Dec. 5, 1961 J. L. WILTZ 3,011,721

GAS VALVES

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Fig. 2.

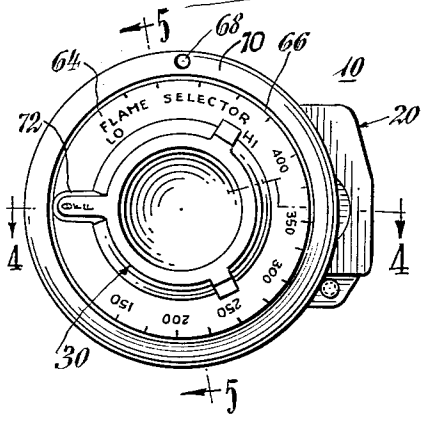


Fig. 1.

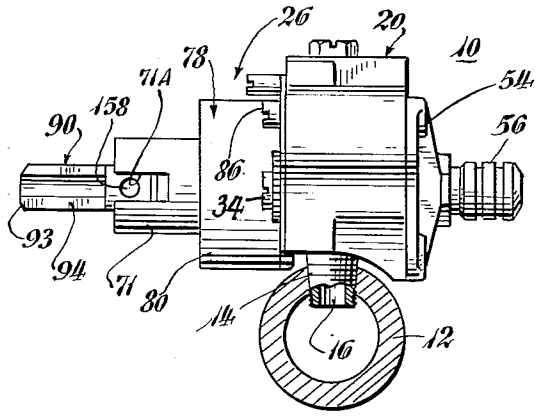
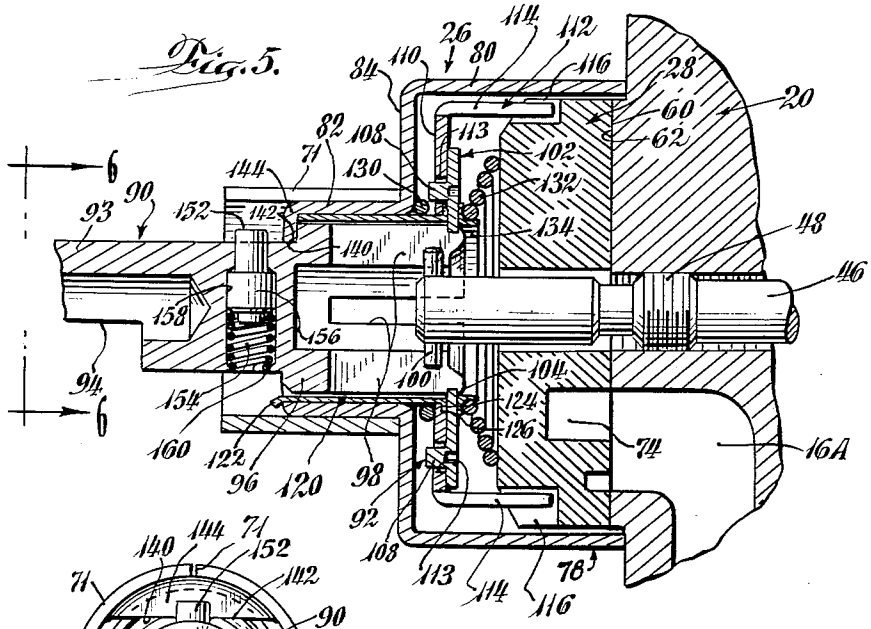


Fig. 5.



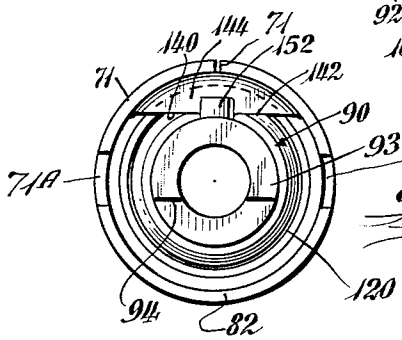


Fig. 6.

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GAS VALVES

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Fig. 4.

