C. S. & J. W. MOORE.

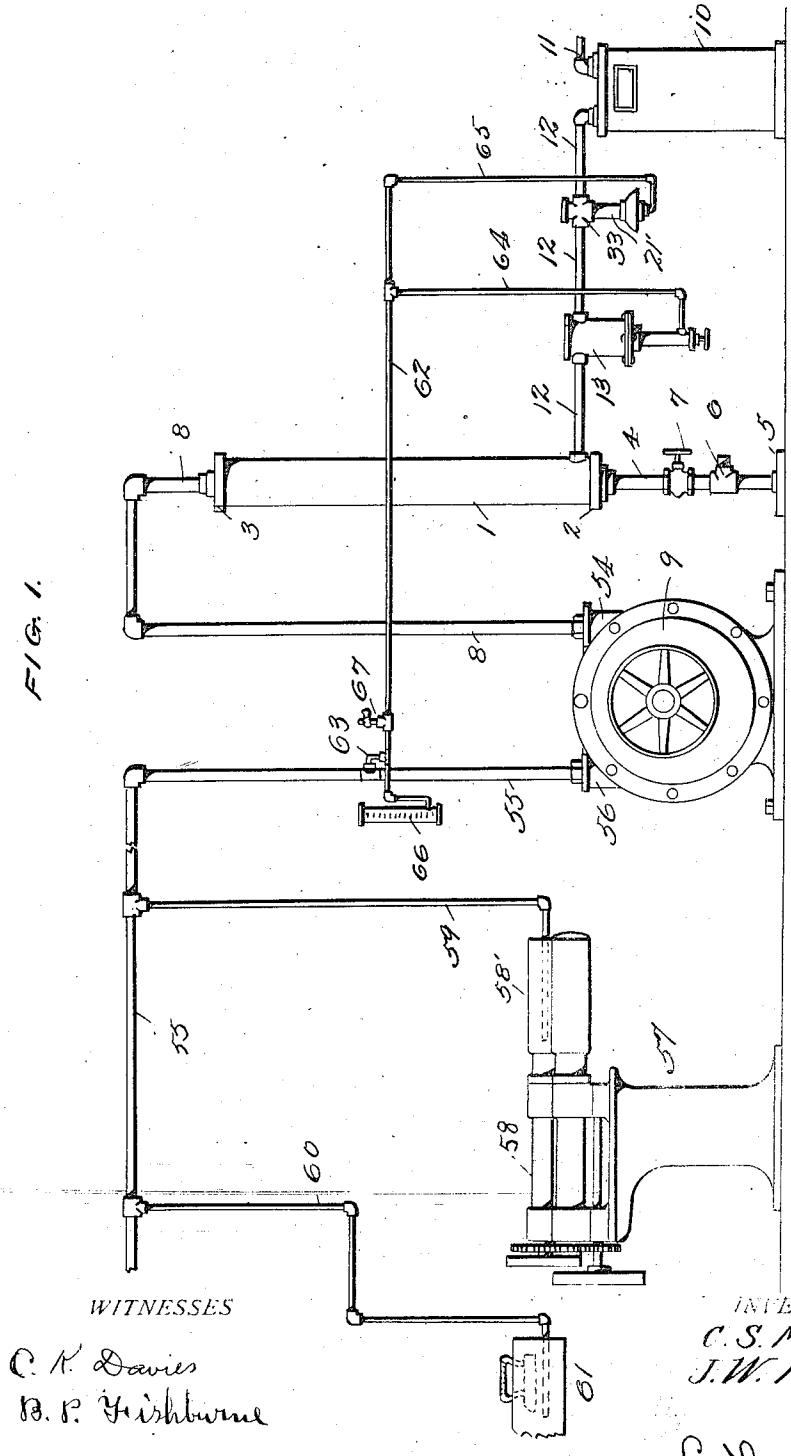
DEVICE FOR MIXING AIR AND GAS.

APPLICATION FILED AUG. 17, 1909.

961,787. Patented June 21, 1910.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

C. K. Davies

B. P. Fishburne

INVENTORS

C. S. Moore and

J. W. Moore.

Attorney

C. L. Parker

C. S. & J. W. MOORE.

DEVICE FOR MIXING AIR AND GAS.

