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J. BECVAR

2,489,611

FUEL CONTROL MECHANISM

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3 Sheets-Sheet 1

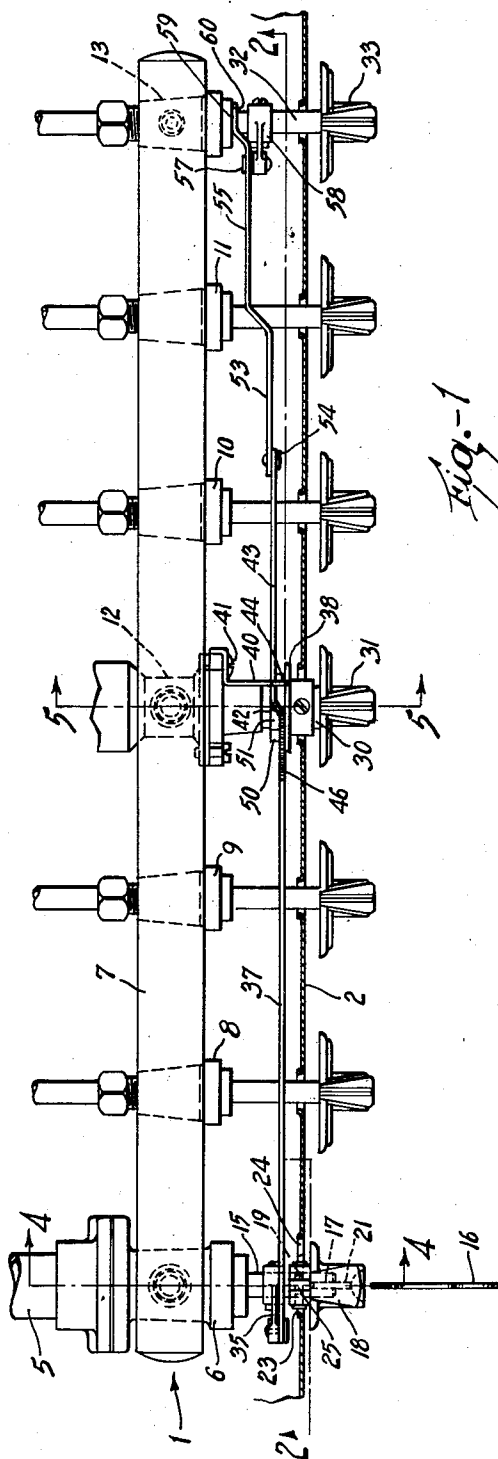


Fig. 1

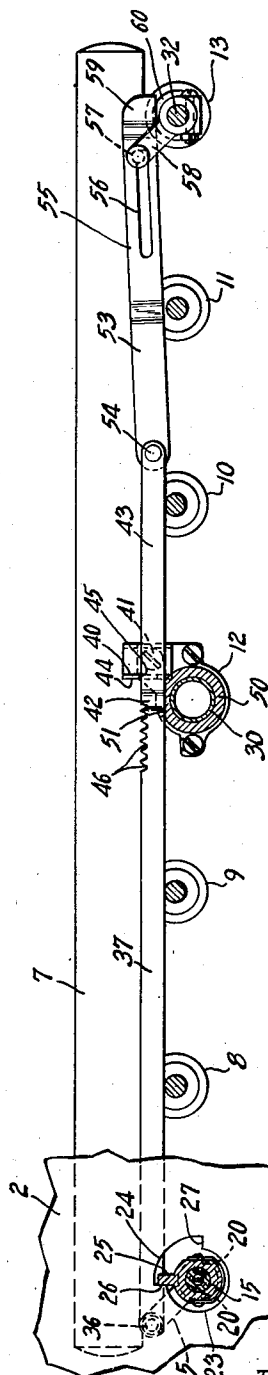


Fig. 2

