Sept. 3, 1935. F. A. GAUGER 2,013,439

VALVE

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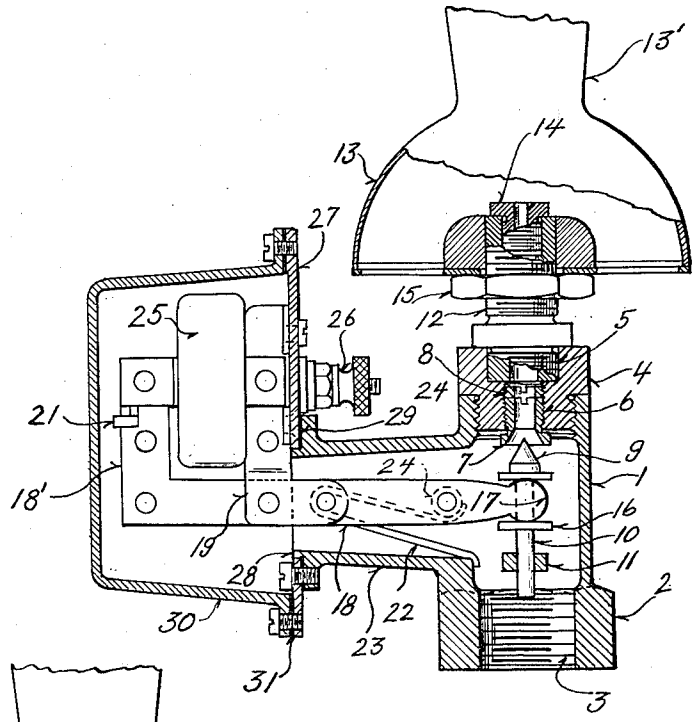


Fig. 1.

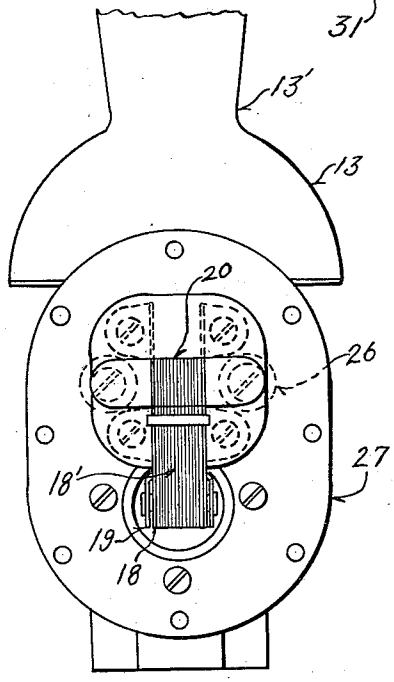


Fig. 2.

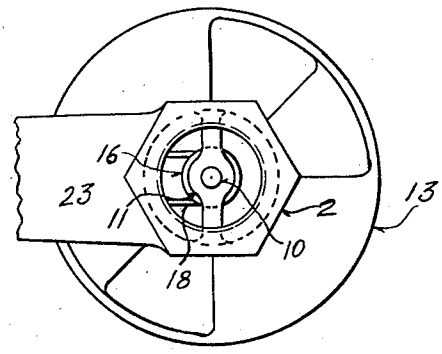


Fig. 3.

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VALVE

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2 Claims. (Cl. 137—139)

This invention relates to valves, and although it has wide utility, it nevertheless is eminently adapted for use with gas burners.

In gas burner constructions it has been the usual practice to put the power operated valve at a point spaced from the burner as these valves as heretofore constructed required a considerable amount of room and it was necessary therefore to have a relatively long connecting pipe between the valve and the burner itself. The result of this was that after the valve had closed, the burner frequently flashed back, due to the passage of the gas remaining in the connecting pipe, through the burner in a relatively decreasing amount. Further it was necessary in the prior construction to provide a certain "differential" pressure drop as measured on opposite sides of the valve as required by the A. G. A. specifications. As actually required in such specifications, only a 5% differential pressure drop was permitted. This necessitated a relatively large valve and it was, therefore, necessary to provide relatively powerful power means for operating this valve against the gas pressure, the large valve being required to secure adequate gas flow without exceeding the allowable differential drop. Under these conditions if electromagnetic means were provided for operating the valve, such means would have to be relatively powerful and could not be supplied in actual practice from the usual relatively small bell ringing transformer.