APPLICATION FILED AUG. 17, 1909.

961,787. Patented June 21, 1910.

2 SHEETS—SHEET 2.

FIG. 4.

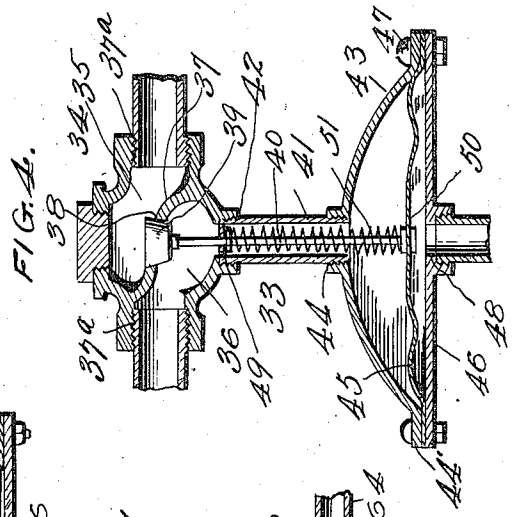


FIG. 3.

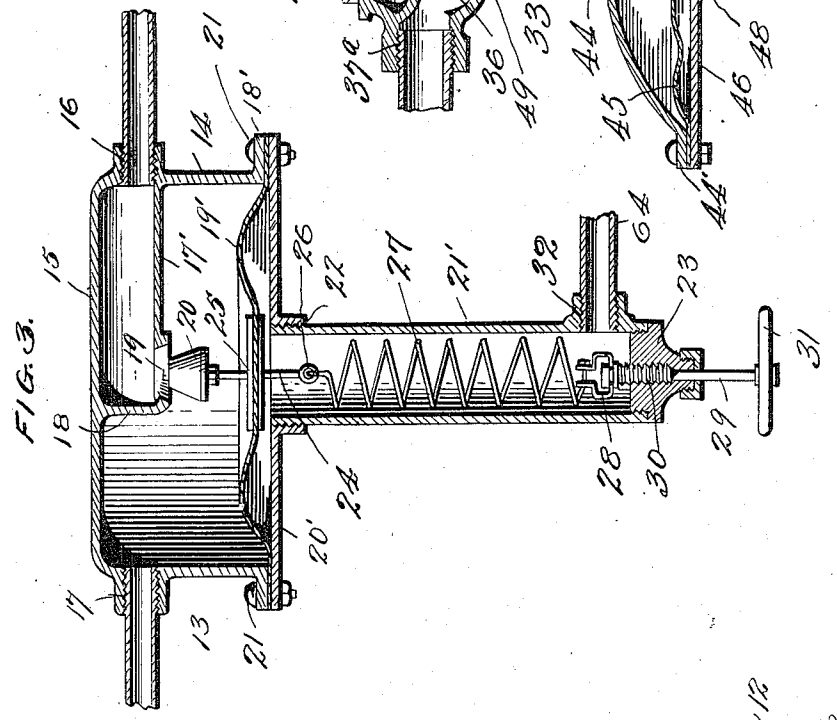
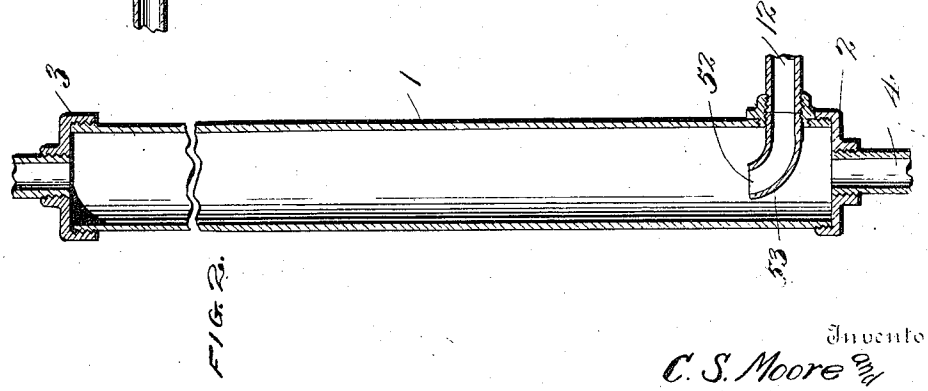


FIG. 2.