INVENTOR.
JOSEPH BECVAR

BY *John H. Leonard*
ATTORNEY

Nov. 29, 1949

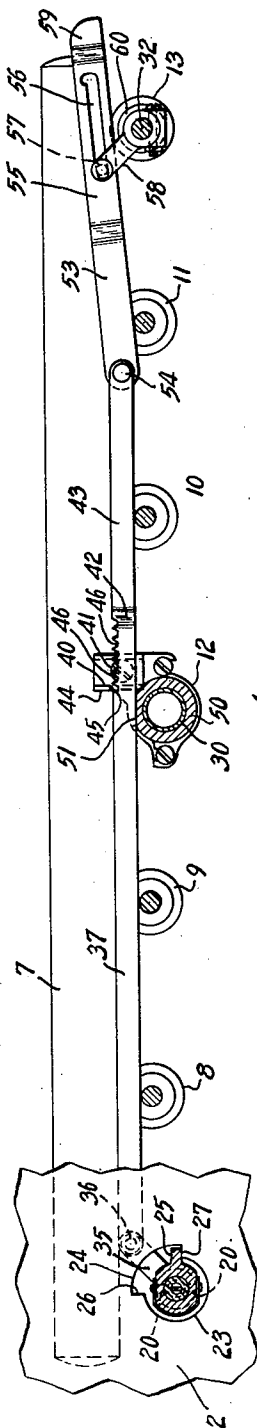
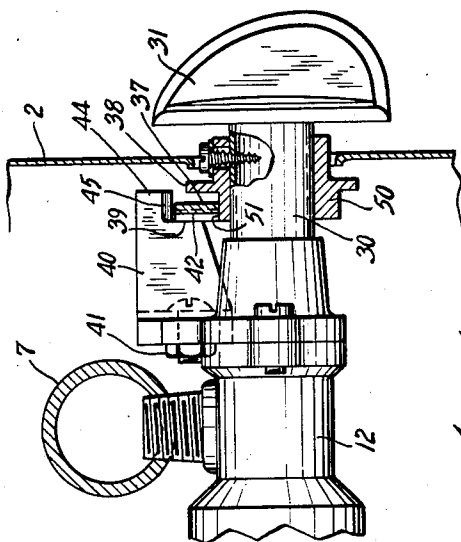
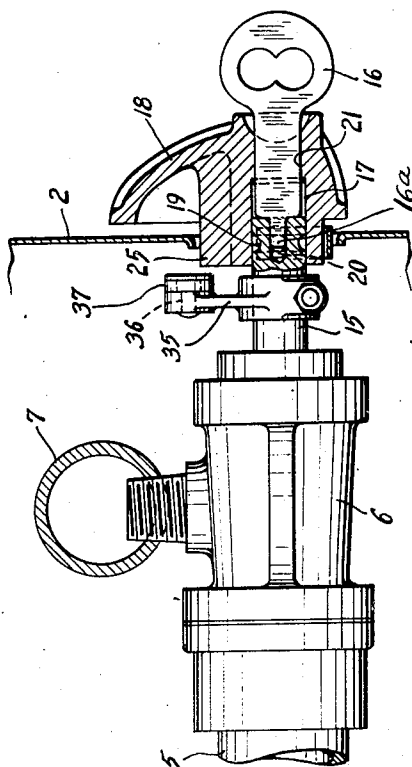
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INVENTOR.
JOSEPH BECVAR

