(No Model.)

A. M. MITCHELL.

AUTOMATIC VALVE FOR GAS BURNERS.

No. 545,302. Patented Aug. 27, 1895.

Fig. 1.

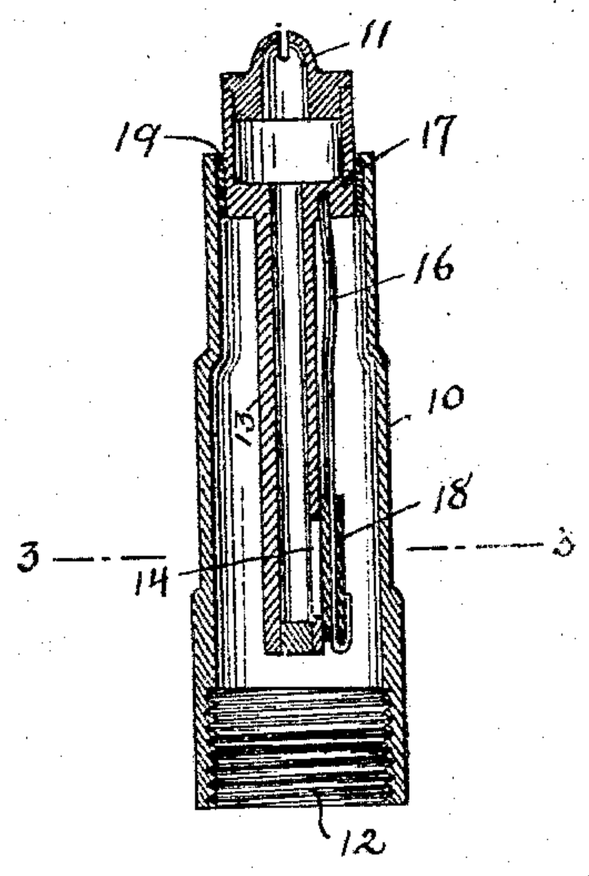


Fig. 2.

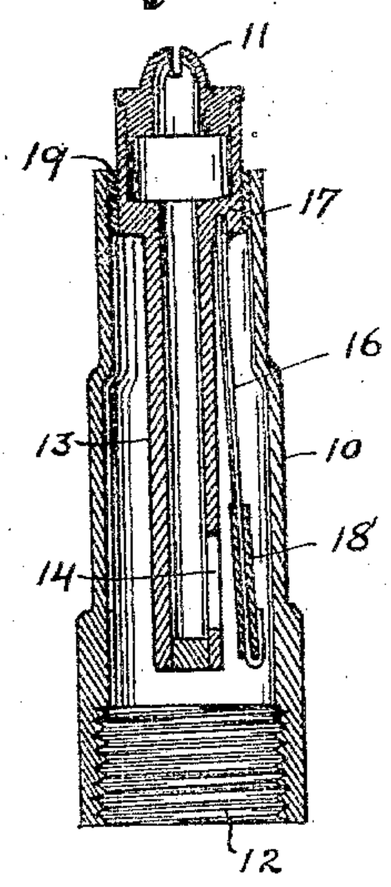
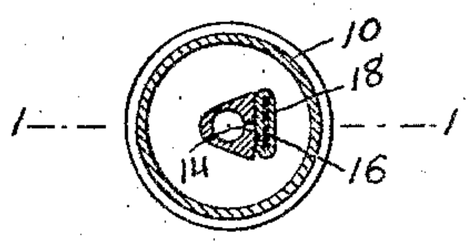


Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE FOR GAS-BURNERS.

SPECIFICATION forming part of Letters Patent No. 545,302, dated August 27, 1895.

Application filed March 30, 1894. Serial No. 505,729. (No model.)

To all whom it may concern:

Be it known that I, ARDON M. MITCHELL, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Automatic Valves for Gas-Burners, of which the following is a description.

My invention consists of certain novel parts and combinations of parts, all of which will be specifically pointed out in the claims concluding this specification.

In the accompanying drawings, Figures 1 and 2 are vertical sections through a burner having my improved automatic valve applied thereto, showing the same in different positions; and Fig. 3 is a horizontal section through the burner and valve shown in Fig. 1 on the line 3 3.

Similar figures of reference indicate the same or corresponding parts of all the figures.

The following is a description of the structure shown in the accompanying drawings, which description will enable persons skilled in the art to practice my invention in the form at present preferred by me; but it will be understood that my invention is not limited to the precise forms shown, as various modifications, some of which will be indicated in the course of the description, may be adopted without departing from the spirit of my invention and without exceeding the scope of the concluding claims.

Referring to said drawings, 10 is the tubular part of an ordinary gas-burner.

11 is a tip of ordinary form.

12 is a screw-thread, by means of which the burner is attached to the gas-pipe.

13 is a perforated pillar, through which the gas flows to the tip 11, which is supported at the upper end thereof.

14 is a port in the pillar 13. 16 is a valve controlling said port. This valve is composed of or supported by a strip composed of materials having different coefficients of expansion placed side by side and attached together. This strip 16 is attached at 17 to the enlarged part of the pillar 13. The lower end of the strip 16—that part forming the valve—is provided with a packing 18.

19 is a piece of asbestos or other non-conducting material.

The principle on which this valve operates may be thus described: Application of heat—as, for example, by an ordinary match applied in the usual manner to light a jet of gas—causes the valve 16 to be lifted from its seat and thus to open the port 14, so that gas can flow therethrough to the tip. The port remains open as long as heat is applied. The heat of the match only initiates the opening motion of the valve, which is thereafter increased or continued by the heat of the gas-flame.