Witnesses

C. K. Davies

B. P. Fishburne

Inventors

C. S. Moore and

J. W. Moore

By C. L. Parker

Attorney

UNITED STATES PATENT OFFICE.

CLARENCE S. MOORE AND JOHN WILLIAM MOORE, OF LEXINGTON, KENTUCKY.

DEVICE FOR MIXING AIR AND GAS.

961,787. Specification of Letters Patent. Patented June 21, 1910.

Application filed August 17, 1909. Serial No. 513,356.

To all whom it may concern:

Be it known that we, CLARENCE S. MOORE and JOHN W. MOORE, citizens of the United States, residing at Lexington, in the county of Fayette and State of Kentucky, have invented certain new and useful Improvements in Devices for Mixing Air and Gas, of which the following is a specification.

This invention relates to a device for mixing air and gas and delivering the same under pressure, to the burners.

It is well known that in many laundries, the gas is used at the pressure that it is supplied through the gas main, which has been found to be about six ounces at the highest, and this pressure is subject to wide and frequent variation. This variation in the gas pressure is very troublesome in the operation of ironing machine burners, as it necessitates changing the amount of air supplied to the burners, and at times it is even impossible to get sufficient supply of gas properly mixed for heating the ironing machines.

An object of our invention is to overcome the disadvantages stated above and to produce a machine which will be adapted to automatically mix the air and gas in proper proportions, and which will automatically cut off the supply of gas if the machine should stop running.

A further object of our invention is to provide a device for automatically mixing the air and gas in proper proportions, the means for automatically mixing the air and gas being regulated by the pressure maintained at the burners.

This invention consists generally of a mixing chamber into which the air and gas to be mixed are introduced, said mixing chamber having means associated therewith for drawing the air and gas into the same, and means for regulating the flow of gas therein.

In the accompanying drawings, forming a part of this specification, and in which like numeral references are used to designate like parts, Figure 1 is a side view of our complete device and illustrating the manner of using the same. Fig. 2 is a vertical cross-sectional view of the mixing chamber of our device. Fig. 3 is a vertical cross-sectional view of the regulating valve of our device. Fig. 4 is a similar view of the safety cut off valve used upon our device.

In the accompanying drawings, forming a part of this specification, and in which the preferred embodiment of our invention is disclosed, 1 designates a cylindrical vertically arranged mixing chamber provided with the caps 2 and 3 at the upper and lower ends thereof respectively. The caps 2 and 3 are screw-threaded upon the mixing chamber 1, as shown in Fig. 2. The pipe 4 has one end thereof screw-threaded into the cap 2 and extending vertically and downwardly is provided with the base member 5. Near the base 5, pipe 4 is provided with the air inlet 6, above and near which is the valve 7, which serves as a means of manually regulating the flow of air into the mixing chamber 1. The pipe 8 is screw-threaded into the cap 3 upon the upper end of the mixing chamber, and establishes communication between said chamber and a rotary blower for a purpose hereinafter to be described.

10 designates a gas-meter of a well known form, through which the gas passes from the gas main by means of pipes 11 and 12 to the mixing chamber 1.

Near the middle of the pipe 12 is arranged the regulating valve 13, which comprises the cylindrical body portion 14 provided with the closed upper end 15, near which are the screw-threaded diametrically arranged openings 16 and 17 which serve to connect said valve 13 with said pipe 12. Within the body portion 14 is the horizontally arranged partition 17′ which is in alinement with the opening 16, said partition 17′ extending upwardly as shown at 18 and being secured to the end 15, thus forming an air-tight receptacle within the body portion 14. Near the upwardly extending partition 18 upon the partition 17′ there is arranged the opening 19, which serves as a valve seat for the downwardly opening valve 20, hereinafter to be described.

The body portion 14 of the valve 13 is provided at its lower end with the outwardly extending flanged portion 18′, beneath which is arranged the edge of the flexible diaphragm 19′. Below the diaphragm 19′ is secured an end plate 20′ which is secured to the flange 18′ by the bolts 21; thus the diaphragm 19′ is securely held in place and also serves as a packing between the plate 20′ and flange 18′, for forming an air-tight joint. The cylindrical casing 21′ has its open upper end screw-threaded into the end plate 20′, at a central point, as shown at 22,

and has its lower end closed by means of the plug 23.