This invention is designed to overcome the above noted defects, and objects of the invention are to provide an electromagnetic valve for a gas burner which is so made that it is adapted to be secured directly to the gas burner without requiring any connecting pipe whatsoever and which therefore permits the use of a relatively small valve located closely adjacent the burner itself, thereby avoiding all possibility of flash back.

Further objects are to provide a construction as outlined above in which, due to the relatively small valve, a correspondingly relatively small electromagnetic means may be employed for operating the valve, such means forming with the body portion a compact unitary structure.

A further object of the invention is to so construct the electromagnetic means that it may be operated from an ordinary bell ringing transformer which has heretofore been impossible with the prior types of devices, overheating being minimized by having the armature and pole faces in actual contact when the valve is held open due to the action of the electromagnetic member, the armature tending to drop open by gravity, thereby closing the valve, and the effects of residual magnetism being overcome in a positive and certain manner by the use of a spring for this purpose, it being noted further than an additional safety feature is obtained by having the armature drop open by gravity when the valve closes so that in the event of current failure, the valve will not remain open.

Further objects are to provide a construction in which the operation of the burner and valve is equally satisfactory on low or high pressure without any danger of flash back, which has heretofore been a defective feature in prior constructions, and in which the valve itself directly seats on the valve seat in the nozzle channel, the valve being actually preferably conical and remaining within the outline of the valve seat, such valve being guided by means spaced from the valve seat and thereby securing a self-aligning semi-floating action.

Further objects are to provide a very compact unitary structure which may be directly attached to the burner, as for instance by screwing the threaded shank into the threaded opening of the burner, which is as easy to attach to the burner as an ordinary fitting, which nevertheless remains in adjustment although it is handled as a unit during its installation or removal, and which is inexpensive to make and reliable in operation.

An embodiment of the invention is shown in the accompanying drawing, in which:

Figure 1 is a vertical sectional view through the device, a fragment of the burner being shown partly broken away.

Figure 2 is a side elevation taken at right angles to Figure 1 with the cover removed.

Figure 3 is a fragmentary bottom plan view of the structure shown in Figure 1.

Referring to the drawings, it will be seen that a body portion 1 is provided which has a hexagonal or wrench receiving lower portion 2 provided with a threaded aperture 3 into which a supply pipe is adapted to be screwed. The upper part of the body portion 1 receives the threaded fitting 4, which in turn is provided with a threaded aperture 5 and a relatively smaller threaded aperture 6. The smaller threaded aperture receives the valve seat 7 which is adjustable and which is locked in adjusted position by means of the ring nut 8 also screwed into the threaded aperture 6. The purpose of this adjustment will appear hereinafter.

The valve comprises a conical member 9 which is carried by the stem 10. The stem 10 is loosely

guided by the member 11 which is integral with the body portion and which is spaced a material distance below the valve seat so that the valve is semi-floating and is self-adjusting, the conical valve at all times, both in open and closed position, remaining within the outline of the valve seat, as is apparent from an inspection of Figure 1.

The body portion is provided with a threaded stem 12 which is screwed directly into the burner 13, as shown in Figure 1, and which carries a nozzle 14, such nozzle being screwed into the upper end of the stem 12. Obviously a lock nut 15 may be employed to lock the parts in adjusted position.

It is to be noted that the valve seat and the valve are in axial alignment with the nozzle and with the throat 13' of the burner so that there is a direct short flow of gas to the burner. This prevents any possibility of flash back under any condition either with low or high pressure, as there is no pocketing of the gas in a relatively long connecting pipe, as has been the practice heretofore.