BY *John H. Leonard*
Esq. ATTORNEY

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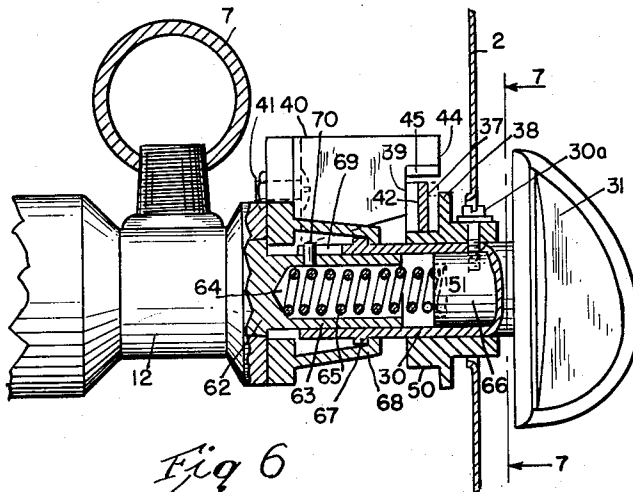
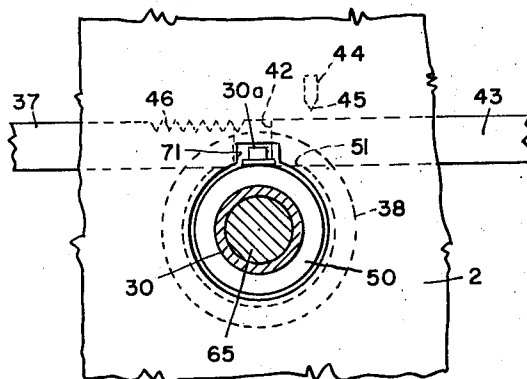
J. BECVAR

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3 Sheets-Sheet 3



INVENTOR.
JOSEPH BECVAR

BY

John A. Leonard
ATTORNEY

UNITED STATES PATENT OFFICE

2,489,611

FUEL CONTROL MECHANISM

Joseph Becvar, Wickliffe, Ohio, assignor to Grand Industries, Inc., Cleveland, Ohio, a corporation of Ohio

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8 Claims. (Cl. 126—42)

1

This invention relates to a safety control for burners of cooking ranges and analogous combustion equipment using service burners. The invention is in the nature of a protective device and system enabling, for instance, a householder or other person who ordinarily uses a certain cooking range to leave the same unguarded but with a feeling of assurance that either there will be no tampering with the burner control instruments or that, if any tampering occurs, such will not be apt to create a dangerous condition upon subsequent authorized re-use of the range.

The invention utilizes and recombines to advantage two previously known devices for use in attempting to safeguard gas burning equipment against dangers resulting from the tendency on part of children to experiment with unguarded apparatus of that type. One device is a removable key for a gas stop cock by which, for example, all the burners of the stove can be blocked from communication with a main gas supply pipe or duct. The other known device is one frequently used on oven and broiler burners of cooking ranges and comprises valve operating handles or knobs which, in order to enable the same to be turned to "on" or gas supplying position, must be moved axially of the valve control stem. Said latter device is more of a psychological deterrent against meddling than a positive safety device. Such oven and broiler gas control cocks are already known in which a rotary, plug-positioning part of the operating stem of the plug has a lug or pin projecting laterally from it and normally seated in a recess on a non-rotary part of the cock as by a spring bearing axially on said stem part, whereby when the stem is moved against the bias of the spring the lug or pin clears the recess to enable the stem to turn the plug. Examples of such gas cock constructions are shown by United States Patents 1,917,981, 1,917,982, and 1,917,983 to J. Kindl.

The present system and apparatus employs the removable key for controlling a master gas cock, which key, through the agency of cooperating safety control apparatus, either prevents the turning on of other valves or renders such turning on of other valves inconsequential from the standpoint of creating potential hazards.

The present arrangement so operates that when the removable key of the master stop cock or the operating handle of the master stop cock has been turned to cut off the supply of gas to all the burners of the stove or range, the control knobs or handles of the broiler and/or oven cannot possibly be turned to "on" or gas-supplying positions.

2

Furthermore, before the removable key has been turned to safety or main gas inlet supply blocking position, if the operator or user of the stove has not thought to turn off the oven or the broiler, then the removable key cannot be turned to safety position except when the oven and broiler burner control valves either are being or have been turned off.

