

(No Model.)

W. J. WARD.  
GAS BURNER.

No. 434,492.

Patented Aug. 19, 1890.

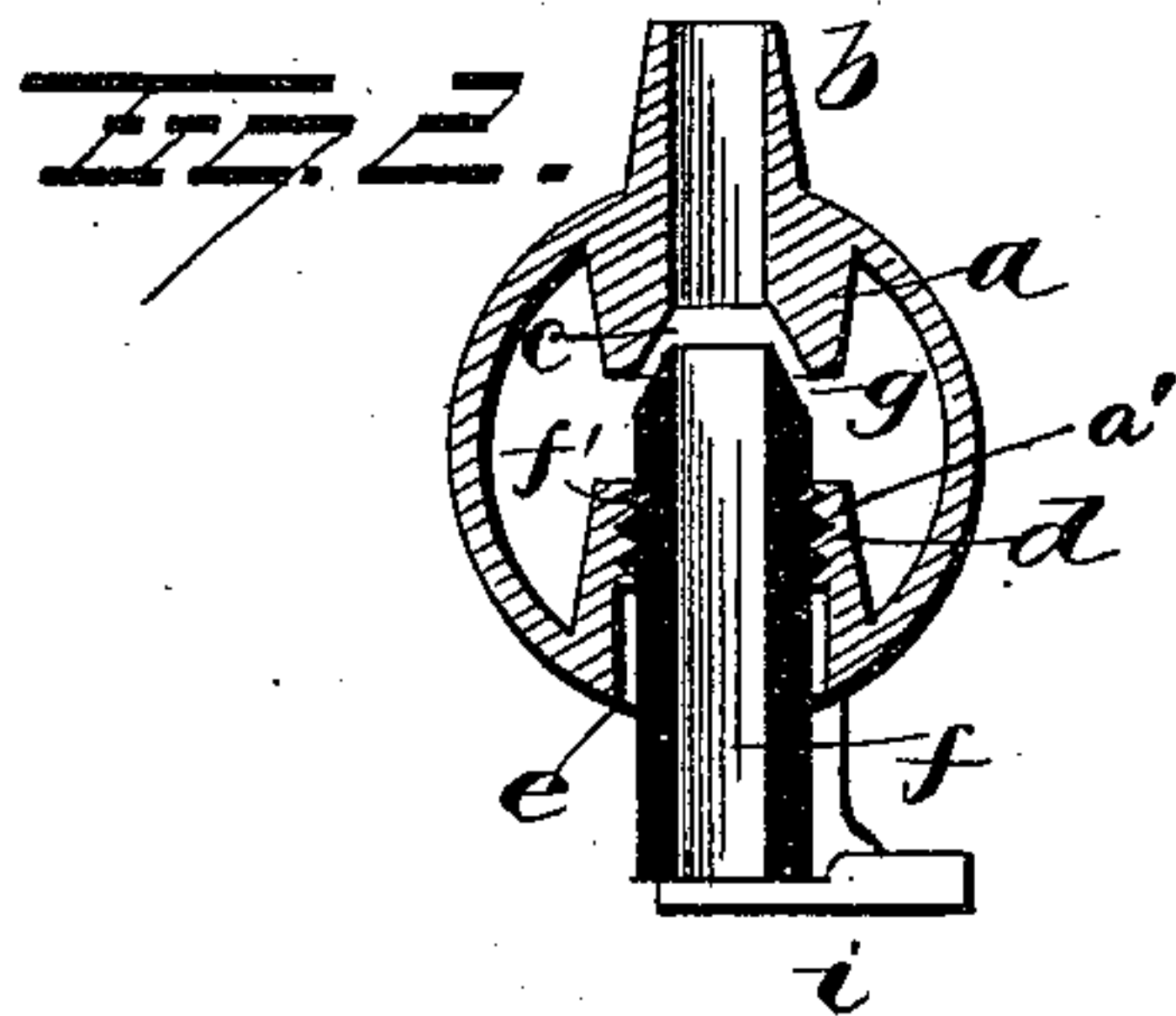
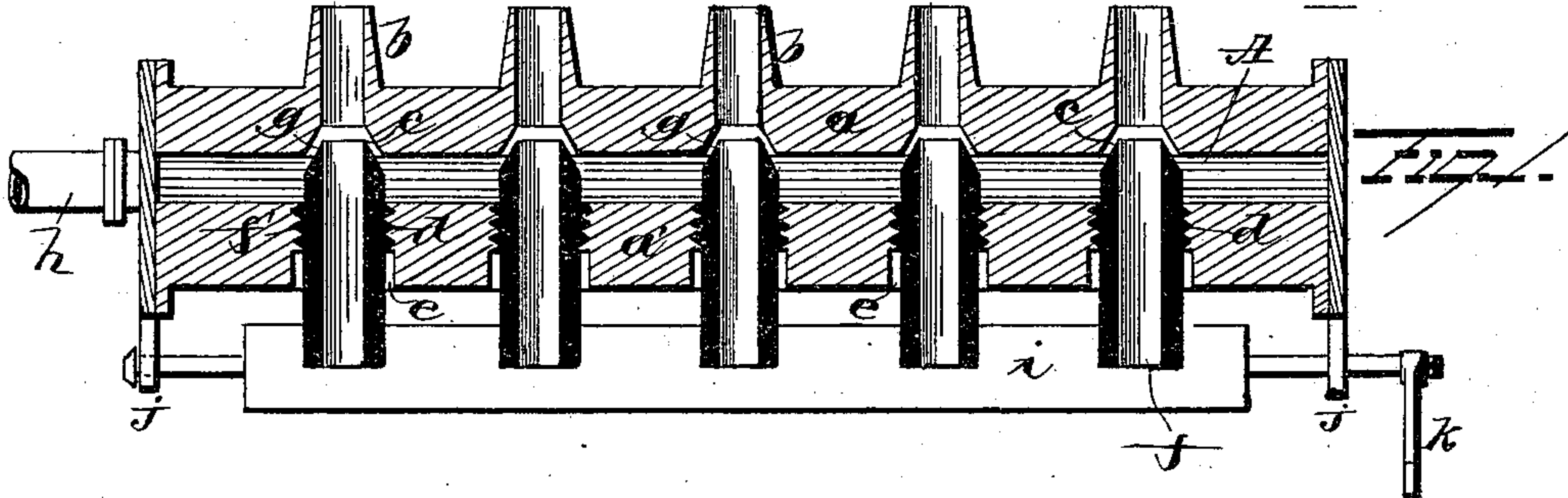


