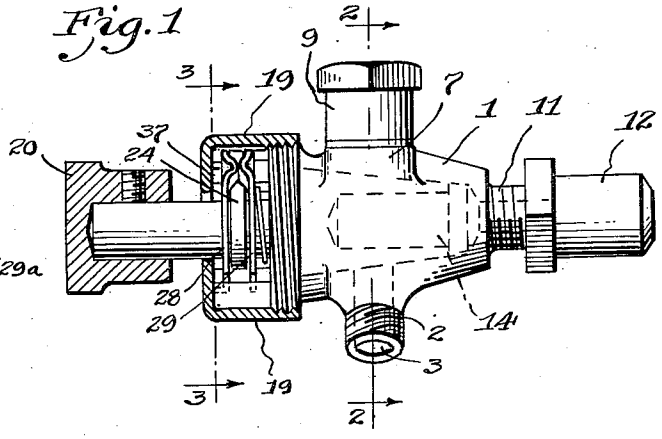
Oct. 15, 1940. E. H. MUELLER 2,217,963

VALVE STRUCTURE

Filed June 26, 1939

Fig. 1



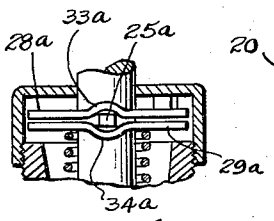


Fig. 7

Fig. 3

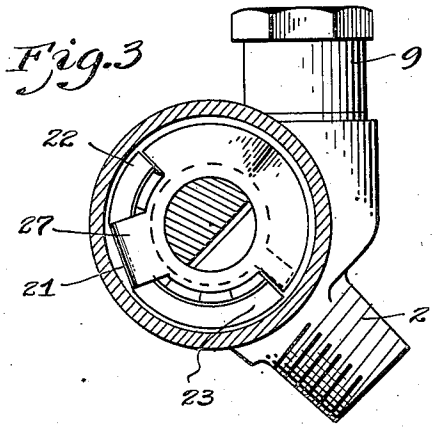
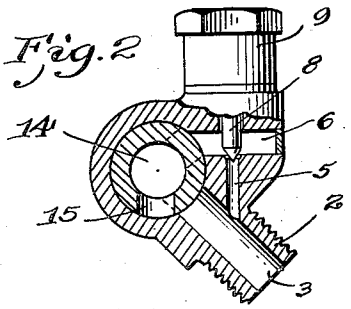


Fig. 2



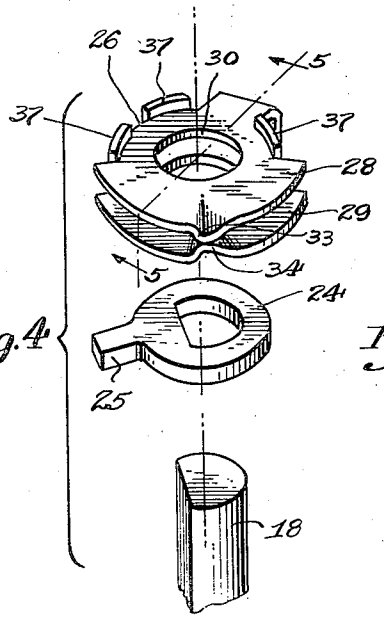


Fig. 4

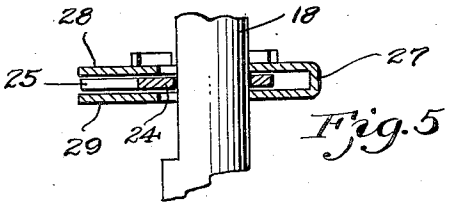


Fig. 5

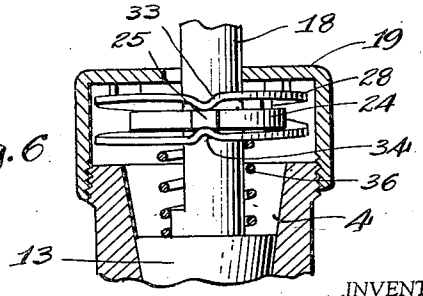


Fig. 6

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VALVE STRUCTURE

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7 Claims. (Cl. 251—163)

This invention relates to a valve structure and it has to do particularly with a valve useful for controlling the flow of gas to one or more gas burners.