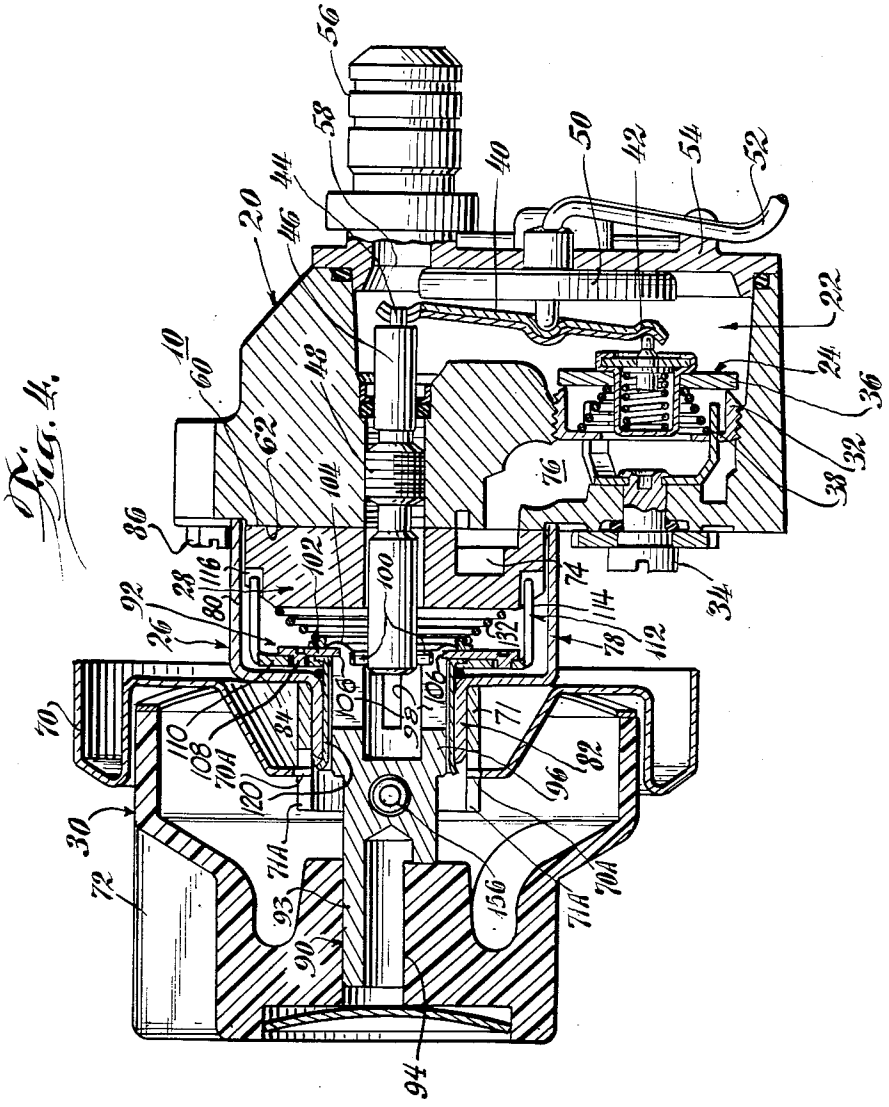
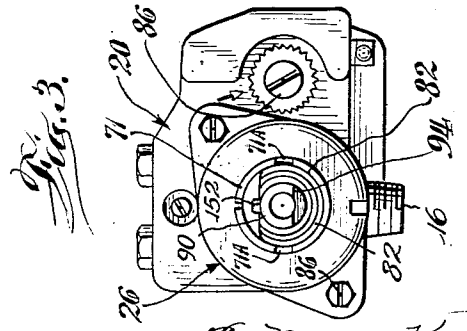


Fig. 3.



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GAS VALVES

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Fig. 7.

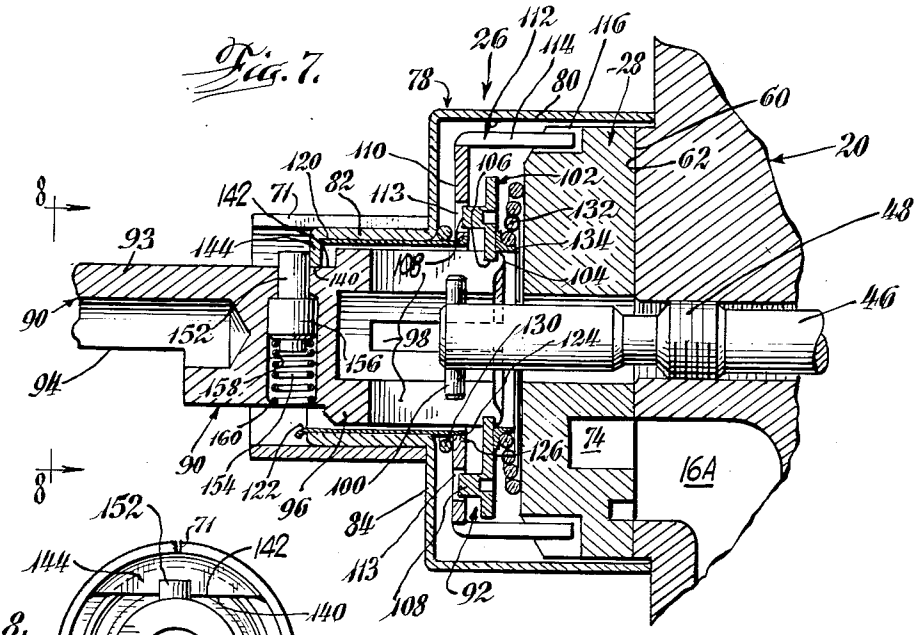


Fig. 8.

