April 18, 1967 MO GOTO 3,315,052

OPERATING MECHANISM FOR A MINIATURE TUMBLER SWITCH

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Fig. 1

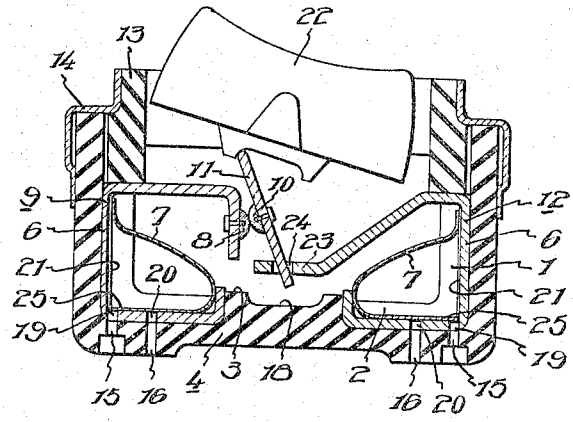


Fig. 2

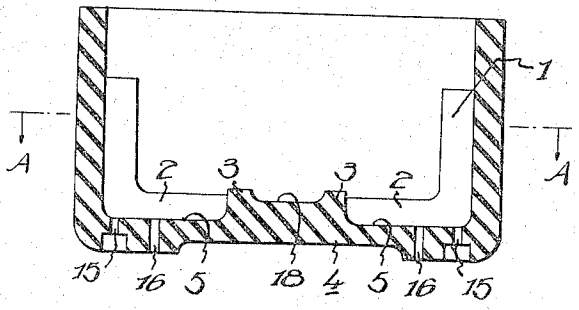
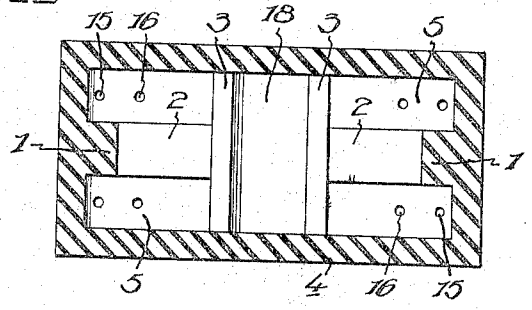


Fig. 3



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Fig. 4

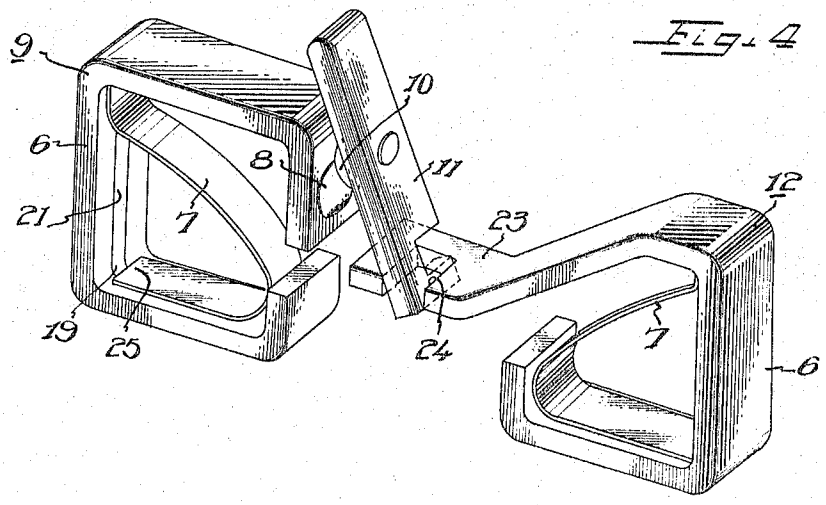


Fig. 5

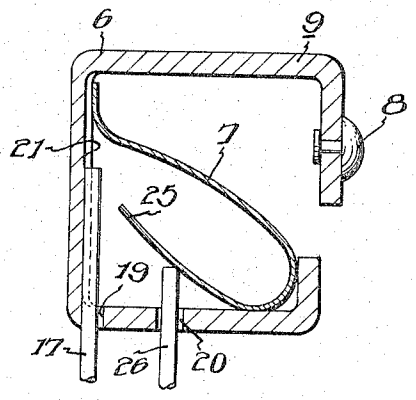


Fig. 6

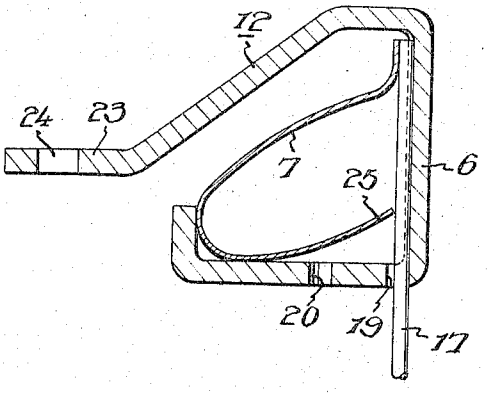


Fig. 7

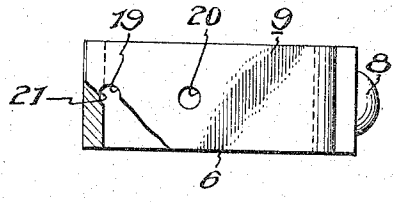
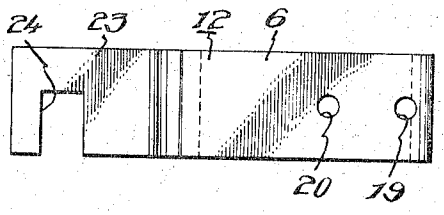


Fig. 8



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3,315,052

OPERATING MECHANISM FOR A MINIATURE TUMBLER SWITCH

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Claims priority, application Japan, July 16, 1965 (utility model), 40/58,046; July 24, 1965 (utility model), 40/60,427; Dec. 28, 1965 (utility model), 40/106,558
4 Claims. (Cl. 200—67)

The present invention relates operating mechanism with a miniature tumbler switch.