In gas ranges, for example, it is desirable to have an arrangement where a burner, or two portions of the same burner, can be supplied with different volumes of gas so that a high flame may be had for rapid cooking and a lower flame may be had for slow cooking or simmering. There are various valves which embody different gas passageways available for this purpose, and the present invention is directed particularly to the provision of an arrangement in the valve which facilitates the positioning of the control member in the various positions. For instance, a valve of this nature, such as the one shown herein, has a rotary valve member which, at one extreme end of its rotary movement, assumes an "off" position and at the other extreme end of its movement assumes an "on" position. At a certain position between these two extremes, there is a third position which is an "on" position, but the valve must be capable of movement past this third position. This invention aims to provide an arrangement for communicating to the operator the intelligence that the valve is at this third position.

In accordance with the invention cooperating members are provided, one of which embodies a yieldable arrangement and one is fixed relative to the valve body and the other rotates with the valve member. More specifically, an element in the nature of a piece of flat spring metal is fixed to one member, preferably the valve body, while another element in the nature of a pin or keyed device is fixed to the other member, preferably the valve member, and cooperates with the spring member. The spring element is of special form furnishing in itself its own spring and yielding action so that this action is attained quite independently of the yielding means which holds the valve member on its seat. The two parts cooperate to form a stop so as to stop the rotation of the valve member in the said intermediate position, but this stop may be overcome by the application of additional turning torque.

An arrangement for carrying out the invention is shown in the accompanying drawing.

Fig. 1 is a view of a valve constructed in accordance with the invention showing some parts in cross section.

Fig. 2 is a cross sectional view taken substantially on line 2—2 of Fig. 1.

Fig. 3 is an enlarged cross sectional view taken substantially on line 3—3 of Fig. 1.

Fig. 4 is a bracketed view showing some of the parts in detached relationship.

Fig. 5 is a cross sectional view taken substantially on line 5—5 of Fig. 4, but showing the parts in assembly.

Fig. 6 is a detailed view with parts cut away and some parts in section showing the operation.

Fig. 7 is a view similar to Fig. 6 showing a modified form.

In Fig. 1 a valve body is indicated at 1 and it has a threaded inlet extension 2 with an inlet passageway 3. The body has a valve chamber 4 into which the inlet passageway leads. A second passageway 5 leads off the inlet passageway 3 and it communicates with the passageway 6 which also leads to the chamber. An extension 7 on the valve body is equipped with a needle valve 8 which is sealed by a cap 9 and which is adjustable to vary the size of the orifice at the outlet end of the passageway 5.

In the form shown, the valve has a single outlet extension 11 equipped with the usual hood 12 and which communicates into the chamber 4. Such a valve may be used with a single burner, and different rates of gas supply or volume of gas may be delivered to the burner by adjustment of the valve member. To this end, a plug valve member 13 is seated in the chamber and it has an axial bore 14 communicating with the end of the valve chamber and the outlet 11. A port 15 extends through the side of the valve. As shown in Fig. 2 the full line position of the port 15 substantially indicates the "off" position where the port is disaligned from the inlet passageway 3, and the passageway 3 is closed. Also, the passageway 6 is closed. If the valve be turned counter-clockwise to align the port 15 with the inlet passageway 3, a full supply of gas flows through the valve and at this time the passageway 6 is closed. If the valve member be turned further to the other dotted line position indicated, the inlet passageway 3 is closed to the valve chamber, but the gas may flow through the passageways 5 and 6, and a smaller and metered supply of gas is furnished. The arrangement thus far described presents no particular novelty; it shows a form of valve with which the arrangement of this invention can be used.

The valve member 13 has a stem 18, and it may conveniently be of the usual D-shape in cross section as shown. This stem extends out

through a cap 19 screw-threaded to the body and may be equipped with an operating handle 20.

The end of the valve body which receives the cap has a flange extending from the screw-threads and this flange is cut away to form a key slot 21, with an abutment 22 on one side thereof and an abutment 23 on the other side, and between the abutments opposite the key slot 21 the flange is cut away to form a large arc.

The member which is arranged to rotate with the plug valve may be in the form of a so-called D washer 24, which fits over the D stem so as to rotate therewith, and the washer has an extending finger 25. The fit between the stem and washer is preferably one which employs the usual tolerances for devices of this character so that no relative rotary movement takes place between the stem and washer other than that which is not avoidable, due to the permissible tolerances.