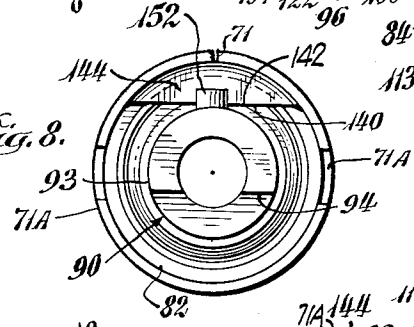


Fig. 9.

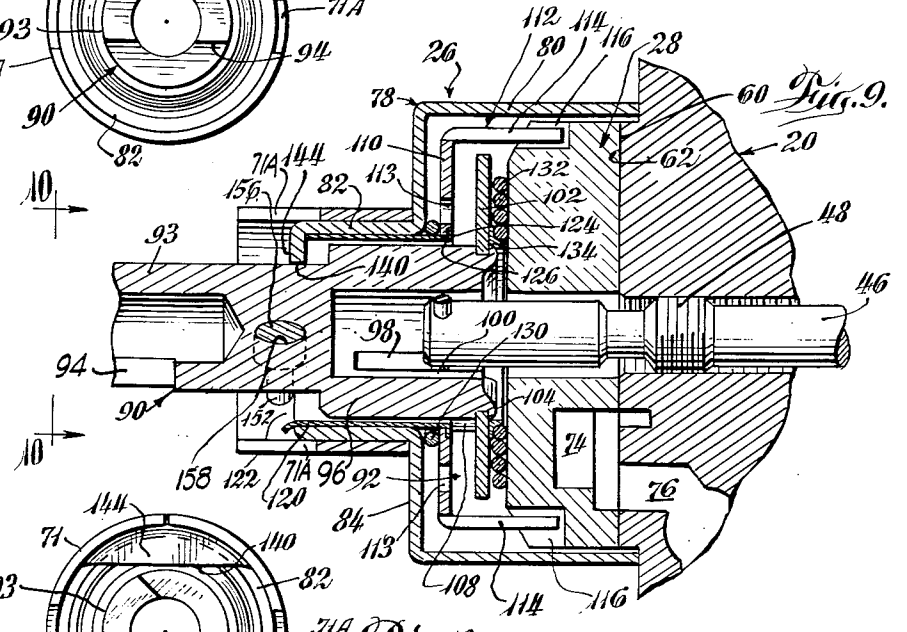
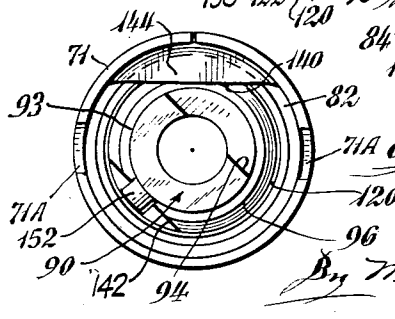


Fig. 10.



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GAS VALVES

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Fig. 12.

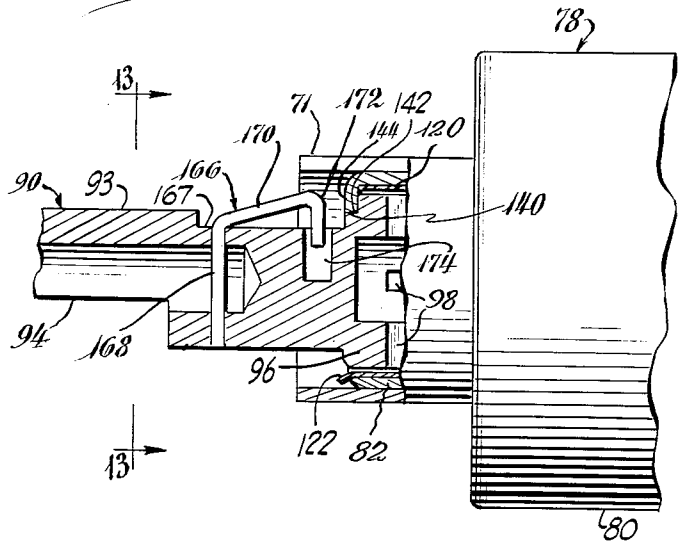


Fig. 11.