The above discussion indicates the principal objects of the present invention. More specific objects will become apparent from the following specification relating to the accompanying drawing showing more or less schematically a conventional burner and control valve arrangement for a cooking range and, in detail, embodiments of the present invention.

In the drawing, Fig. 1 is a plan view showing an illustrative forward portion of a cooking range of conventional type incorporating the gas control mechanism or apparatus hereof in one form;

Fig. 2 is a front elevation showing the improved safety mechanism hereof in "safety" or gas-shut-off position;

Fig. 3 is a view similar to Fig. 2 showing the main gas shut off mechanism in condition to enable operation of any or all of the burners of the range or stove;

Fig. 4 is a sectional detail view taken along the axis of the main shut off valve as indicated at 4—4 on Fig. 1;

Fig. 5 is a similar detail sectional view of an oven control valve taken along the line 5—5 on Fig. 1.

Fig. 6 is an enlarged view of the valve and operating mechanism illustrated in Fig. 5, part thereof being shown in section for clearness and illustration; and

Fig. 7 is an enlarged fragmentary sectional view taken on line 7—7 of Fig. 6.

In Fig. 1 the front part of a conventional cooking range is shown at 1 and a fixed forward panel or apron 2 may be considered as comprising part of the burner control assembly of the stove, being in at least partially concealing relation to the valve mechanism as usual in modern cooking range construction. The main supply pipe for gas to serve the various burners is shown at 5 and the master control cock or valve 6 of any suitable construction is arranged in blocking relation to a manifold supply pipe 7 so that when the valve 6 is operated in one position, as shown in both Figs 1 and 2, no gas can flow from the main 5 to the manifold 7. When the valve 6 is open then the opening of the top service burner controls 8, 9, 10 and 11 will serve to supply the respectively

associated burners (not shown), and the oven and broiler control valves 12 and 13, respectively, can be turned to open position to enable normal operation of the oven and broiler.

Assuming that the valve 6 is constructed like an ordinary stop cock, the stem of which is shown at 15, a removable key such as shown at 16, Fig. 1, is arranged to be inserted as into an axial slot, i. e. non-circular opening, 17 on the stem in order to establish an operating connection between said stem and a valve handle or knob 18 swivelled onto the stem 15. The swivel connection, as shown, is a peripheral groove 19 on the stem into which a pair of pins 20 yieldingly supported on the knob extend. The knob 18 is operatively connected to the stem when a shank portion of the key 16 is inserted through a complementary central axial slot 21, i. e. non-circular opening, of the knob 18 into the end slot 17 of the stem 15. Thereupon the valve 6 can be turned on and off simply by manipulating the knob in the usual manner of operating gas cocks. The key may have a reduced end portion 16a entering a circular pilot bore in the outer end of the valve stem 15.

For limiting the free turning movement of the knob 18 while the key is removed (for example within a 90° angle) the apron or panel 2 has an opening 23 for receiving the shank of the knob which opening is radially enlarged at one side as at 24. An abutment projection 25 on the shank of the knob 18 engages circumferentially spaced abutment shoulders 26 and 27 of the opening portion 24, thus limiting the swivelling movement of the knob on the valve stem as stated above and ensuring that, when the key is in operating position, the position of the knob will always indicate the condition (e. g. closed or open) of the master stop cock.

The top burner valves are preferably unaffected by the present control system except in that they cannot be supplied with gas when the master stop cock is in "safety" or "off" position. The oven and broiler burner control valves are, however, mechanically interlocked with the control knob and key assembly 16-18 described above, preferably by the following arrangement:

As best illustrated in Figs. 6 and 7 the oven control valve 12 has an operating stem 30 on which is fixedly secured an operating knob 31 so that the stem 30 and knob 31 rotate together and the knob is in fixed position axially on the stem 30. In the form illustrated this connection is made by means of the screw 30a.

