(No Model.) 2 Sheets—Sheet 1.

W. E. MURRIN.

DEVICE FOR MIXING AERIFORM FLUIDS.

No. 421,603. Patented Feb. 18, 1890.

Fig. 3.

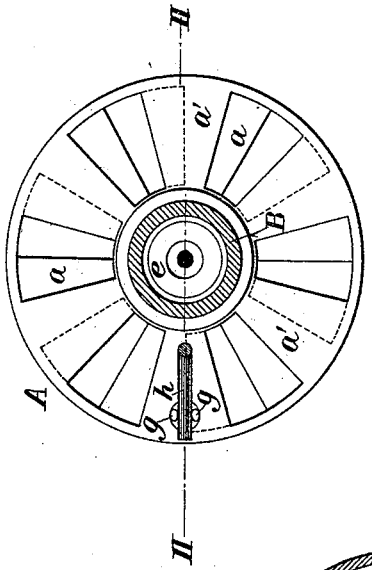


Fig. 4.

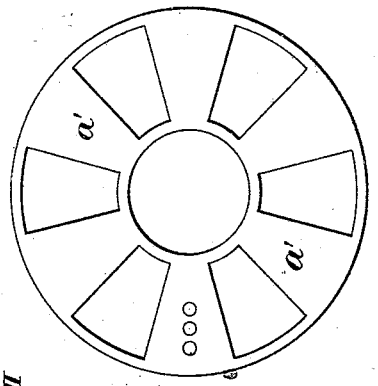


Fig. 2.

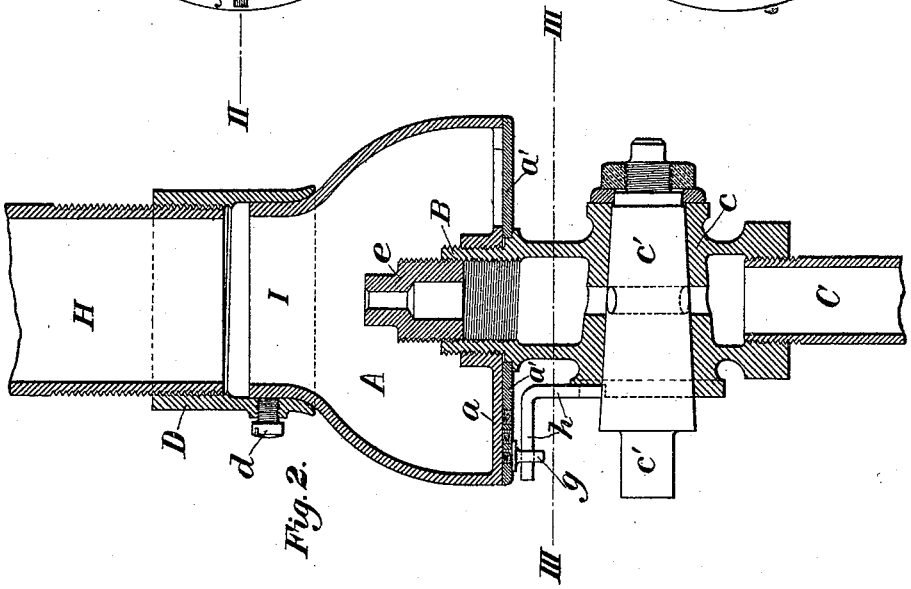
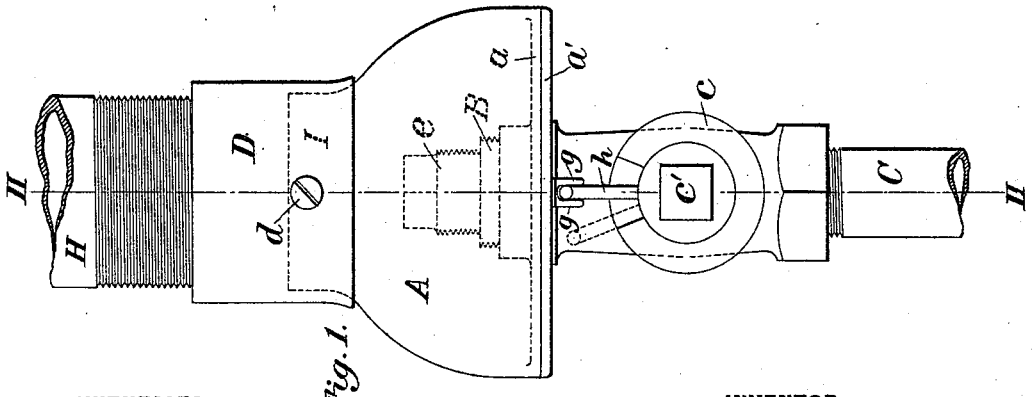


Fig. 1.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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No. 421,603. Patented Feb. 18, 1890.