A double spring preferably takes the form of a single piece of alloy steel, and this is generally indicated at 26. This piece of metal is bent upon itself to form a bight portion 27 with spaced plates or arms 28 and 29 which extend from each other in a substantially parallel manner. The spacing between the plates or arms is such as to receive the D washer as shown in Fig. 5. The metal is so fashioned in shape that the bight portion forms an extension wthich is disposed in the key slot 21. Preferably the usual tolerances are employed so that the double spring member is nicely keyed to the valve body, although the structure will work satisfactorily even if the bight portion is press fitted into the key way and even though the D washer 24 be press fitted onto the stem. Such tolerances in this class of work are usually plus or minus ten thousandths of an inch. The double spring is fashioned with apertures 30 for fitting over the stem. Preferably, the aperture in the plate 28 has a nice fit for relative rotation, although here again the usual tolerances may be used, while the aperture in plate 29 is quite large for purposes which will presently appear. The double spring member is, in effect, cut away to accommodate the abutments 22 and 23 to thus form the extending bight, and the free ends of the portions 28 and 29 fit in the large arcuate cut-away portion opposite the key slot 21.

The D washer is sandwiched in between the arms 28 and 29 as shown in Fig. 5, and the end of the finger 25 preferably comes substantially flush with the peripheral curved edges of the members 28 and 29.

Each of the two spring members are fashioned with a depression so as to form cam abutments which normally come substantially in contact with each other as shown in Fig. 4. The depression in the member 28 is shown at 33, while in the member 29 is shown at 34, and they are preferably so formed as to provide a relatively abrupt inclined surface on one side and a relatively gradual inclined surface upon the other. These cam elements lie in the path of the arm 25.

The D washer is placed between the arms 28 and 29 and then this assembly is passed over the stem. A coil spring 36 is used for holding the valve member on its seat, and this coil spring passes through the aperture in the arm or plate 29 and reacts against the D washer. The plate 28 is next adjacent the cap 19 and is preferably provided with one or more turned up shoulders 37 for engaging the cap, and in this manner the large arcuate portion of the arm 28 is spaced from the cap. When the valve is turned "off" as shown in the full line position of Fig. 2, the finger 25 abuts against the shoulder 23. As the handle is turned counter-clockwise, as Figs. 2 and 3 are viewed, the finger comes into engagement with the steep inclined portions of the cams, and the movement is arrested. At this time the port 15 is in alignment with the inlet 3 and a full flow of gas passes through the valve. This arresting action is quite pronounced, but by applying additional torque the finger flexes the spring member and moves between the cam as shown in Fig. 6, and when the finger strikes the abutment 22 the port 15 aligns with the passageway 6 so that a small metered quantity of gas flows through the valve for a small gas flame. Upon return movement the finger passes quite easily between the cams due to the slow lift of the cam faces with which the finger meets as the valve is turned clockwise.

The spring member is flexed at the bight portion as the finger 25 moves between the cams. The plate 29 will be flexed downwardly. The plate 28 is also flexed because the large arcuate section thereof is spaced from the cap by the legs 37. There will be some flexing of the plate 28 in that portion thereof between the depression 33 and the lugs 37.

Thus the valve has two definite limits for its rotation, one of which is "off," and the other of which is "on," and it has an intermediate position determined by the cam shaped depressions, which is another "on" position. The simmer position and full "on" position may be reversed. In addition to the action of the steep cams exerting a stopping action to the rotation of the valve at the intermediate position, the portions 33 and 34 come together with an impact as the finger 25 passes between these portions. This creates an audible sound, as any spring action device will. This is particularly true when the stem and valve are rotated clockwise, since then the finger passes from between the portions 33 and 34 on the steep cam side. The fact that the spring 36 reacts against the D washer is incidental, this merely being a convenient backing for the spring. The D washer and the yieldable element 26 are capable of providing the above mentioned function in themselves and independently of any other spring. The aperture 30 in the plate 28 has preferably a quite snug fit with the stem, and this also aids in keying the yieldable element in position against rotation, since the element is held both at the bight 27 and more or less centrally by the stem.