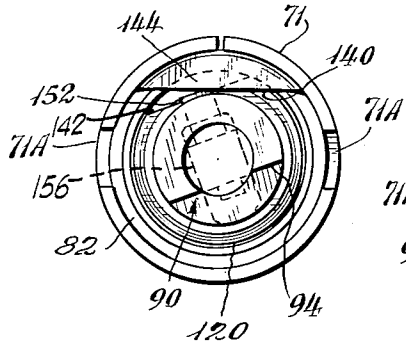
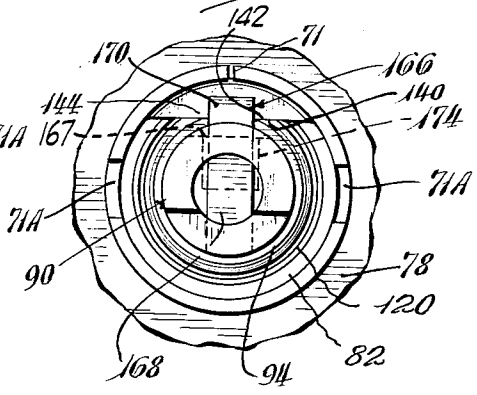


Fig. 13.



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United States Patent Office 3,011,721
Patented Dec. 5, 1961

3,011,721

GAS VALVES

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Filed July 21, 1959, Ser. No. 828,665
7 Claims. (Cl. 236—99)

The present invention relates to gas valves and has for its primary object the provision of a new and improved locking type of gas valve and is an improvement over the construction disclosed and claimed in the copending application of Richard O. Ives, filed contemporaneously herewith and assigned to the assignee of this application.

A further object of the present invention is to provide a new and improved thermostatic gas valve in which a single handle and valve stem are used both to control the open position of the valve and the temperature setting to be maintained by the valve.

A further object of the present invention is to provide a new and improved valve of the character set forth in the preceding paragraph in which the gas flow controlling valve element is connected to the handle and stem by disengageable clutch means and including new and improved abutment means for requiring the flow controlling element to be rotated a predetermined angular extent before the clutch means can be disengaged when the valve is being turned from the off position toward on but which can be rotated in the opposite direction (toward off) with the clutch means disengaged to within the angular extent and, preferably, all the way to the off position.

In brief, the valve of the present invention is of the locking type. It includes a rotatable gas flow controlling element mounted in a housing. The element is adapted to be rotated by valve stem means extending outside of the housing and which is both rotatable and axially movable relative to the housing. The stem means and element are connected by means enabling the element to be rotated by the stem means. The rotatable gas flow controlling element and stem means are connected by disengageable clutch means so that a thermostatic control element can be adjusted independently of the gas flow controlling element upon rotation of the stem means subsequent to disengagement of the clutch means. The valve is so constructed and arranged that the disengagement cannot be effected until after the stem means and flow controlling element have been rotated a predetermined angular extent from off toward on position, thereby insuring at least a minimum gas flow before independent adjustment of the temperature to be maintained. This means includes cooperating abutments on the valve stem means and the housing which are in abutting relation and prevent axial movement of the valve stem means to effect declutching until the abutments become angularly displaced. After declutching, the thermostatic valve is adjusted independently of the setting of the gas flow controlling element. It sometimes happens, though, that undesired frictional forces effect movement of the control element toward off position when the stem means is thus turned toward off. This may move the element enough so that the clutch means might not be reengageable because of the abutments. In accordance with the present invention, one of the abutments is made to be a movable one and so arranged that as the valve is moved toward off position it is moved so as not to prevent axial or angular movement of the stem means. Accordingly, reengagement of the clutch means can be effected anywhere in the range of movement of the gas flow controlling element. More specifically, the movable abutment may be a resilient or resiliently biased radially movable abutment on the valve stem means, which, on movement of the latter toward off, is depressed into the stem means by

the other abutment means, which may be a part of the valve housing.

Other objects and advantages of the present invention will become apparent from the ensuing description of an illustrative embodiment thereof, in the course of which reference is had to the accompanying drawings, in which:

FIG. 1 is a side elevational view of a valve constructed in accordance with the present invention, with the valve and thermostat actuating handle omitted, and with the valve in an intermediate open position;

FIG. 2 is an end elevational view of the front end of the valve with the valve handle and associated bezel illustrated;

FIG. 3 is a front elevational view of the valve as illustrated in FIG. 1, but with the valve in its off position;

FIG. 4 is an enlarged axial cross sectional view through the valve taken along the broken line 4—4 of FIG. 2 with the valve in an intermediate open position, and with the valve handle and stem means clutched to the gas flow controlling element;

FIG. 5 is a further enlarged fragmentary axial cross sectional view along the line 5—5 of FIG. 2 illustrating the operative position of various operating parts when the valve is locked in its off position;

FIG. 6 is a fragmentary transverse cross sectional view taken along line 6—6 of FIG. 5;

FIGS. 7 and 8 are views similar to FIGS. 5 and 6, but with the valve unlocked in its off position ready to be turned toward on;

FIGS. 9 and 10 are views similar to FIGS. 5 and 6 but along the line 4—4 of FIG. 2, with the valve unlocked, with the valve handle and stem means declutched from the gas flow controlling means in an intermediate position of the latter, and with a different temperature adjustment;

FIG. 11 is a view similar to FIG. 10 with the valve handle and stem means declutched but with the valve in a position toward off and showing one of the abutment means depressed and thus ineffective to prevent either angular or axial movement of the stem means;

FIG. 12 is a fragmentary axial cross sectional view of another embodiment of the invention; and

FIG. 13 is a transverse cross sectional view taken along the line 13—13 of FIG. 12.