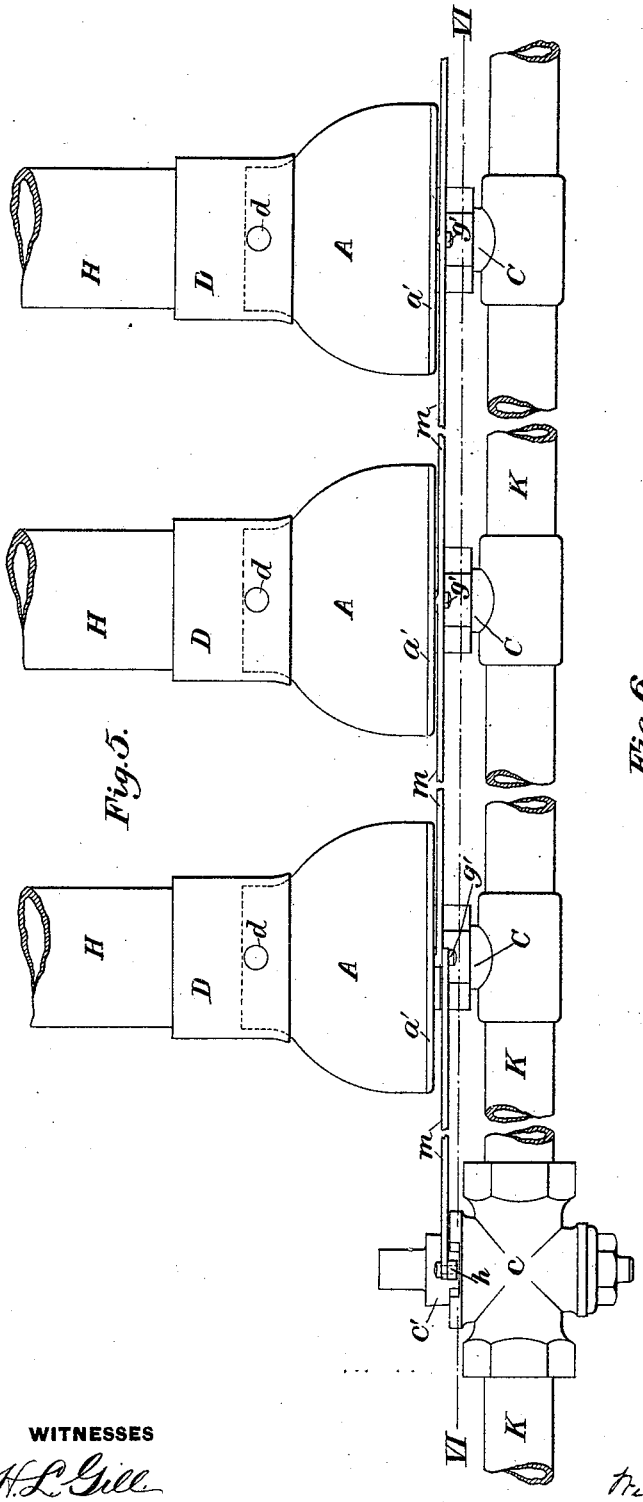

Fig. 5.

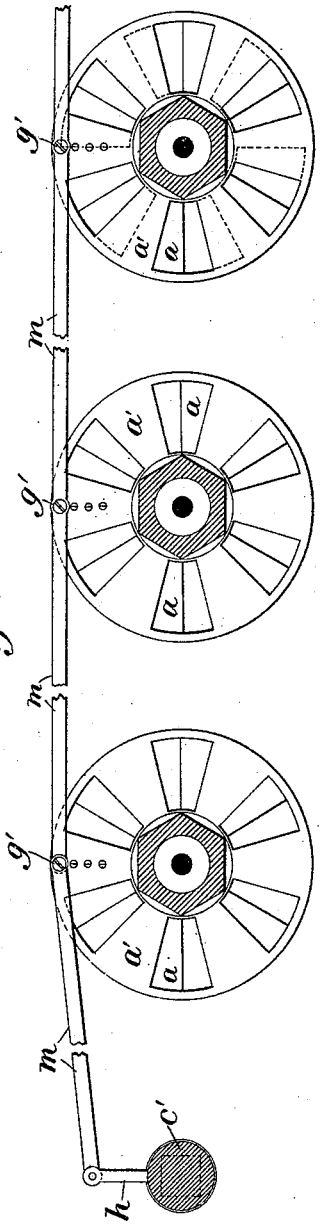

Fig. 6.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM E. MURRIN, OF FRANKLIN, PENNSYLVANIA.