In the modified form as illustrated in Fig. 7, the parts are the same in character as those previously described. The modification resides in a reversal of the projections 33 and 34. In this form the arms 28*a* and 29*a* are closer together than they are in the preceding form so that the projection 25*a* is normally under frictional engagement under the arms. The formations 33*a* and 34*a* are reversed to, in effect, form a pocket or recess. As the projection shifts and comes into a position at the recess the arms 28*a* and 29*a*, due to their tension, collapse towards each other and engage the projection 25*a* in the recess and this determines the intermediate position. Upon the application of additional turning torque the projection may be forced out of the pocket by a wedging or camming action, forcing the plates apart.

I claim:

1. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, an element having spaced arms fixed to one member, at least one of the arms being yieldable, a projection on the other member and lying between said arms for shifting between the arms upon relative rotary movement between the members and a formation on one of the arms lying along the path of the projection for determining one of said positions when the projection abuts the formation, said projection being movable past the formation upon application of turning torque sufficient to flex the yieldable arm.

2. In a valve for the passaage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a spring metal element bent upon itself to form a bight portion and spaced arms, said element being fixed to one member, a projection on the other member and lying between the arms for shifting therebetween upon relative movement of the members, and a formation on at least one of the arms lying along the path of the projection for determining one of said positions of the valve member when the projection abuts the formation, said projection being movable past the formation upon the application of turning torque sufficient to flex at least one of the arms.

3. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a yieldable element comprising a piece of spring metal bent upon itself to form a bight portion and two arms extending therefrom, a projection on the other member and positioned between the arms so that it shifts relative to the yieldable element upon relative rotary movement of the members, and a formation in at least one of the arms extending transversely of the space between the arms and presenting inclined surfaces lying in the path of the projection, one of said surfaces determining one of the positions of the valve member when the projection strikes the same, and the projection being shiftable past the formation by the flexing of the yieldable element upon the application of turning torque.

4. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a spring metal device fashioned with a return bend to form a bight with two arms extending therefrom in a substantially parallel manner, said device being fixed to the valve body, a projection fixed to the valve member and lying between the arms, means on the body member providing fixed stops for the projection for determining two of said positions, and a cam shaped formation on at least one of the arms located between the said stops and in the path of movement of the projection for determining another of said positions.

5. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a spring metal device fashioned with a return bend to form a bight with two arms extending therefrom in a substantially parallel manner, said device being fixed to the valve body, a projection fixed to the valve member and lying between the arms, means on the body member providing fixed stops for the projection for determining two of said positions, said arms each having a formation integral therewith which extend transversely of the space between the arms and which contact with each other and which present inclined surfaces in the path of the projection, the inclined surfaces on one side of the integral formations determining another of said "on" positions when the projection abuts thereagainst, at least one of said arms flexing for the movement of the projection between the formations upon the application of additional turning torque.

6. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a stem on the valve member, a cap secured to the body member and through which the stem extends, spring means for holding the valve member on its seat, a device having a return bend therein forming a bight portion and two spaced arms, said arms being apertured for the passage of the stem therethrough, said device being located within the cap, a key-way in the body member in which the bight portion is keyed, a washer secured to the stem and having a projection lying between the two arms, the body member having fixed stops for the projection to limit the rotary movements of the valve member and determine two of said positions, cam shaped projecting means on the said device lying in the path of the projection and between the fixed stops for determining another of said positions, said device flexing for the movement of the projection past the projecting means.

7. In a valve for the passage of fluid at different rates therethrough, a body member and a relatively rotatable valve member having ports arranged to be disaligned at a rotary position of the valve member and to be brought into registry at different rotary positions of the valve member for establishing respectively an "off" position and different "on" positions of the valve, a stem on the valve member, a cap secured to the body member and through which the stem extends, spring means for holding the valve member on its seat, a device having a return bend therein forming a bight portion and two spaced arms, said arms being apertured for the passage of the stem therethrough, said device being lo-

cated within the cap, a key-way in the body member in which the bight portion is keyed, a washer secured to the stem and having a projection lying between the two arms, the body member having fixed stops for the projection to limit the rotary movements of the valve member and determine two of said positions, opposed projections on the two arms extending transversely of the space therebetween and engaging each other and presenting cam surfaces in the path of the projection for determining another of the "on" positions, and means on the device for spacing the same from the cap to facilitate the flexing of both of said arms for the passage of the projection on the washer between the opposed projections.

ERVIN H. MUELLER.