The valve in its essential principles consists of the combination of two materials having different coefficients of expansion. When heat is applied to such a structure according to well-known laws, the structure as a whole or parts thereof are laterally deflected, which lateral deflection opens the port 14. The metals or materials may be united in any suitable way, as by deposition or by soldering or by rivets. At the present time I prefer to make the valve or the operating parts thereof of different metals having suitable relative coefficients of expansion—for example, of the combination of iron or steel and zinc or of platinum and zinc. They might, however, be made in whole or in part of materials not metallic, and, as an example of one made in part of metallic and in part of non-metallic material which I have experimented with somewhat zinc and isinglass may be mentioned. Any suitable materials having different coefficients of expansion may be used, provided they will stand the heat to which they are subjected and provided they will not break by the amount of flexure which they have to endure. I at present prefer to make the valve or stem of the valve of one or more materials having a considerable coefficient of heat-conductivity, as thereby the heat applied to the tip is more readily conducted to the operating part of the stem; but this is not essential.

The pillar 13 may be made of any suitable material. I prefer, however, to make it of a material having a high coefficient of conductivity—such, for example, as copper—and

to extend it up as near as may be to the tip, so that the heat of a match applied in the ordinary manner to the tip will be readily conducted to and through the pillar to operate the valve. Of course the material of the valve itself might be relied upon to conduct the heat to its operating part, but the action would be less prompt.

I prefer to apply to the valve a packing 15 of some material which readily conforms to the surface against which it is pressed, and which is not affected injuriously by the heat present. Many different materials might be used, but at present I prefer to use a laminated packing consisting, for example, of sheets of thin aluminium-foil or silver-foil. There are some advantages in making it of silver-foil, in that the conductivity of silver is high, and hence the heat from the pillar will be more readily communicated to those parts of the valve covered by the packing, which is desirable, especially when the entire strip 16 is made of materials having different coefficients of expansion.

Instead of the valve being arranged to close its port with its face, as it does in the structure shown in the drawings, it might be arranged to open and close the part by the lateral motion of its end.

The device may be operated in the ordinary way.

The lighted match applied to the tip or to any part of the tube supporting the tip will cause the valve, due to the unequal expansion of its parts, to have a lateral motion, which will uncover the port 14 and permit gas to issue from the tip. This gas being ignited may produce only a small flame; but the heat of this flame will continue the motion of the valve and a flame of the full dimensions will soon be produced; or, if preferred, the valve may be opened positively by any suitable mechanism controlled from the outside of the burner to start the flame. If the gas be extinguished without turning the cock, as by blowing it out, the burner will gradually cool and the valve will seat itself until the port 14 is well covered and the passage of the gas thereafter suspended.

It is obvious that the extent to which the valve uncovers its port is determined by the amount of heat present, and that this is in turn dependent upon the amount of gas passing through the burner in a given period of time, since the more rapidly the passage of gas the more caloric will be carried away by it. It is therefore plain that in case of irregular supply the accelerated passage of gas may be made to automatically cause the valve to seat itself a proportionate amount, thus cutting off an abnormal supply and regulating the amount of gas consumed. It is obvious that the more rapid passage of gas through the parts will diminish their temperature and that this in turn will diminish the lateral motion of the valve and hence diminish the port through which the gas can pass, and that on the other hand a diminished flow of gas will, by carrying away less caloric, result in a higher temperature of the parts and a larger port-area, and hence an increased flow of gas.

Another advantageous feature is that the gas is heated before it issues from the burner, due partly to the heated valve itself projecting down into the tip and partly to the heated pillar containing the port. It is well understood that the heating of gas before it issues from the burner increases the brilliancy of the flame and the economy of consumption.

For some reasons I prefer to make the tube 10 of non-conducting material, as thereby less heat applied by the match will be dissipated and lost; but at present I make it of a conducting material and preferably economize heat by interposing between the tip and the tube a non-conducting material 19—such, for example, as asbestos.

I prefer to make the valve 16 or its stem of an elastic or springing material, as the elasticity of the material may then be relied upon to keep or aid in keeping the valve firmly seated.

The device above described may be used with or without the ordinary stop-cock on the gas-supply pipe. My present intention is to use it with the stop-cock, whereby the height of the flame may be regulated in the ordinary manner, although it might be used without such stop-cock.

In the foregoing specification I have referred to various modifications which might be adopted in the practice of my invention, but I have not endeavored to specify all the modifications which might be made; and it will be understood that reference by me to some of these is not intended to exclude others not referred to but which are within the spirit and scope of my invention, broadly considered.

In the concluding claims the omission of an element or the omission of reference to the detail features of the elements mentioned is intended to be a formal declaration of the fact that the omitted elements or features are not essential to the inventions therein severally covered.

What I claim is—

1. In a gas burner, the combination with the tip and burner tube, of a port, a valve automatically operated by a device composed of materials having different coefficients of expansion, a perforated pillar composed of heat conducting material containing said port and a heat insulating material between said pillar and said tube.

2. A packing composed of a plurality of layers of metallic foil in contact with each other wrapped upon a support.

3. In a gas burner, the combination with a port, a valve automatically operated by variations of temperature and a packing com-

posed of a plurality of layers of metallic foil in contact with each other wrapped upon a support.

4. In a gas burner, the combination with a port, of a valve moving in a diagonal or curved line with reference to said port automatically opening and closing said port and varying its size in proportion to the heat present by the expansion and contraction of the device composed of materials having different co-efficients of expansion.

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