DEVICE FOR MIXING AERIFORM FLUIDS.

SPECIFICATION forming part of Letters Patent No. 421,603, dated February 18, 1890.

Application filed July 12, 1889. Serial No. 317,267. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. MURRIN, of Franklin, in the county of Venango and State of Pennsylvania, have invented a new and useful Improvement in Devices for Mixing Aeriform Fluids, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of my improvement. Fig. 2 is a vertical section thereof on the line II II of Figs. 1 and 3. Fig. 3 is a horizontal section on the line III III of Fig. 2, showing a bottom plan view of the mixing-chamber. Fig. 4 is a plan view of the plate *a'* detached. Fig. 5 is a plan view showing a number of my improved mixers arranged for use with a furnace. Fig. 6 is a vertical section of the same on the line VI VI of Fig. 5. Like letters of reference indicate like parts in each.

My invention is especially adapted for use in connection with fire-places, furnaces, and other heaters using natural gas for fuel, and is designed to furnish an easily-detachable regulating mixing-chamber which can be made and sold as an independent article of manufacture and readily connected with gas-consuming apparatus of various descriptions.

In devices for mixing natural gas and air as commonly used, the natural gas is introduced by means of a supply-pipe furnished with a cock or valve into a chamber which is entirely open to the atmosphere on the under side, the area of opening being very much greater than that of the adit-pipe for the gas. By this arrangement the amount of air admitted is the same whether more or less gas is introduced, so that sometimes too little and at other times too much atmospheric air is mixed with the gas before it enters the combustion-chamber.

Devices have been employed for admitting both the air and gas by pipes each furnished with a valve or cock, and in some instances these valves have been arranged and connected so that they are opened and closed by the same mechanism. I therefore do not claim, broadly, the simultaneous operation of the air and gas adits, my invention being designed as an improvement on such contrivances as I have just referred to.

As the proportionate quantity of atmospheric air to secure the best results for heating purposes is much greater than that of natural gas, it is important that the air should be admitted through a considerably larger area of opening than that provided for the admission of the gas, not only to permit of the introduction of the requisite proportionate amount of air, but also to allow the air to enter without undue rapidity, so as to afford sufficient opportunity for thorough mixing with the gas before the entrance of the mixed air and gas into the combustion-chamber. For this purpose I use a mixing-chamber A of larger diameter at its under than on its upper end and preferably of semi-globular shape. The lower end of this mixing-chamber is furnished with two perforated annular plates *a a'*, the upper one *a* of which is fixed to the mixing-chamber and the lower one *a'* of which rotates on its axis in contact with the upper plate. The perforations in one of these plates exactly correspond in size and position with those in the other, and are so arranged that when the lower plate is turned through an arc of about ninety degrees all of the perforations in both plates are closed, so that by means of the register thus formed the admission of air into the mixing-chamber may be entirely prevented or regulated to any desired degree.

A short pipe B, for the admission of gas into the mixing-chamber A, is placed centrally in the fixed register-plate *a* of the mixer. Within the short pipe B and within the mixing-chamber A is screwed a gage-jet *e*, the aperture of which is of such regulated diameter as to admit the passage into the mixing-chamber of a certain maximum quantity of gas. This gage-jet *e* is readily inserted or removed by means of a key through the tubular opening at the top of the mixing-chamber whenever the latter is uncoupled from the pipe H, which connects it with the combustion-chamber or fire-place. The upper end of the mixing-chamber is preferably tubular and of considerably smaller diameter than the lower end. The tubular extremity I of the mixing-chamber is made smooth and slightly tapering, so as to fit closely into the flaring end of a tubular coupling-sleeve D, which is screwed onto the end of the pipe H

which connects with the combustion-chamber. The interior of the coupling-sleeve D for about half its depth at the lower end is smooth and slightly flaring, so as to receive and form a close fit with the exterior of the tubular extension I of the mixing-chamber. A set-screw *d*, which takes into screw-threads in the coupling-sleeve D, presses, when screwed home, against the surface of the tubular extension I, and separably unites the mixing-chamber and the pipe H by means of the coupling-sleeve D. By this arrangement the mixing-chamber A may be readily detached from the pipe H, which connects it with the combustion-chamber, by simply loosening the set-screw *d*, when the mixing-chamber A can be slightly depressed and moved to one side, giving access to its gage-jet *e* in the interior of the mixing-chamber for the purpose of examination or for changing the maximum amount of gas-supply.