Referring now to the drawings and first primarily to FIGS. 1 to 4, the valve of the present invention is indicated as a whole by reference character 10. It is adapted to be mounted upon and supplied with gas from a gas supply manifold 12, the mounting being effected by an externally threaded dependent nipple 14 within which is a gas inlet passageway 16. The valve includes, in the main, a valve body 20 within which is a chamber 22 (see FIG. 4) in which is mounted a thermostatically actuated regulating valve indicated as a whole by reference character 24 controlling the flow of gas from a manually operable valve 26 including a rotary gas flow controlling valve element shown to be a rotor valve disc 28. The disc is adapted to be adjusted by a handle 30 which is also utilized to select the temperature to be maintained. The valve and operating means may take various forms, that illustrated being of the type disclosed and claimed in the copending applications of Wiberg (case 2) Serial Number 817,519, filed June 2, 1959, and of Norman M. Huff, Serial Number 817,518, filed June 2, 1959, and both assigned to the assignee of this application. Accordingly, the valve will not be described in detail, but only sufficiently to provide a better understanding of the invention which, as indicated heretofore, is directed to improved valve locking means and improved means making it necessary to move the valve handle and gas flow controlling element a certain amount before the gas controlling element can be declutched, in which respect the

present application is directed to improvement in apparatus disclosed and claimed in the contemporaneously filed application of Richard O. Ives, Serial No. 828,600.

The thermostatic valve **24** includes a relatively stationary valve seat **32** adapted to be moved axially for calibration purposes, as by a rotatable calibrating screw **34**. The valve includes also a movable valve member **36** biased away from the valve seat by a spring **38** and the position of which is varied by thermostatic actuating means. The position is varied as by a bimetallic lever **40** having one end **42** associated with the valve **36** and its other end **44** operatively associated with the rotatable axially movable shaft **46** having an intermediate threaded portion **48** movable by the valve handle **30** to vary the temperature to be maintained by the valve. The position of the lever and, thus, of the valve member **36** is controlled by a thermostatically actuated power device **50** which may be of the diaphragm type and connected as by a capillary tube **52** to a suitable sensing unit (not shown) which may include a thermostatic capsule maintained in contact with the bottom of a cooking vessel placed on a burner to which the flow of gas is controlled by the valve **10**. For convenience, the thermostatic motor **50** may be mounted upon an end plate **54** closing the recess **22** and supporting also an outlet hood **56** communicating with a gas outlet passageway **58** and through which gas flows to the burner in conventional manner.

The flow of gas to the thermostatic valve is controlled by the manually operable rotatable rotor disc **28** which has a planar face **60** abutting against a planar face **62** formed on the valve body. The body and disc may be provided with suitable passageways interconnecting the passageway **16** and the recess **22** via the thermostatically operated regulating valve **24**. The passageways may be such that they enable the valve disc **28** to be moved between off and full on positions to provide a manually regulatable flow of gas to the burner as between a low flame setting **64** and a high flame setting **66** indicated on the valve handle (see FIG. 2) in cooperation with an indicating dot **68** on a bezel **70** associated with the valve handle and mounted upon a bezel mounting tube **71** secured to the valve and having slots **71A** for receiving tongues **70A** of the bezel. The off position of the valve is indicated by a radial boss **72** on the handle when it is under the dot. In FIGS. 1 and 4 the valve is shown at an intermediate position to provide an intermediate height flame. In this position, gas flows from the inlet passageway **16** to the portion **16A** thereof opening at the face **62** to rotor passage **74** and to a passageway **76** in the valve body leading to the thermostatic valve **24** and hence to the recess **22**. For additional details of a construction which may be used, see the above referred to Wiberg application.

The rotor valve disc **28** is mounted in a housing or casing **78** having a larger diameter interior portion **80** and a smaller diameter axially extending portion **82** which are interconnected by a front wall **84** spaced some distance forwardly of the rotor **28**. The casing is secured to the valve body by suitable means such as screw bolts **86**.