As will be more fully described hereinafter, when the valve 12 is in the "off" position, the stem 30 normally occupies a position axially of the valve 12 such that the screw 30a lies within a notch in the apron 2 and prevents rotation of the stem 30. The stem 30, however, is movable axially of and toward the body of the valve 12, against the source of a spring, a sufficient distance to move the screw 30a inwardly of the apron 2 out of the apron slot therein, in which latter position the stem 30 is not restrained from rotation by the apron.

As shown particularly in Figs. 1 and 2, the stem 15 of the master control cock has fixedly secured thereon an arm 35 preferably behind the apron 2, and the arm pivotally supports as on a pin 36 a generally horizontally extending link 37 in the form of a bar of rectangular section, having portions passing above the operating stems 30 and 32 of the oven and broiler control valves 12 and 13 respectively. The parts of the link may be considered as rigid or non-flexible vertically.

The link 37 adjacent the oven valve 12 is guided between a flange 38 fixed to the shank 30 of the knob 31 and a shoulder 39 on a bracket member 40 rigid with the non-rotating body of the valve 12 and secured thereto as by a bolt and nut assembly 41. Near the working axis of the valve 12 the bar stock of the link 37 is offset rearwardly as at 42 so that, in the relative position of the parts shown in Fig. 1, the portion 43 of the link 37 which extends to the right from the valve 12 lies in such relation to the shoulder 39 as to prevent movement of the knob stem and flange assembly 30, 31, 38 axially toward the valve 12. This is due to the fact that the space between the flange 38 and shoulder 39, measured forwardly and rearwardly of the range, is made only slightly greater than the distance between the forward face of the link 37 and the rearward face of the offset portion 43 and, when the valve 6 is in "off" position, the offset 42 is substantially at the axis of the stem 30 so that concurrently the forward face of the link 37 bears against or lies close to the rear face of the flange 38 and the rear face of the portion 43 bears against or lies close to the forward face of the shoulder 39.

When the link is shifted to the right into the position shown in Fig. 3, the offset portion 42 and the link portion 43 are moved to the right of the shoulder 39 so that only the link 37 remains between the shoulder 39 and the flange 38. In this position the stem 30 may be moved axially inwardly toward the body of the valve 12 as the space between the shoulder 39 and flange 38 is ample to accommodate the single thickness of the link 37 when the stem 30 has been moved inwardly a sufficient distance to position the screw 30 inwardly from the plane of the apron 2 and thus clear of the slot in the latter. This inward axial movement of the stem 30 could not be very great and accordingly the natural flexure of the link 37 flatwise permits rearward or inward movement of the portion of the link 37 engaged by the flange 38.

In the "off" position of the valve 6 as illustrated in Figs. 1 and 2 the link portion 43 closely underlies the lower end 45 of an overhanging abutment shoulder 44 on the bracket 40, as best shown in Figs. 2 and 5, so that the link portion cannot be raised from the position there illustrated. The stem 30 has a hub portion which is rigid therewith and preferably is in the form of a collar or cylindrical sleeve 50 with which the flange 38 may be integral. The top side of the sleeve, in the position illustrated in Figs. 1 and 2, is in the form of a flat surface 51 which closely underlies the adjacent lower edges of the link 37, the offset 42, and the portion 43. The relation of the portion 43 to the end 45 and surface 51 prevents rotation of the stem out of "off" position whenever the master stop cock is in the "off" position.

The pointed end 45 of the abutment 44 is arranged lockingly and selectively to coact with a series of upwardly facing notches 46 on the link 37 when the handle of the master stop cock 6 is turned to various "on" or gas supply positions, one of which is shown by Fig. 3. It should be noted that the notches 46 are of sufficient depth so that the link 37 may be raised clear of the surface 51 a sufficient distance to enable a lower edge of the link 37 to ride on the cylindrical surface of the collar or sleeve 50 when any one of the notches 46 is aligned with and can receive the abutment 44. In the various "on" positions of the master control knob 18 the link 37 is moved

5

to the right, and, if the oven burner valve is then opened, the link 37 is cammed upwardly by the rising end of the flat surface 51 so that one of the notches 46 will be caused to move into embracing and link-locking relation to the pointed end 45 of the abutment 44. Thereby the oven burner must be turned off before the master stop cock can be turned off. Also, if both the oven control valve and master stop cock are "off," the oven control valve is locked from rotation by the engagement of the portion 43 of the link with the flat surface 51 and end 45 as well as by the screw 30a.