The downwardly opening valve 20, above referred to is rigidly mounted upon the stem 24, which passes through the diaphragm at a central point and is rigidly secured thereto, by any suitable means, as shown at 25. The stem 24 extends downwardly below the diaphragm 19′ and is provided at its extremity with the enlarged apertured portion 26, within which is secured the upper end of a retractile coil spring 27, which has its lower end secured to the bracket 28 which is loosely mounted upon a tension regulator comprising a spindle 29, provided with the screw-threaded portion 30, which is threaded in the plug 23, as shown in Fig. 3. A wheel 31 is rigidly mounted upon the spindle 29, and serves as a means whereby said spindle may be rotated for the adjustment of the tension of spring 27. Spring 27 is adapted to normally maintain the valve 20 in an unseated position, as shown in Fig. 3.

Near the lower end of valve 13 is the threaded flanged opening 32 which is adapted to receive the end of a pipe, hereinafter to be referred to.

A safety valve 33 is arranged between the regulating valve 13 and the gas meter 10. The upper body portion 34 of valve 33 is divided into the upper and lower chambers 35 and 36 respectively, by means of the diagonally arranged partitions 37 into which chambers sections of the pipe 12 are secured as at 37ª. The partition 37 is provided with the centrally arranged opening 38 which serves as a valve seat for the upwardly-opening valve 39 rigidly mounted upon the reciprocatory stem 40, hereinafter to be described. A section of a pipe 41 has its upper end screw-threaded into the lower portion of the upper body portion 34 at 42, and the lower portion thereof is screw-threaded into the bell-shape casing 43 at a point centrally thereof at 44. The bell-shape casing 44 has its edge bent horizontally to form the flanged portion 44′, upon which is arranged the edge of the flexible diaphragm 45. Below said diaphragm 45, the end plate 46 is arranged in engagement with said diaphragm and has its edge secured to the flanged edge 44′ by means of the bolts 47. The end plate 46 is provided with a screw-threaded flanged opening 48 centrally thereof, into which a pipe is secured, for a purpose hereinafter to be described.

The stem 40 secured to the upwardly opening valve 39, above referred to, is slidably mounted through an air-tight bearing 49 rigidly secured upon the internal surface of said pipe section 41, and passes downwardly and has the lower end thereof rigidly secured to the central portion of the flexible diaphragm 45 as at 50. A spring 51 is arranged around the stem 40, between the bearing 49 and the diaphragm 45, and being under compression tends to maintain valve 39 in its seated position as shown in Fig. 4.

The pipe 12 extends within the mixing chamber 1 as at 52, and is provided with the upwardly bent end 53, as clearly shown in Fig. 2.

As above stated, communication is established between the blower 9, which may be any preferred form of rotary blower, and the mixing chamber 1, by means of the pipe 8, which communicates with the chamber 1 at the top and with said blower at the top and at one side thereof, as at 54. A pipe 55 communicates with the blower upon the other side thereof at 56, and is adapted to conduct the mixed fuel introduced into said blower from pipe 8, to a rotary ironing machine, for heating the rotary irons 58 through the branch pipe 59. The mixed fuel may be conducted to any form of burner, through another branch pipe 60, as illustrated at 61. The rotary ironing machine 57 and the burner 61, form no part of our invention but are only shown for the sake of illustration.

A return pressure pipe 62, receives its pressure from pipe 55 by means of the joint 63 and communicates with the lower portion of the regulating valve 13 by means of the branch pipe 64 as at 32, while the branch pipe 65 establishes communication between the return pressure pipe 62 and the safety valve 33 at the lower portion thereof, as at 48. Upon one end of the return pressure pipe 62 is arranged the mercury gage 66, which indicates the amount of pressure maintained in pipe 55 and at the burners. A burner 57 is mounted upon pipe 62, whereby the operator may judge by the color of the flame, when said burner is lighted, as to the manner in which the air and gas are being mixed.

The foregoing is a description of the structure of our device, and we will now proceed to explain the operation of the same.