The valve handle **30** is connected to the rotor valve disc **28** by valve stem means **90** and clutch means **92** whereby the rotor disc may be turned by or declutched from the valve stem means. The valve stem means **90** includes an outer stem portion **93** of generally D-shaped configuration provided by a flat **94** and upon which the handle **30** is secured. It includes also a hollow inner somewhat enlarged portion **96** having slots **98** therein and connected to the valve regulating shaft **46** through a pin **100** at the end of the shaft, the pin and slot connection permitting relative axial movement between the shaft and stem means. The stem means is constructed as an assembly including also a drive washer **102** fixedly secured to the inner end of stem portion **96** as by peening **104** and having radially inwardly extending keys **106** extending into opposed slots **98**.

The clutch means **92** includes the diametrically opposed forwardly extending drive projections or fingers **108** on the drive washer and the central generally annular portion **110** of the drive yoke **112**. The portion **110** has apertures **113** adapted to receive projections **108** in the clutch engaged condition. The yoke has opposed rearwardly extending drive fingers **114** extending into oppositely disposed slots **116** in the rotor disc **28**.

The drive yoke is rotatably mounted within the housing **78** as upon a tubular bearing element **120** fixedly secured within the smaller diameter forward extension **82** of the housing. The element **120** has opposed outwardly extending front and rear flanges **122** and **124**, the former of which abuts against the major portion of the front end of housing part **82** and the latter of which abuts against a shoulder **126** provided by counter-boring at the region of the central opening in the drive washer **102**.

In order to prevent undesired rotation of the yoke and valve disc after disengagement of the clutch means, braking means in the form of a spring **130** is provided frictionally to restrain movement of the drive yoke, as described and claimed in the aforementioned Huff application, Serial Number 817,518. The spring **130** is disposed about the tubular bearing element **120** and between the annular part **110** of the drive disc and the vertical part **84** of the housing **78**. The braking spring is constructed to have a concavo-convex shape before assembly, thereby to provide an effective frictional force for restraint of movement of the yoke and valve disc when the latter are declutched from the stem means.

The valve disc **28** is held against the valve body and the stem assembly is held in its axially outermost position by a spring **132**, one end of which is seated against the outer surface of the valve disc and the other of which bears against the inside of the drive washer **102**, the contact between the spring and drive washer being through an annular spring guide and seat **134**.

In the off position of the valve illustrated in FIG. 5, the stem assembly and valve handle are drivingly connected to the valve disc **28** through the drive washer, the drive yoke and the engaged clutch means, the engagement being effected by disposition of the drive washer fingers **108** in the apertures **113** of the yoke **112**. To declutch or disengage the drive washer from the drive yoke, the valve handle and stem are moved axially inwardly against the force of the spring **132**, thereby to disengage the drive projections **108** on the drive washer from the yoke, as shown in FIG. 9. After such disgengagement, the valve and stem assembly can be turned independently of the rotor disc valve **28** so that rotation of the handle turns only shaft **46** to adjust the temperature setting of the valve.

The valve is provided with improved locking means so that the valve handle and disc cannot be turned until it has been pushed inwardly axially a predetermined distance. This locking means comprises a pair of abutting surfaces on the valve stem means and housing. The two surfaces are a flat **140** on the housing and a flat **142** on the stem. As indicated, see FIGS. 5 and 6, the flat **140** on the housing is provided by a radially inwardly extending integral portion **144** of the housing and of which the flat **140** is a chordal surface of the opening therein through which the stem **90** extends. The flat **142** on the stem is simply a milled flat effectively on the larger diameter portion **96** of the stem. Viewing particularly FIGS. 5 and 6, it will be noted that the surfaces **140** and **142** are in abutting relation so that the handle, the stem assembly and the valve disc cannot be turned.

To unlock the valve, the handle and stem assembly are pushed inwardly from the position of FIG. 5 to the position of FIG. 7. The axial length of the flat **142** on the stem is about the thickness of or slightly wider than the thickness of portion **144** of the housing so that when

the stem assembly is pushed inwardly to the position of FIG. 7 the stem assembly can be turned.

The valve is so arranged that the handle and stem assembly cannot be declutched from the rotor valve disc **28** until after former has been turned to a predetermined angular extent as of about 40 degrees, which is substantially less than the movement of disc **28** from off to on position. To accomplish this, cooperating abutment means are provided on the housing and stem assembly limiting axial movement of the stem assembly in the limited angular region so that declutching cannot be effected. Referring now particularly to FIGS. 7 and 8, the abutment means on the housing is constituted by the downwardly extending portion **144** of the housing and an abutment **152** mounted in the smaller diameter portion **93** of the stem. The abutment **152**, as shown in FIG. 7, is so located that it engages abutment **144** and prevents inward movement of the stem assembly sufficient to declutch the drive washer from the drive yoke. From FIG. 7 it will be noted that abutment **152** is in engagement with abutment **144** and the drive fingers **108** are in the apertures **113** in the drive yoke, thereby to drivingly couple the drive washer and the yoke.

