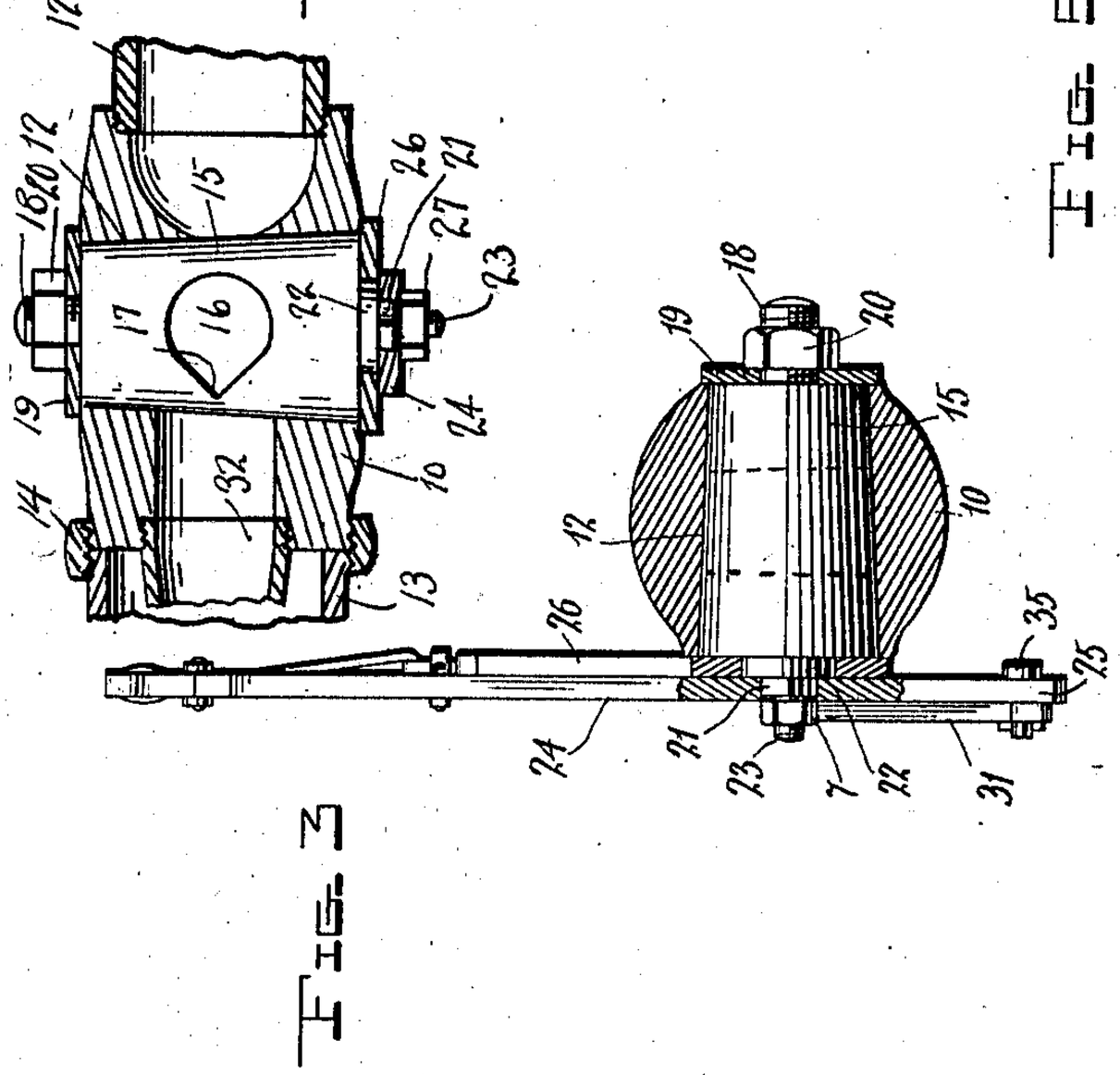

FIG. 7

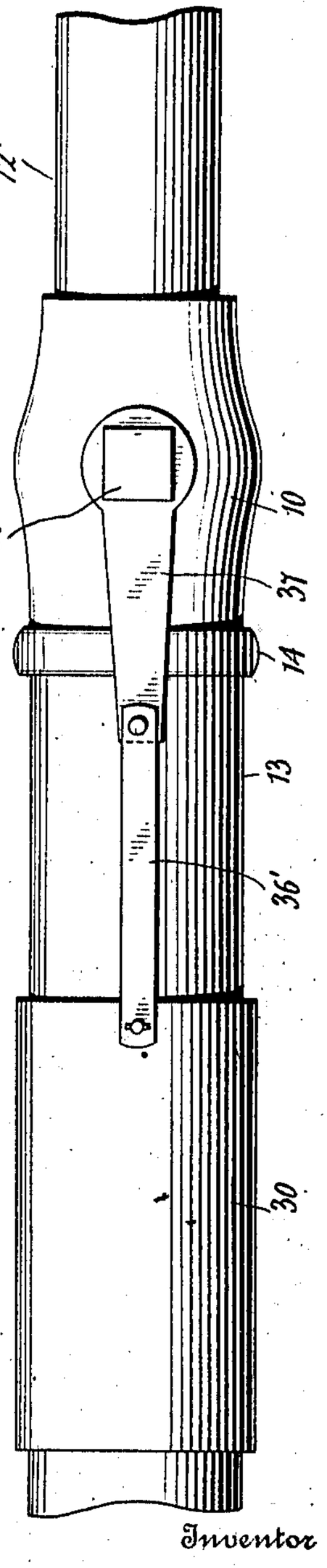

FIG. 5

Witnesses

J. L. Jackson

Henry T. Bright

Inventor

Stephen H. Hale

By Chandlee & Chandlee

Attorneys

UNITED STATES PATENT OFFICE

STEPHEN H. HALE, OF NEODESHA, KANSAS.

AIR AND GAS MIXING DEVICE.

970,919. Specification of Letters Patent. Patented Sept. 20, 1910.

Application filed March 2, 1910. Serial No. 546,881.

To all whom it may concern:

Be it known that I, STEPHEN H. HALE, a citizen of the United States, residing at Neodesha, in the county of Wilson, State of Kansas, have invented certain new and useful Improvements in Air and Gas Mixing Devices; 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.

This invention relates to air and gas mixing devices and is particularly adapted for use in connection with the burning of natural gas, artificial gas, and all other gaseous materials which require to be mixed with air in order to obtain the proper combustion and greatest number of heat units.

The object of the invention is the production of a device of the character named wherein the means for controlling the passage of air and the means for controlling the passage of gas through said device are simultaneously operated by a common operating element and said means are so correlated that when a given quantity of gas passes through the device, a given quantity of air will also pass therethrough and as the quantity of gas is increased or decreased the quantity of air will be proportionately increased or decreased.

Another object of the invention resides in providing means whereby the relation between the quantities of air and gas passing through the device may be varied so that said device may be utilized in connection with different gases, some of which require a greater or less degree of air to a given quantity of gas than others in order to obtain the best results with respect to combustion.

Still another object of the invention resides in providing an indicating mechanism in conjunction with the device which will constantly show the amount of gas being utilized with a given known pressure.

With the above and other objects in view the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully described and particularly pointed out in the appended claims.

In describing the invention in detail reference will be had to the accompanying drawings wherein like characters of reference denote corresponding parts in the several views; and in which,

