Aug. 25, 1953 L. H. McCAMMANT 2,650,274

MERCURY SWITCH MOUNTING

Filed July 18, 1951

Fig. 1

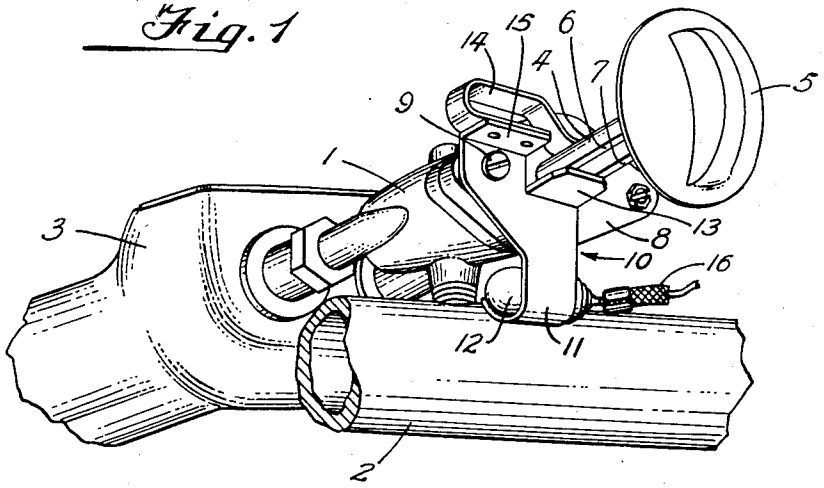



Fig. 2

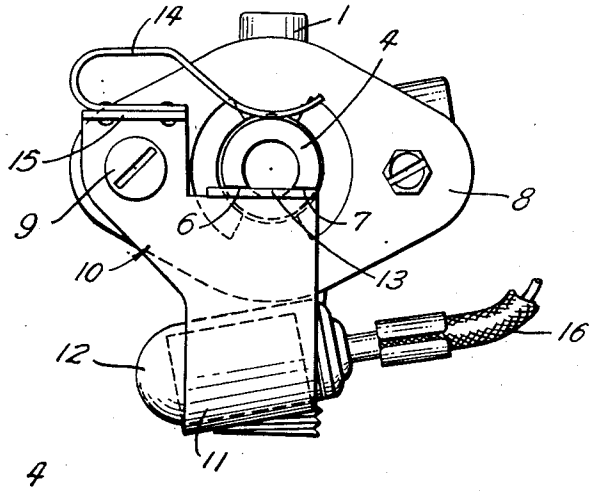
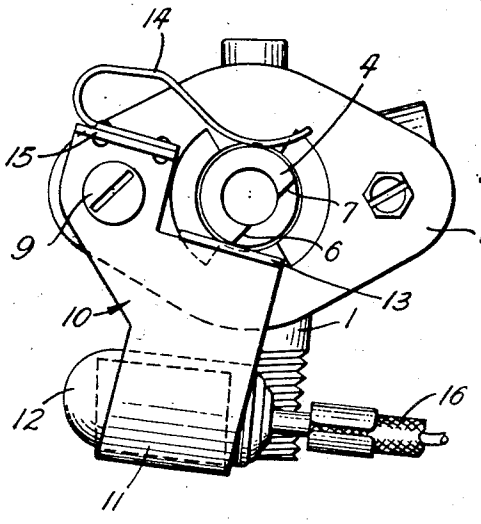



Fig. 3




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## MERCURY SWITCH MOUNTING

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4 Claims. (Cl. 200—61.47)

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This invention relates to a mounting for an electrical switch, and in particular to a mounting for a mercury switch associated with the main shut-off valve for a top burner on a gas stove.

An object of this invention is to provide a novel mounting for a mercury switch operative to tilt the same to close the electric circuit therethrough in response to angular movement of a rotary shaft.

Another object of this invention is to associate a mercury switch with a fuel valve in a novel manner so that the mercury switch is tilted to close an electrical circuit in response to opening of the fuel valve and the mercury switch remains in the closed condition in all open positions of the fuel valve.

Another object of this invention is to tilt a mercury switch to provide a closed electrically conductive path therethrough in response to opening of a fuel valve and to maintain the switch in the same tilted position at all open positions of the fuel valve.

A further object of this invention is to provide a mercury switch in association with a fuel valve actuated by a rotary stem, wherein the mercury switch is maintained closed in all open positions of the fuel valve even when the rotary valve stem rotates more than 180 degrees in moving the valve from its closed position to its full open position.

A still further object of this invention is to limit the angular tilting of a mercury switch in response to the opening of a valve so as to minimize the displacement of the external electrical conductors connected to the switch electrodes.

Other and further objects and advantages of the invention will be apparent from the following description of a preferred form thereof.

In the drawings:

Figure 1 is a perspective view illustrating the switch mounting associated with the manually-operated main shut-off valve controlling the supply of gas to a top burner on a gas stove.

Fig. 2 is an end view of the switch mounting and the valve stem in the closed position of the valve; and

Fig. 3 is an end view of the switch mounting and the valve stem when the valve stem is rotated to open the valve.