Referring further to Figs. 1 and 2, the link 37 beyond the extension 43 to the right thereof carries a pivoted link member 53 which, for convenience and to enable raising of its unattached end may be connected to the extension 43 by a pivot pin or rivet 54. A rearwardly offset portion 55 of the pivoted link member 53 has a longitudinal slot 56, the terminal portion of which, toward the right in the position shown by Fig. 2, is occupied by a pin 57 carried on an arm 58 rigid with the operating stem 32 of the broiler burner control valve 13 to which the knob 33 is fixedly secured. To the right of the pin 57 the end of the pivoted link member 55 has an offset portion 59 which, in the relative position of parts shown by Figs. 1 and 2, lies in rearward abutment with a portion of the valve 13, for example a surface 60 at the end of the plug proper of said valve 13. In the position of parts shown by Fig. 3 (master control valve turned on) said rearwardly offset portion 59, by virtue of movement of the link assembly to the right, clears the surface 60 for enabling the knob 33 to be moved axially with its stem 32 as a condition precedent to turning the plug of the valve 13 to "on" or broiler burner gas supplying position. When the stem 32 is slid rearwardly the arm 58 bodily moves the link member 55 rearwardly. In turning off the broiler burner by counterclockwise rotation of the knob 33, still assuming the master cock is open and the link 37 shifted to the right, the pin 57 of the arm 58 moves idly along the slot 56.

To summarize the operation it will be seen that when the master stop cock 6 is open all the service burner valves can be opened freely and so can the oven and broiler control valves. Before the master control valve can be turned to closed position, preparatory to removing the key 16, it is necessary to close the oven control valve 12 unless the latter has already been closed. Under the conditions just mentioned, the oven control handle 31 must be turned counterclockwise to closed position because in all open positions of the oven control valve 12, the pointed end 45 of the abutment 44 is seated in one of the notches 46 of the bar 37, the parts being held in that relationship by the camming effect of the rising end of the flat surface portion 51 of the sleeve 50, which surface is disposed horizontally only in the closed position of the oven control valve. If the broiler control valve 13 has not already been closed at the time the master stop cock is closed preparatory to removing the key 16, then the counterclockwise rotation of the arm 35 associated with the master stop cock 6 will, during closing movement of said stop cock, close the broiler control valve. When the master stop cock is turned off, operation of the oven control knob 31 and broiler control knob 33 to "on" position is prevented by the abutment of portions of the link or bar 37 (including portion 59 of link member 53) with the associated valve structures as fully described

6

above. Thus the only burners that can be turned on are the top or fully exposed service burners which would not emit any gas until the main stop cock is later opened. When the latter is open then whichever of the main service burners has been turned on will be ignited by the constantly burning pilot flame. As will be apparent it is impossible to create a potentially dangerous condition in the broiler or oven so long as the master stop cock is in the closed or "safety" position. Referring next to Figs. 6 and 7, the manner in which the stem 30 is mounted for axial movement and may be interlocked with the apron 2 to prevent rotation, is illustrated.