Figure 1 is a side elevation of a gas line with the invention incorporated therein; Fig. 2, a vertical longitudinal section of what is illustrated in Fig. 1; Fig. 3, a section on the line 3—3 of Fig. 1; Fig. 4, a section on the line 4—4 of Fig. 1; Fig 5, a side elevation of a gas line with a modified form of the invention incorporated therein. Fig. 6, a detail perspective view of the key for operating the modified form illustrated in Fig. 5; and, Fig. 7 is a section on the line 7—7 of Fig. 1.

Referring to the drawings, the invention is shown as comprising a valve casing 10 provided with a longitudinal bore 11 and a transverse tapering bore 12. Secured in the bore 11 at one end thereof through the medium of a threaded engagement is a pipe 12′ which leads from a suitable gas supply, while another pipe 13 is secured to the opposite end of the valve casing 10 by means of a threaded band 14; said pipe 13 leading to a desired distributing point. Mounted in the tapering bore 12 is a correspondingly shaped plug 15 which is provided with a transverse aperture 16, the greater portion of which is circular in transverse section, but which terminates at one side in a V-shaped extension 17. The position of the bore 16 is such that when the plug 15 is rotated a quarter of a turn in one direction said bore will register with the bore 11 and connect the pipes 12′ and 13, while a rotation of the plug 15 a quarter turn in the opposite direction will entirely move the bore 16 out of registration with the bore 11 and close communication between the pipes 12′ and 13. The plug 15 is held against longitudinal displacement from the bore 12 in which it is seated by forming a reduced threaded extension 18 on one end of said plug upon which is passed a washer 19, the latter being bound against the casing 10 by means of a nut 20 working on the threaded extension 18. In order to conveniently rotate the plug 15 in its seat the end thereof opposite the extension is also provided with an extension which includes a squared intermediate portion 21, a circular inner portion 22 and a reduced threaded outer portion 23. Mounted on the squared intermediate portion 21 is an operating lever 24 provided with a lower extension 25. Disposed between the lever 24 and the

top of the plug 15 and mounted on the inner circular portion 22 is a segmental dial plate 26; said lever and dial plate being secured against displacement by a nut 27 working on the threaded outer portion 23. From the construction just described it will be apparent that any oscillation of the lever 24 will in turn cause a rotation of the plug 15 and enable the passage of gas from the pipe 12′ to the pipe 13 to be readily and easily controlled.