For purposes of illustrating the principles of the present invention, the following description is directed toward its use in connection with a manually-operated main shut-off valve controlling the supply of gas to a top burner on a gas stove. However, other applications will suggest

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themselves to those skilled in the art, and it is not intended that the following description be construed as limiting the invention to the particular described use.

As is conventional in the gas stove art, a main shut-off valve 1 is mounted above a manifold 2 and communicates therewith to supply gas to the top burner 3 of a gas stove. Opening and closing of the valve is effected through a rotary valve stem 4 operated by a manual knob 5. Beyond the casing of the valve the stem is formed as the major segment of a cylindrical tube to provide an outer periphery of the stem which forms the major segment of a circle, with the center of the circle being located at the longitudinal rotational axis of the stem, and flat surfaces 6, 7 at the cut away portion of the stem spaced more than 180 degrees apart round the circumference of the stem.

At the rear of the valve casing a back plate 8 is mounted in fixed relation thereto. A screw 9 connected to back plate 8 and extending outwardly therefrom provides a pivotal axis for a bracket, generally indicated at 10. The pivotal axis 9 of the bracket is spaced from the longitudinal rotational axis of valve stem 4.

At its lower end bracket 10 is formed with an integral loop 11 which carries a mercury switch 12 of conventional design. Commonly mercury switches are either of the type having a pair of spaced electrodes and a pool of mercury within the casing of the switch or of the type in which a single electrode and the mercury pool are within the switch casing and the casing itself forms the other switch electrode. In both types, when the switch casing is tilted to a desired angular position the mercury pool bridges the space between the switch electrodes to form an electrically conductive path through the switch. When the switch is in its normal position the mercury pool is out of contact with one or both of the switch electrodes and the switch is open.

The switch bracket 10 is also formed with a flat transversely extending arm 13 which bears against the lower side of the valve stem 4. A leaf spring 14 is secured to a transverse arm 15 of the switch bracket and has its free end biased to engage the top of the valve stem to continually urge the bracket arm 13 into engagement with the adjacent lower peripheral portion of the valve stem.

In the normal position of the valve stem 4 the valve is closed, switch bracket arm 13 engages the flat faces 6 and 7 on the valve stem, and the switch bracket is positioned angularly

to hold the mercury switch 12 in its open condition.

To open the valve the stem 4 is rotated in a counterclockwise direction in the drawing. The flat surfaces 6, 7 on the valve stem move away from engagement with the adjacent bracket arm 13, and the circular peripheral portion of the valve stem rides over the top face of the bracket arm 13. Since this circular peripheral portion on the valve stem at its point of engagement with bracket arm 13 is spaced farther below the longitudinal axis of the valve stem than were the flats 6, 7 when they engaged the bracket arm 13, the bracket arm 13 is displaced downwardly by this angular movement of the valve stem. The entire switch bracket is thereby displaced angularly in a clockwise direction about its pivotal axis 9 to tilt the casing of the mercury switch to its closed position.

Continued rotary movement of the valve stem 4 to fully open the valve merely maintains the mercury switch in its same angular position because the entire circular periphery of the valve stem, which progressively rides over the bracket arm 13 during such continued opening movement of the valve, is concentric with the longitudinal rotational axis of the valve stem. Because of this, the mercury switch remains closed even though full opening movement of the valve stem may involve more than 180 degrees rotation thereof. This is a distinct advantage over prior art constructions in which the mercury switch bracket was mounted directly on the valve stem and a rotary movement of the valve stem of more than 180 degrees resulted in tilting the mercury switch to a position where the electrical circuit through it was broken. With the present construction, the mercury switch remains closed independent of the amount of angular rotation of the valve stem which is required to fully open the valve.

In addition, the limited tilting of the mercury switch in the present invention results in a minimum displacement of the conductors 16 which connect the switch electrodes to the rest of the electrical circuit. These conductors are not wrapped around the valve stem as the latter is rotated toward the full open position of the valve, as is the case in the prior art constructions where the mercury switch moved in unison with the valve stem throughout the full angular movement thereof. The lead in conductors 16 can therefore be made shorter in length and the liability of breaking these conductors because of a relatively large travel of the mercury switch is obviated.

To close the valve the valve stem 4 is rotated in the opposite direction (clockwise in the drawing) about its longitudinal axis. When the flats 6 and 7 on the valve stem have been returned to their normal horizontal position the leaf spring 14 insures that the mercury switch bracket 10 returns to its normal position with the arm 13 engaging the flats 6 and 7 on the stem. The mercury switch is thus returned to its normal position to break the circuit through the switch.

While there has been described a specific preferred form of the present invention, it is to be understood that various modifications and variations of the illustrated device may be resorted to without departing from the spirit and scope of the invention. For example, the mercury switch may be of a design which requires a greater tilting in order to close than would be



effected by engagement of its mounting bracket directly with the periphery of the valve stem. Obviously a collar having a shape similar to the described valve stem shape, but of larger circumference, could be attached to the valve stem to move in unison therewith and to engage the switch bracket for tilting it the desired amount.