It is to be noted from Figure 1 that the stem 10 of the valve is provided with spaced disks 16 between which the rounded ends 17 and forked lever 18 are positioned. This forked lever is in reality formed from the outer plates of the laminated armature 18', see Figures 1 and 2. It is positioned between the outer plates 19 of the pole structure, the pole structure being also laminated, as indicated at 20 in Figure 2. It is preferable to provide a shading coil 21 for the armature and to have the armature directly contact with the pole face of the electromagnet when the valve is in open position, as shown in Figure 1.

In order to overcome the effects of residual magnetism, due to the actual contacting of the faces of the armature and pole structure, it is preferable to provide a spring 22 which bears against the lower wall of the lateral offset 23 of the body portion at one end, and at the other end which is hooked beneath the spacer 24 holding the arms of the lever 18 apart. The armature tends to drop open through the action of gravity when the valve is in closed position. Obviously, therefore, if through current failure the electromagnet would become de-energized, the valve would close and an additional safety feature is thereby secured. The energizing coil 25 of the electromagnet is connected (not shown) to binding posts 26 insulated from and carried on the outer side of the back plate or face plate 27 of the housing for the electromagnet. This housing for the electromagnet is accurately centered or positioned with reference to the lateral offset 23, as it will be seen that the back plate is bored out and fits over a shouldered projecting portion 28, see Figure 1, formed on the lateral offset. It is secured to such lateral offset by screws or in any other suitable way, and preferably a gasket is provided, as indicated at 29 in Figure 1. A gas-tight cover 30 is provided which fits over the electromagnet and is secured by screws or other suitable means to the plate 27, a suitable gasket 31 being preferably provided.

It will be seen that no stuffing boxes are required for this construction as the cover 30 forms a gas-tight compartment with the plate 27 and houses the electromagnet so that the electromagnet may directly cooperate with the valve without having any frictional losses due to stuffing boxes or the equivalent constructions.

Further it will be seen that the maximum opening of the valve and also the maximum spacing of the armature from the pole piece may be adjusted by adjusting the valve seat to its proper position, thereafter locking it by means of the ring nut.

Further it is to be noted that by having the armature face directly engage the face of the pole piece, that maximum flux occurs when the electromagnet is in operation, holding the valve open and consequently a minimum current flow is required in the winding, thereby minimizing heating.

Also it is apparent that a relatively small valve can be employed as it is located closely adjacent to the nozzle, the valve seat forming in effect a continuation of the nozzle channel.

It is to be noted further that the device can be very readily manufactured and may be cheaply produced. It is easy to install and is substantially fool-proof.

It has been found from actual use of the device that it fulfills the requirements of this type of apparatus in a highly satisfactory manner and permits its installation or removal as a unitary structure.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. An electromagnetically operated valve comprising a body portion, a valve seat threaded into said body portion and adjustable with respect to said body portion, means for locking said valve seat in adjusted position, a valve cooperating with said valve seat and loosely guided at a point spaced from said valve seat, a lever cooperating with said valve to move said valve and pivotally supported from said body portion, an electromagnet provided with a pole piece fixed with respect to said body portion, a rocketing armature carried by said lever and cooperating with said pole piece, said pole piece and said armature contacting when said valve is in open position, and a spring for breaking contact between said armature and said pole piece when said electromagnet is deenergized, said adjustable valve seat determining the spacing between said armature and pole piece when said electromagnet is deenergized.

2. An electromagnetically operated valve comprising a body portion, a valve seat threaded into said body portion and adjustable with respect to said body portion, means for locking said valve seat in adjusted position, a valve cooperating with said valve seat and loosely guided at a point spaced from said valve seat, a lever cooperating with said valve to move said valve and pivotally supported from said body portion, an electromagnet provided with a pole piece fixed with respect to said body portion, and a rocketing armature carried by said lever and cooperating with said pole piece, said pole piece and said armature contacting when said valve is in open position, and a spring assisting in breaking the contact between said armature and said pole piece, said armature tending to drop open by gravity and said spring overcoming the effect of residual magnetism.

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