Fig. 3.

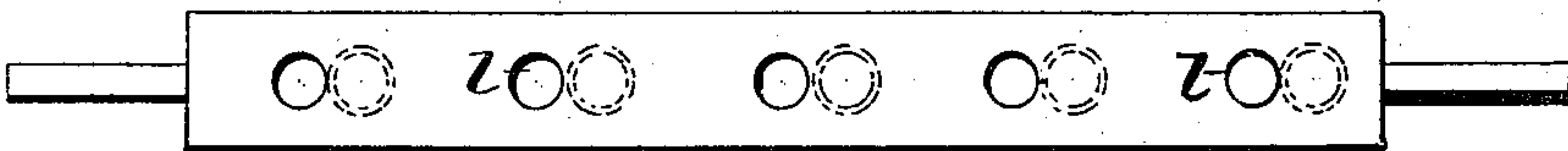
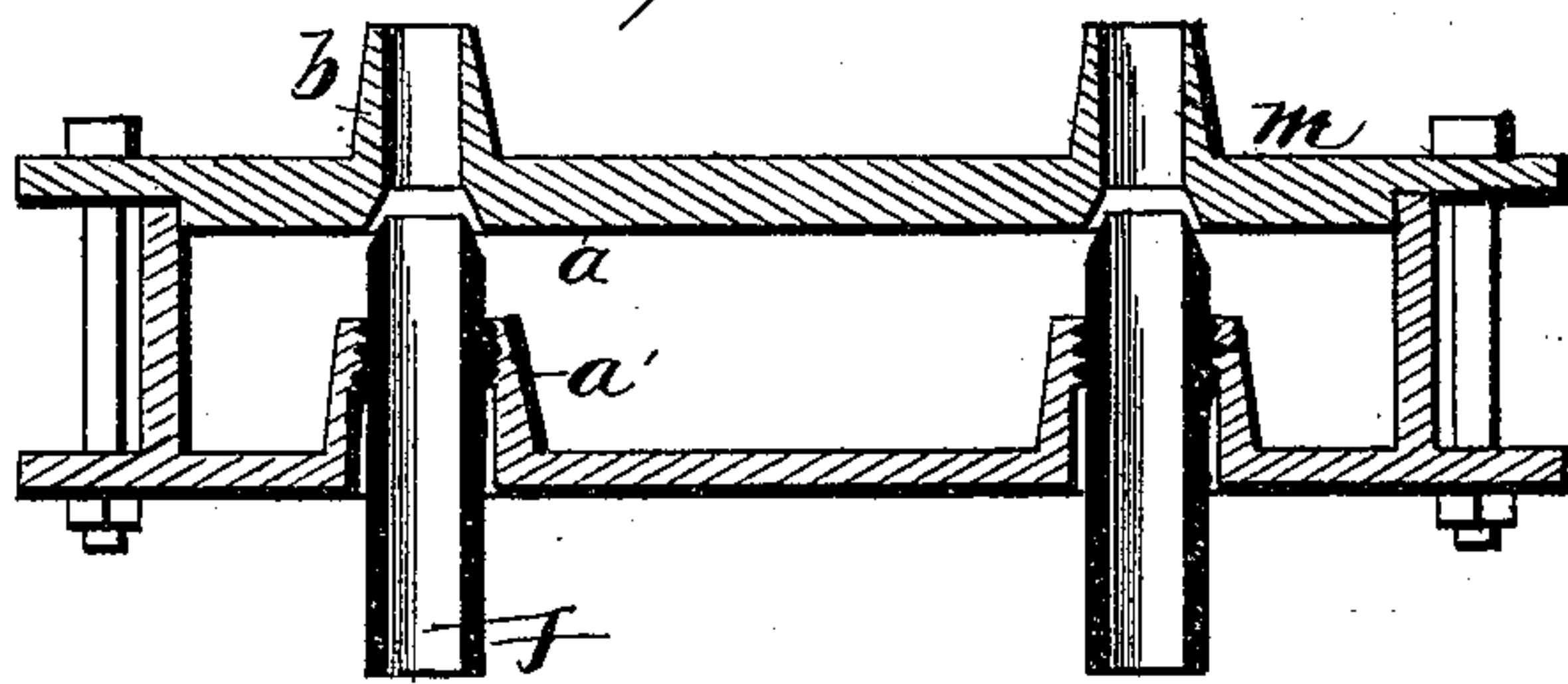


Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## GAS-BURNER.

SPECIFICATION forming part of Letters Patent No. 434,492, dated August 19, 1890.

Application filed December 24, 1888. Serial No. 294,516. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. WARD, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Burners; 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 improvement in gas-burners.

In working heating and puddling furnaces and many other varieties as well—such, for example, as heating-furnaces—when the furnace is charged with iron to be made hot for rolling, hammering, or welding a very clear hot fire is needed in order to raise the temperature of the iron to a welding heat, after which this heat has to be moderated. Ordinarily this reduction of heat is effected by manipulating a damper on top of the stack, which chokes the draft and changes the white heat to a dark or smoky fire, thereby keeping the iron from burning; but this flame and the smoke come out of the top of the stack very thick owing to the furnace being full. This same procedure has to be resorted to when for any reason whatever the machinery has to be stopped in case of accident or for like cause. As a result of this, the stack soon burns out, and much unnecessary flame and smoke are emitted at the top of the stack.

The object of my present invention is to obviate these defects in a large measure by regulating the quantity and quality of gas and air fed to the jets; and to this end it consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal vertical section through my preferred form of burner. Fig. 2 is a transverse section of the same. Fig. 3 shows a modified form of damper, and Fig. 4 is a modification of the burner.