I claim:

1. In a switch mounting, in combination, a rotary valve stem controlling the opening and closing of a valve, said stem being provided with a circular peripheral portion and a peripheral portion cut away to provide a flat surface spaced closer to the longitudinal axis of the stem than said circular peripheral portion provided therewith, a bracket pivotally mounted about an axis spaced from the longitudinal axis of the stem, a leaf spring mounted at one end on the bracket and at a free portion remote from its mounted end engaging the stem to urge a surface on the bracket into continuous engagement with the adjacent surface of the peripheral portion provided with the stem, whereby the rotary position of the stem determines the angular position of the bracket about its pivotal axis, and switch means carried on the bracket operable to provide one circuit condition when said bracket surface engages the flat peripheral portion provided with the stem to position the switch means in one position and operable to provide a different circuit condition when said bracket surface engages the circular peripheral portion provided with the stem to tilt the switch means to another position spaced farther from the longitudinal axis of the stem.

2. In a switch mounting, in combination, a rotary valve stem controlling the opening and closing of a fuel valve, said stem carrying a circular peripheral portion and a peripheral portion cut away to provide a flat surface spaced closer to the longitudinal rotational axis of the stem than said circular peripheral portion provided therewith, a bracket pivotally mounted about an axis spaced from the longitudinal rotational axis of the stem and extending parallel thereto, a leaf spring attached at one end to the bracket and at a free portion remote from its mounted end bearing against the stem to urge a surface on the bracket into continuous engagement with the adjacent surface of the peripheral portion carried on the stem, whereby the rotary position of the stem determines the angular position of the bracket about its pivotal axis, and a mercury switch carried on the bracket to move angularly in unison therewith operable to provide one electrical condition when said bracket engages the flat peripheral surface portion carried on the stem to position the mercury switch in one position and operable to provide a different electrical condition when the stem is rotated to position said circular peripheral portion carried on the stem in engagement with said bracket surface to tilt the mercury switch to a different position.

3. In a switch mounting, in combination, a valve for controlling the flow of gas to a burner, a rotary valve stem controlling the opening and closing of said valve, said stem projecting beyond one end of the valve and provided thereat with a circular peripheral portion and a peripheral portion connected to the circular peripheral portion which is cut away to provide a flat surface spaced closer to the longitudinal rotational axis of the stem than said circular peripheral portion provided therewith, a bracket pivotally mounted

on said one end of the valve about an axis spaced from the longitudinal axis of the stem and extending parallel thereto, a leaf spring attached at one end to the bracket and remote from its mounted end bearing against the upper peripheral portion provided with the stem to urge a surface on the bracket into continuous engagement with the lower peripheral portion provided with the stem, whereby the rotary position of the stem determines which particular peripheral portion provided therewith is in engagement with said surface on the bracket to thereby determine the angular position of the bracket about its pivotal axis, and a mercury switch carried on the bracket to move angularly in unison therewith operable to provide an open circuit when said flat surface on the bracket engages the peripheral portion provided with the stem to position the mercury switch in one angular position and operable to provide a closed circuit when the stem is rotated to position its associated circular peripheral portion in engagement with said surface on the bracket to tilt the mercury switch to a different angular position.

4. For use in a burner ignition system for gas stoves, the combination of a valve arranged to control the flow of gas to a burner, a rotary valve stem controlling the opening and closing of the valve, said valve stem projecting beyond one end of the valve and being provided thereat with a circular peripheral portion and a peripheral portion cut away to provide a flat surface spaced closer to the longitudinal axis of the stem than said circular peripheral portion, a bracket pivotally mounted on said one end of the valve about an axis extending parallel to the longitudinal axis of said stem in spaced relation therefrom, said bracket being provided with a first arm extending away from said one end of



the valve above the pivotal axis of the bracket, an elongated leaf spring mounted on said first arm of the bracket engaging the upper side of the peripheral portion provided with the stem, said bracket being provided with a second arm extending away from said one end of the valve and positioned to engage the lower side of the peripheral portion provided with the stem, said spring acting between the peripheral portion provided with the stem and the bracket to bias the bracket to position said second arm in engagement with the lower side of the peripheral portion provided with the stem, said stem in the closed position of the valve positioning said flat peripheral portion at its lower side to engage said second arm on the bracket and said stem when turned to open the valve positioning said circular peripheral portion at its lower side to engage said second arm on the bracket, whereby the rotary position of the stem determines the angular position of the bracket about its pivotal axis, and a mercury switch carried by the bracket positioned to open a circuit through the switch when said flat peripheral portion provided with the stem engages said second arm on the bracket, said mercury switch being positioned to close a circuit through the switch when said circular peripheral portion provided with the stem engages said second arm on the bracket.

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**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,566,549 | McMeen | Dec. 22, 1925 |
| 1,933,062 | Keebler et al. | Oct. 31, 1933 |
| 2,099,417 | Bast | Nov. 16, 1937 |
| 2,399,033 | Hudson | Apr. 23, 1946 |