Assuming the blower 9 to be at rest, there will be no pressure in pipes 55 and 62 and the regulating valve 13 will be open to its limit and the safety valve 33 will be closed to prevent the escape of the gas as shown in Figs. 3 and 4. It is to be understood that the compressed spring 51 in the safety valve is a great deal slighter and more sensitive than the retractile spring 27 in the regulating valve, and that it requires a very little pressure upon the diaphragm 45 to move valve 39 to the limit of its open position. Upon the operation of the blower 9, air is drawn in through the inlet 6, into the mixing chamber 1, and forced through pipe 55 to the burners. The burners are always open or turned on, and the blower 9 is rotated at such a speed that it can maintain a pres-

sure of about 1 pound with the burners on. The burners used are generally of the strainer type, or they may consist of a section of a pipe provided with small perforations as shown at 58 and 61. The instant the blower 9 is started and a slight pressure created in pipe 55, the same is conducted by pipe 62 to the regulating valve 13 and the safety valve 53. The safety valve 33 will be opened while the regulating valve 13 will maintain its normal open position, on account of the greater strength of the spring 27 over spring 51. Thus it will be seen that gas will be drawn into the mixing chamber, the same mixed with the air, and thence to the burners, where it is at once ignited. As the blower increases in speed to obtain the rate at which the same is constantly rotated, the pressure increases in pipe 55 and the same is conducted to the regulating valve 13 and tends to close the same. If the mixture of air and gas contains too much gas, the oxidation at the burners will be imperfect, and the pressure increased in pipe 55. This causes a rise of valve 20, thus diminishing the volume of gas, and regulating to a nicety the proportion of gas to be admitted. If there is a too great amount of air, the oxidation of the gas will be very rapid at the burners, which creates a vacuum below the flame, and therefore would greatly reduce the pressure in pipe 55, which in turn would open the regulating valve to admit of a greater flow of gas. It will thus be seen that the regulating of the relative volume of air and gas is entirely controlled by the pressure maintained in the pipe, which conducts the mixture under pressure to the burners, and that this pressure is regulated by the manner of the oxidation of the gas.

It is obvious that should the blower accidentally stop, that the safety valve would cut off the supply of gas, and should the burner be put out, and the blower still continue to operate, that the pressure would increase in pipe 55, and close the regulating valve, thereby cutting off the supply of gas.

Having fully described our invention, we claim:

1. In an apparatus of the character described, the combination with a blower mechanism adapted to be operated at a constant speed, and a suitable burner, of a receptacle having communication with said blower mechanism and within which air and gas are mixed before the same are fed to said burner, said receptacle having means associated therewith to admit the entrance of air therein, means of communication associated with said receptacle for supplying gas thereto from a suitable source, means of communication associated with said blower mechanism and said burner for supplying the mixed air and gas under pressure, to said burner, a valve mechanism associated with said first named means of communication and adapted to regulate the supply of gas into said receptacle, means of communication between said last named means of communication and said valve mechanism for actuating said valve mechanism as the pressure in said second named means of communication varies, a safety valve mechanism associated with said first named means of communication, and having means of communication with said second named means of communication, said safety valve mechanism being adapted to normally remain in open position and to automatically close when the pressure in said second named means of communication falls below a predetermined limit, substantially as described.

2. In combination, a burner, a rotary blower provided with a pipe communicating with said burner, a mixing chamber provided with a pipe communicating with said rotary blower, a pipe communicating with said mixing chamber and a suitable fuel supply source, a valve arranged upon said last named pipe for regulating the supply of gas, a second valve arranged upon said last named pipe for cutting off the supply of gas when said rotary blower is at rest, a pipe establishing communication between said first named pipe and the controlling diaphragms of said valves, and said second named valve being adapted to be more easily actuated than said first named valve, substantially as described.

3. In combination, a burner, a rotary blower provided with a pipe communicating with said burner, a mixing chamber provided with a pipe communicating with said blower, a pipe communicating with said mixing chamber and a suitable gas supply source, an adjustable valve arranged upon said last named pipe, a second valve arranged upon said last named pipe, each of said valves being adapted to be actuated by a diaphragm, said second named valve being adapted to be more easily actuated than said first named valve, and a pipe communicating with said first named pipe and the diaphragm of each of the said valves, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CLARENCE S. MOORE.
JOHN WILLIAM MOORE.

Witnesses:
THOS. W. ROSE,
G. T. ROSE.