A represents the gas-reservoir, it preferably being of cylindrical form, of any length, and of suitable diameter, as shown in Fig. 2. A pair of oppositely-located and slightly-tapering ribs *a a'* project from the inner wall of the reservoir toward each other with their

inner faces but a short distance apart. A series of tips *b* project out of the top of the reservoir along the back of the upper rib *a*. Thus far the burner is conveniently constructed—cast or otherwise—in one integral piece, and when thus formed holes are drilled straight through the ribs and tips. This completes the upper portion of the burner, except that the lower ends *c* of the holes in the upper rib *a* are slightly enlarged, for a purpose which will appear. The corresponding and aligning holes in the lower rib *a'* are screw-threaded at *d*, and about half-way into the rib the hole is redrilled at *e* to make it of sufficient size to readily receive the air-tubes, now to be described. The air-tubes *f* have screw-threads *f'* on a portion of their exterior, and are tapered at their upper ends *g*, so as to extend up into the enlarged ends *c* of the openings in the tips when screwed up to the greatest extent.

The gas is supplied through a pipe *h* and has an unobstructed passage into the reservoir, while air is sucked or siphoned in through the air-tubes by the current of gas passing across the tapered ends *g* of the air-tubes up through the tips. Of course the feed of gas may be regulated by increasing or diminishing the size of the openings between the air-tubes and the tips, and the supply of air is regulated in the same manner, for when the gas-passage is diminished in size the velocity of the gas which passes in a smaller flow is greatly increased, thus drawing with it a greater quantity of air, and, on the other hand, when the size of this opening is increased, the gas passes at a much slower speed, though in increased volume, and hence takes with it less air. By manipulating these tubes the gas-pressure may be varied from one-half ounce to one hundred, more or less, and sixty per cent. of air to forty per cent. of gas may be used, or as high as eighty per cent. of air to twenty per cent. of gas, and in many other proportions.

In addition to the fact that the feed of air and gas may be regulated as explained, I furnish an air excluder or damper to operate on all of the air-tubes at once. This damper consists of a strip or plate *i*, pivoted at points *j* in proximity to the lower ends of the air-tubes. One end of this damper is provided



with a crank *k*, and these parts are so arranged that when the damper is turned up vertically, as shown in Fig. 1, it is removed from the pipes, and as a consequence they  
 5 are left open. When turned in the opposite direction—that is, horizontally—the pipes are all closed and the air shut off entirely from all the tubes simultaneously. This has the  
 10 same effect of cooling the furnace as was formerly attained by closing the damper in the stack. With a hinged damper, substantially as described, the damper can be journaled in  
 15 boxes supported on springs, so that the damper will follow the air-tubes as they are adjusted up or inwardly and rest in close  
 contact with the outer ends of the air-tubes.

In Fig. 3 a slightly-modified form of damper is shown, the only difference being that this  
 20 damper is adapted to be slid endwise instead of turned over the ends of the air-tubes, and is provided with holes *l*, designed to be thrown into alignment with the tubes when the latter are opened and out of alignment in order  
 to close the tubes.

25 In Fig. 4 a slightly-modified form of burner is shown. In this figure a rectangular reservoir is shown, and while the air-tubes are preferably in two rows they project into the  
 reservoir the same as in the former construction; but in this modification the tips are all  
 30 secured on or integral with a removable cover *m*, so that the burner may be taken apart and cleaned at any time. In this burner the size of openings and feed of air or gas are regulated the same as in other constructions.

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

1. In a gas-burner, the combination, with a gas-distributing reservoir the top plate of  
 40 which is provided on its outer surface with a series of upwardly-projecting burner-tips integral with said plate, the lower end of the bores of the tips being enlarged to form beveled  
 45 seats and the bottom plate of said reservoir having screw-threaded openings located in line with the bores of the burner-tips, of a series of air-tubes adjustably secured within the screw-threaded openings,  
 50 each tube being provided with a beveled upper end corresponding in shape to the enlarged end of the bore of its corresponding burner-tip, substantially as set forth.

2. In a gas-burner, the combination, with a gas-distributing reservoir and a series of  
 55 burner-tips leading therefrom, of a series of air-tubes adjustable toward and away from the burner-tips and a damper common to all of said air-tubes, substantially as set forth.

3. In a gas-burner, the combination, with a  
 60 cylindrical gas-reservoir, said reservoir having a pair of oppositely-located integral ribs and tips projecting from the back of one of these ribs, said tips having an enlarged interior, of adjustable tapered air-tubes screwed  
 65 into the lower rib and a damper for opening and closing the air-tubes, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing  
 70 witnesses.

WILLIAM J. WARD.

Witnesses:

AUGUST FLACH,  
 JOHN RARE.