The declutching is permitted after the stem assembly and valve disc have moved a predetermined amount. This is accomplished by making the portion **144** of the housing of chordal construction. Thus, referring now to FIGS. 9 and 10, after the valve handle and stem assembly have been rotated so the abutment **152** moves angularly away from abutment **144**, then the valve handle, stem assembly and drive washer **102** can be moved inwardly to declutch the drive washer from the drive yoke, as shown in FIG. 9. When declutched, the drive fingers **108** engage the rear surface of the drive washer and are no longer in effective driving engagement therewith.

It should be noted that the feature of preventing declutching of the handle and stem from the valve disc until the latter has been turned a predetermined extent can be utilized independently of the locking means. This can be accomplished by replacing the locking flat **142** with an annular step. When this change in construction is made, the valve handle and stem still have to be turned a predetermined extent before declutching can be effected.

In accordance with a further feature of the invention, the abutment **152** is rendered ineffective to prevent either axial or angular movement of the stem assembly upon return movement toward off position. To accomplish this the abutment is made effectively resilient. In the embodiment presently being described, this is done by mounting the abutment movably in the stem and biasing it outwardly by spring means **154**. The abutment includes an enlarged head **156** confined in an opening **158** in the stem and against which the spring bears. The spring is confined as by a lip **160** surrounding the opening **158**. Thus, as the valve stem is moved toward off, as from the position of FIGS. 9 and 10 to that of FIG. 11, and with the clutch disengaged, the abutment **152** is depressed against the force of spring **154** by the flat **140**. Accordingly, reengagement of the clutch can be effected anywhere in the range of movement of the valve disc, so it matters not that the latter might have been moved toward off into a location where the apertures **113** on drive yoke **112** are quite near the positions they occupy in the off position of the valve.

Another embodiment of the invention is shown in FIGS. 12 and 13. In it the abutment is a resilient depressible one indicated as a whole by reference character **166** mounted on a flattened (as by milling) region **167** on the stem. It includes a first leg portion **168** extending through stem portion **93** and fixedly secured to it as by a press fit. It includes an intermediate upwardly and rearwardly extending portion **170** from which depends an abutment **172** projecting into an opening **174** in the stem and of sufficient depth to receive the entire abutment so that the latter can be depressed into it by the flat **140** on portion **144** of the housing during movement toward off position and with the clutch **92** disengaged.

Reviewing briefly the operation of the valve, it will be assumed first that the valve is in its off position as illustrated in FIGS. 5 and 6. At this time, the locking flats **140** and **142** are in abutting relation to each other and drive washer **102** is fully coupled to the drive yoke **112** and abutment **152** is in its extended position, all as indicated in FIGS. 5 and 6.

In order to unlock the valve, the valve handle and stem assembly are pushed inwardly to the position illustrated in FIGS. 7 and 8. The inward movement is limited by abutments **144** and **152** so that declutching does not take place. However, the flats **140** and **142** are moved out of abutting relationship and flat **140** bears against the circular outer portion of the stem portion **93** so that the valve handle, stem assembly and valve disc can be rotated.

Once unlocked, the valve handle and parts connected thereto can be turned. After the abutment **152** has been turned to be angularly displaced from abutment **144**, the valve handle can be pushed inwardly to effect declutching by movement of the drive fingers **108** out of the apertures **113** in the drive yoke. Once declutching is effected, the thermostat can be adjusted as desired with the valve disc disposed anywhere in the range between the declutching point and the high or full on position of the valve disc. Thereafter, the temperature adjustment can be effected as desired.

To return the valve to off position, the valve handle is turned back toward off until the drive fingers **108** are moved into the apertures **113** by the action of the spring **132**. Thereafter all of the parts move in unison.

During adjustment of the thermostatic valve while the clutch is disengaged, it may happen that the valve disc **28** will be moved toward off so that the apertures **113** will be located so close to off position that the abutment **152** will be in the angular range of abutment **144** in order to engage the clutch. In order to permit movement of the abutment **152** and stem means into this range, the abutment is made depressible by the flat **140**, as shown in FIG. 11. Accordingly, reengagement of the clutch is possible under all circumstances. The operation is the same with abutment **166** as with abutment **152**.

While the present invention has been described in connection with the details of an illustrative embodiment, it should be understood that these details are not intended to be limitative of the invention, except insofar as set forth in the accompanying claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A locking type thermostatic gas valve, including in combination, a rotatable control element, a housing for said element, valve stem means extending into said housing and being rotatable and axially movable relative to said housing, means including normally engaged clutch means disengageable upon predetermined axial movement of said stem means and interconnecting the latter and the element whereby said element can be rotated, means for locking said stem means against rotation including a flat of short axial length on said stem means and a flat on said housing abutting against the first mentioned flat, said flats being movable out of abutting relation upon axial movement of the stem means after which the latter can be rotated, and means including an effectively radially resilient abutment on said stem means and cooperating abutment structure on said housing engageable by said resilient abutment and requiring rotation of said stem means through a predetermined angular distance before said stem means can be moved axially a sufficient distance to disengage said clutch means.