The stop cock or valve 12 has the usual rotatable plug 62 with an integral stem 63 which slidably fits into the hollow stem 30. The stem 63 has an axial bore 64 accommodating a compression spring 65 which is partially compressed between the base of the bore 64 and the inner end of the extension 66 of the knob 31. The extension 66 is securely anchored in the stem 30 against rotation and axial movement relative thereto by the screw 30a. The spring urges the stem axially away from the valve body, the outward limit being fixed by a shoulder 67 on the stem 30 which engages a complementary shoulder on the cap 68 of the valve body. The inner end of the stem 30 terminates short of the plug 62 and is provided with a longitudinal slot 69 which accommodates a pin 70 rigid with the plug stem 63. In the outermost position of the stem 30, as limited by the shoulder 67, the screw 30a lies in the plane of the apron 2. As best illustrated in Fig. 7, the apron 2 is provided with a notch 71 which is aligned, forwardly and rearwardly of the range, with and accommodates the screw 30a when the valve 12 is in "off" position. The broiler burner control valve 13 is the same as the valve 12 and is correctly arranged so that its stem 32 is movable axially.

I claim:

1. In a gas stove having two burners, each having an individual gas valve control element which has to be shifted axially before it can be turned to valve opening position, a master gas control valve for the burners, means including linkage connected to an operating part of the master valve for operation of the linkage, said linkage extending adjacent the individual gas controls and providing abutment means preventing said axial shifting of said control elements but only when the master valve is closed.

2. In a gas stove having a plurality of burners, each with an individual control valve, one of said valves having a turnable control element with means preventing it from being turned into gas supplying position except upon axial shifting of said element, a turnable master control valve having a link operatively connected thereto and in blocking abutment relationship to said control element for preventing axial shifting thereof when the master control valve is closed, said link being moved out of said blocking relationship when the master control valve is open.

3. Mechanism according to claim 2 wherein the link is arranged to be shifted transversely of its axis by said turnable element of an individual control valve when the latter is turned to open the associated valve and the master control valve is open, and locking means for the link rendered effective by such transverse shifting of the link whereby the master control valve may be prevented from being turned to gas blocking position when said individual control valve is open.

7

4. Mechanism according to claim 2 wherein the link has a pin and slot connection with a rotary part of the individual control valve so arranged that the latter can be moved freely to on and off positions when the master control valve is supplying gas but operating, when said master control valve is being moved to gas blocking position, to close the individual control valve.

5. In a gas stove having a burner, a control valve for the burner, said control valve having a turnable control element, a turnable master control valve, a link connected to an operative part thereof, and movable endwise thereby and arranged to be shifted in the plane of endwise movement in a direction transversely of its length, means operated by rotation of the turnable control element to effect said transversing shifting of the link, means operative to lock the link against said transverse shifting by the last mentioned means of the turnable control element when the link is moved endwise by the master control valve to a position wherein the master control valve is closed, and said means on the turnable control element being operatively engaged by the link when the link is locked to prevent rotation of the turnable control element.

6. The mechanism according to claim 5 further characterized in that means are provided which are operative when the link is shifted transversely by operation of the turnable control element to lock the link against endwise movement so as to prevent closing of the master control valve.

7. In a gas stove having a burner, a control valve for the burner, said valve having a turnable control element, a master control valve, a link operatively connected to the master control valve and movable endwise thereby when the master control valve is turned to open and closed position, and arranged to be shifted in the plane of endwise movement in a direction transversely of its length by rotation of the turnable control element to an open position when the master valve is open and locking means rendered operative by the link when the link is shifted transversely by the turnable control element to lock the link against endwise movement whereby closing of the master control valve is prevented when the burner control valve is open.

8. In a cooking range having a plurality of 50

8

burners, control valves individually controlling the burners, each valve having a turnable control element, the turnable element of one valve being axially shiftable and having means preventing it from being turned to gas supplying position except upon axial shifting of the element, a turnable master control valve, linkage mechanism connected to and movable by the master control valve upon turning the master control valve to open and closed positions, said mechanism extending adjacent both of the burner control valves and having means operating on the axially shiftable element, when the master valve and the axially shiftable element are in closed position to prevent axial shifting of the element, and said mechanism also having means operating on the other element, when the master valve and other element are in closed position, to prevent rotation of said other element.

JOSEPH BECVAR.

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