The gas-supply pipe C is furnished at its upper end with a detachable cock or valve *c* of ordinary construction, the stem *c'* being squared or otherwise arranged so as to be readily operated by a key to permit of the passage of more or less gas or shut it off entirely, as may be desired. To the stem *c'* of the valve is attached a short bent lever *h*, which extends upward toward the register-plates on the under side of the mixing-chamber A and enters between two pins *g g*, which are attached to and project downward from the movable register-plate *a'*. The stem of the valve has a movement through an arc of about ninety degrees, and as it is turned in one direction or the other the movable register-plate *a'* of the mixing-chamber is rotated more or less on its axis, depending upon the degree to which the stem of the gas-valve *c* is turned. These parts are so arranged relatively to each other that when the stem of the gas-valve *c* is turned to shut off the gas the lower register-plate *a'* is in the position which entirely closes the apertures in the upper register-plate *a* and prevents the admission of air into the mixing-chamber. When, however, the stem *c'* of the gas-valve is turned to admit more or less gas into the mixing-chamber, the lower register-plate *a'* is correspondingly turned to admit more or less air into the mixing-chamber. Ordinarily this arrangement gives a sufficiently satisfactory adjustment; but it may be rendered more perfect by making the pins *g g* adjustable on the lower plate *a'* of the mixing-chamber, so as to move them nearer to or farther from the axis of rotation of the register-plate *a'*, and thus the degree of rotation of the plate *a'* consequent on any movement of the gas-valve *c* may be so adjusted as to supply a larger or smaller proportionate amount of air to a given quantity of gas. This arrangement is illustrated in Fig. 4.

It is obvious that the mixer and gas-valve constructed as described are of small size and compact arrangement, and are readily adapted to any style of heater in which natural gas is used.

It remains only to show how a series of such mixing devices may be connected together for use side by side in a single heater. Two, three, or more mixers are arranged in a row with the stems of their gas-adit valves in the same axial line, connected each with a horizontal gas-supply pipe K, and the gas-valve *c* is placed in any convenient position on the pipe K, and the lever *h*, instead of connecting with the pins *g g* on the movable register-plate *a'*, is attached to a rod *m*, which in turn is connected with a pin *g'* on the register-plate of each mixer, and thus all of the register-plates *a'* are operated simultaneously. In this case the pin *g'* may be adjustable on the register-plate *a'* in the same way and with like effect, as before described in relation to the pins *g g*.

I claim—

1. An air and gas mixing chamber, in combination with a gas-adit pipe, the under side of said chamber surrounding said pipe having a pair of perforated register-plates, one of which is movable relatively to the other, and the upper end of said chamber being of considerably smaller diameter than the lower end, and the gas-adit pipe having a gas valve or cock, the stem of which is connected and movable with the movable register-plate, substantially as and for the purposes described.

2. The combination of an air and gas mixing chamber, with perforated register-plates on the under side, one movable relatively to the other, and a gas-pipe and gas valve or cock, the stem of which is adjustably connected with the movable register-plate of the mixing-chamber, substantially as and for the purposes described.

3. The combination of an air and gas mixing chamber having a gas-adit pipe with a gage-jet set thereon, and an exit or gas-delivery pipe for connecting the mixing-chamber with the combustion-chamber of a furnace or fire-chamber, and a sleeve-coupling between the mixing-chamber and gas-delivery pipe screwed or attached to one and separably connected with the other, substantially as and for the purposes described.

4. In combination with a gas-pipe and a mixing-chamber having a pair of perforated register-plates, one movable on the other, a gas-cock in the pipe having a bent lever attached to the plug of the cock, one arm of which engages a bifurcated lug extending from the moving register-plate, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 22d day of June, A. D. 1889.

WILLIAM E. MURRIN.

Witnesses:
W. B. CORWIN,
JNO. K. SMITH.