The pipe 13 is provided at diametrically opposite points with corresponding angular cut-away portions 28 and 29, one face of each of said cut-away portions being disposed at right angles to the longitudinal axis of said pipe, while the other faces of each cutaway portion is inclined outwardly from the longitudinal axis of said pipe. Mounted on the pipe 13 and adapted to cover and uncover in its movements the cut-away portions 28 and 29 is a sliding sleeve 30 which is connected with the lever 24 by means of a link 31 one end of which is pivotally connected with said sleeve and the other end with the extension 25 of the lever 24 so that when said lever is actuated it will simultaneously rotate the plug 15 and produce a sliding movement of the sleeve 30 on the pipe 13.

Mounted in the end of the casing 10 so as to be disposed within the pipe 13 with its bore in registration with the bore 11 of said casing is a tapering nozzle 32 the delivery end of which is disposed between the cut-away portions 28 and 29 slightly inward of the outermost limit of same. As some gases require a greater amount of air mixed therewith than others it is necessary to provide means for varying the amount of movement imparted to the sleeve 30 by a given movement of the lever 24. To this end the lower portion 25 of said lever is provided with a plurality of apertures 33 disposed longitudinally of said lever while the adjacent end of the link 31 is likewise provided with a longitudinally disposed plurality of apertures 34. It will thus be obvious that any respective pair of apertures 33 and 34 may be brought into registration and the lever and links secured together through the medium of a pivot pin 35 inserted through said apertures. It will be further apparent that the limits of movement of the sleeve 30 may be varied by moving the connection between link 31 and the lever 24 longitudinally of said link while the length of the movement of said sleeve may be varied by shifting the connection between the lever 24 and the link 31 longitudinally of said lever.

The modified form of construction illustrated in Fig. 5 is adapted for use in the distribution of gas for domestic purposes and is designed primarily to prevent the operation of same as the result of carelessness or by persons with mischievous intent. To this end the plug 15 is provided with a reduced squared upper end 36 on which is mounted a crank arm 37, while a link 36′ is pivotally connected with the free end of said crank arm and with the sleeve 30. The operation of the device constructed in accordance with what is shown in Fig. 5 is had through the instrumentality of a detachable key 38 adapted for interlocking engagement with the squared head 36 of the plug 15.

In operating the device it is only necessary to move the lever 24 in the direction of the arrow shown in Fig. 1. Such movement of said lever will institute the rotation of the plug 15 to open communication between the pipes 12 and 13 and at the same time move the sleeve 30 toward the casing 10 and uncover the cut-away portions 28 and 29 to permit the entrance of air into the pipe 13 to be mixed with gas issuing from the nozzle 32. As the aperture 16 is moved into full registration with the bore 11 the head of gas passing through the nozzle 32 is constantly increased and consequently the suction produced at the mouth of said nozzle is proportionately increased. This condition renders it necessary to increase the size of the air inlet opening at a less rate than full registration of the bore 16 with the bore 11 is had in order to allow for the increased suction produced at the mouth of the nozzle 32 owing to the increasing head of gas. This is accomplished by the peculiar manner in which the cut-away portions 28 and 29 are formed; the openings formed by said portions converging in the direction of movement of the sleeve 30 during the operation of the device.

Owing to the peculiar formation of the bore 16 the number of feet of gas passing through the line under a given pressure can be positively calculated with respect to the various positions of the plug 15 during its rotation by the lever 24, which will enable a suitable table to be compiled and applied to the dial plate 26 so that the number of feet of gas passing through the line at any given position of the lever 24 will be indicated by the dial plate.

What is claimed is:

1. In an air and gas mixing device, the combination of a mixing chamber, a gas inlet valve and an air inlet valve, means for opening said valves simultaneously and for closing them simultaneously, said valves being constructed and arranged for progressively increasing the effective area of the air inlet valve at a constantly diminishing ratio, and for progressively increasing the effective area of the gas inlet valve.

2. In an air and gas mixing device, the combination of a mixing chamber, a gas inlet valve provided with a tapering port adapted to be opened from its narrow end

toward its broad end, a tapering air inlet valve adapted to be opened from its broad end toward its narrow end, and means for simultaneously opening and closing said valves.

3. In an air and gas mixing device, the combination of a mixing chamber, a gas inlet valve, an air inlet valve provided with a tapering opening adapted to be uncovered from its broad end toward its narrow end, a gas delivery nozzle having its mouth disposed in proximity to the opening to the air inlet valve, and a common means for simultaneously opening the gas inlet valve and uncovering the opening of the air inlet valve.

4. In an air and gas mixing device, the combination of a casing forming a mixing chamber and provided with a tapering air inlet opening, a sliding closure adapted to uncover said air inlet opening from its broad end toward its narrow end when moved in one direction, a gas inlet valve, and a common means for simultaneously opening the gas inlet valve and moving said sliding closure to uncover the air inlet opening.

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

STEPHEN H. HALE.

Witnesses:
S. W. MILLER,
M. I. BAUMGARDNER.