2. A gas valve, including in combination, a rotatable control element, a housing for said element, valve stem means extending into said housing and being rotatable and

axially movable relative to said housing, means including normally engaged clutch means disengageable upon predetermined axial movement of said stem means and interconnecting the latter and the element whereby said element can be rotated, and means including an effectively radially resilient abutment on said stem means and cooperating abutment structure on said housing engageable by said resilient abutment and requiring rotation of said stem means through a predetermined angular distance before said stem means can be moved axially a sufficient distance to disengage said clutch means.

3. A locking type gas valve, including in combination, a rotatable control element, a housing for said element, valve stem means extending into said housing and being rotatable and axially movable relative to said housing, means including normally engaged clutch means disengageable upon predetermined axial movement of said stem means and interconnecting the latter and the element whereby said element can be rotated, means for locking said stem means against rotation including a flat of short axial length on said stem means and a flat on said housing abutting against the first mentioned flat, said flats being movable out of abutting relation upon axial movement of the stem means after which the latter can be rotated, and means including an effectively radially resilient abutment on said stem means and cooperating abutment structure on said housing including structure on said housing defining said flat on said housing and engageable by said resilient abutment and requiring rotation of said stem means through a predetermined angular distance before said stem means can be moved axially a sufficient distance to disengage said clutch means.

4. A locking type thermostatic gas valve, including in combination, a rotatable control element, a housing for said element, valve stem means extending into said housing and being rotatable and axially movable relative to said housing means including normally engaged clutch means disengageable upon predetermined axial movement of said stem means and interconnecting the latter and the element whereby said element can be rotated, means for locking said stem means against rotation including a flat of short axial length on said stem means and a flat on said housing abutting against the first mentioned flat, said flats being movable out of abutting relation upon axial movement of the stem means after which the latter can be rotated, and means including an effectively radially depressible abutment on said stem means and abutment structure on said housing cooperating therewith and engageable by said depressible abutment and requiring rotation of said stem means through a predetermined angular distance before said stem means can be moved axially a sufficient distance to disengage said clutch means.

5. A gas valve, including in combination, a rotatable control element, a housing for said element, valve stem means extending into said housing and being rotatable and axially movable relative to said housing, means including normally engaged clutch means disengageable upon predetermined axial movement of said stem means and interconnecting the latter and the element whereby said element can be rotated, and means including an effectively radially depressible abutment on said stem means and abutment structure on said housing cooperating therewith and engageable by said depressible abutment and requiring rotation of said stem means through a predetermined angular distance before said stem means can be moved axially a sufficient distance to disengage said clutch means.

6. A gas valve, including in combination, a rotatable gas flow controlling element movable between off and on positions, an adjustable thermostatic valve, manually operable means for rotating said element and adjusting said thermostatic valve, disengageable clutch means operatively connecting said manually operable means to said element, said manually operable means being rotatable to move said element and adjust said thermostatic valve, and being axially a sufficient distance movable to disengage said clutch means, and means including cooperating abutment structures on said valve and manually operable means requiring rotation of said means through a predetermined angular range when moving from off toward on position before said means can be moved axially to disengage said clutch means and permitting movement of said means toward off position in said range in axial position to disengage said clutch means, the abutment structure on said manually operable means being a resilient radially movable structure engageable with the abutment structure on the valve to prevent clutch disengaging axial movement of the manually operable means in said range and being depressible by the abutment structure on the valve in clutch disengaged condition in said range.

7. A locking type gas valve, including in combination, a rotatable gas flow controlling element movable between off and on positions, an adjustable thermostatic valve, manually operable means for rotating said element and adjusting said thermostatic valve, disengageable clutch means operatively connecting said manually operable means to said element, said manually operable means being rotatable to move said element and adjust said thermostatic valve, and being axially a sufficient distance movable to disengage said clutch means, and means including cooperating abutment structures on said valve and manually operable means requiring rotation of said means through a predetermined angular range when moving from off toward on position before said means can be moved axially to disengage said clutch means and permitting movement of said means toward off position in said range in axial position to disengage said clutch means, the abutment structure on said manually operable means being a spring biased radially movable element engageable with the abutment structure on the valve to prevent clutch disengaging axial movement of the manually operable means in said range and being depressible by the abutment structure on the valve in clutch disengaged condition in said range.

References Cited in the file of this patent

UNITED STATES PATENTS

2,765,809	Lamar	Oct. 9, 1956
2,826,368	Winslow	Mar. 11, 1958