It is an object of the present invention to provide a tumbler switch in which a resilient belt plate is fixed to the switch case in each room unitedly.

Another object of the present invention is the provision of a new and improved tumbler switch of the type described wherein by means of pressure of said belt plate fixed to said switch case as well as seizure of said belt plate end portion, a wire inserted into the semi-circle slot, is kept fast.

Another object of the present invention is the provision of a new and improved tumbler switch of the type described wherein said wire which is kept fast, is easily capable of removing from said slot of said switch case.

Another object of the present invention is the provision of a new and improved tumbler switch of the type described wherein a swaying movable plate is supported rollingly movably in the oblong notch of the horizontal portion of said belt plate in said switch case.

Another object of the present invention is the provision of a new and improved tumbler switch of the type described, having a simple construction, easily being constructed and manufactured and also, operative very quickly.

Yet another object of the present invention is the provision of a new and improved tumbler switch of the type described wherein arcing is decreased remarkably when the contactors approach each other, and also in case said contactors are welded, they may be easily separated.

For a better understanding of the present invention, reference should be had to the following detailed description taken in conjunction with the drawings, in which:

FIG. 1 is a sectional elevational view of a tubular switch constructed in accordance with the present invention.

FIG. 2 is a sectional elevational view of the tumbler switch case.

FIG. 3 is a sectional plan view of the tumbler switch.

FIG. 4 is a magnified perspective view illustrating the situation of the swaying by movable plate contacted with the input contact piece and the output contact piece.

FIG. 5 is a magnified sectional elevational view illustrating a wire inserted into and removed out of the input contact piece.

FIG. 6 is a magnified sectional elevational view illustrating a wire inserted into the output contact piece.

FIG. 7 is a magnified base plan of the input contact piece partly sectioned.

FIG. 8 is a magnified base plan of the output contact piece.

Referring now to the drawings, as illustrated in FIG. 2 and FIG. 3, a wall **1** provided in the middle part of each inside of the switch case, having a set-back on the head of each wall **1** and extended as shown by **2** to the centre where at the each end of said walls, crossing whereon, a centre wall **3** is provided, forming a slot **18** for descending of a swayingly movable plate **11**.

Inside of said switch case, four rooms **5** are formed, having at the each room bottom, a wire inserting hole **15** and a rod material inserting hole **16**, by means of the

sides of the wall **1**, together with the centre wall **3**, wherein an input contact piece **9**, having a fixed contactor and an output contact piece **12**, having a tumbling contactor **10** are provided respectively and properly, in each couple of said rooms **5**.

Holes **19** and **20** are bored in each room **5**, at the corresponding points with those holes, one of which **15** is for a wire **17** insertion and the other of which **16** is for a rod material insertion respectively, in the bottom of each body **6** of said output contact piece **12** and input contact piece **9**, wherein, respectively, a resilient belt plate **7** having an end portion **25** for supporting a wire **17**, is provided and along inside of said input contact piece **9** and of output contact piece **12** respectively, upwardly extending semi-circle slots **21** are formed as inner spaces of said holes **19**.

Said swayingly movable plate **11**, having said tumbling contactor **10**, being held with a switch handle **22** by the head is borne by its lower portion with said output contact piece **12**, movably and rockingly in the oblong notch, cut in the horizontal part of said output contact piece **12**.

A lid **13** is set in said switch case **4** covering whereon, fixing said output contact piece **12** and said input contact piece **9**, by means of a hold-fast **14** from outside of said lid **13** together with which, said switch case **4** is combined or formed so as to be united.

Because of the construction of the present invention as stated above, in order to contact said wire **17** with said output contact piece **12** or said input contact piece **9**, as shown in FIG. **5**, said rod material **26** is first inserted through said holes **16** and **20** so as said belt plate **7** is to be pushed upwards, then said wire **17** is inserted into said wire inserting hole **15**. After said wire **17** passes through said hole **19**, and slides along said wire sliding slot **21**, said rod material **26** is pulled out, so as said wire **17** is to be kept fast by means of pressure of said resilient belt plate **7** as well as seizure or folding of said end portion **25** of said belt plate **7**.

In order to remove said wire **17** from said output contact piece **12** or input contact piece **9**, said rod material **26** is inserted through said holes **16** and **20**, so as said belt plate **7** is to be pushed upwards and said end portion **25** of said belt plate **7** is to be released from said wire **17** and then, said wire **17** can be removed easily by merely pulling it.

Owing to the simple construction of the present tumbler switch, manufacture of which is not only easy but also the amount of working procedure can be reduced because of the vice work for fixing in said switch case, said output contact piece **12** and said input contact piece **9**, may not be employed, accordingly, the cost of manufacture can be decreased.

Owing to said swaying movable plate **11** being supported rockingly on said output contact piece **12** and said resilient belt plate **7** being provided, the present tumbler switch is operative instantly.

Owing to the construction of the present tumbler switch, arcing is decreased remarkably when said contactors **8** and **10** approach, each other and also, in case said contactors are welded, they may be separated very easily.

While there has been illustrated and described a single embodiment of the present invention, it will be appreciated that numerous changes and modifications will occur to those skilled in the art, and it is intended in the appended claims to cover all those changes and modifications which fall within the true spirit and scope of the present invention.

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

1. A miniature tumbler switch comprising a casing having an open end, wall means within the casing providing at least two oppositely disposed spaces, an input contact

element in one space, an output contact element in the other space, a lid for the open end of the casing fixing said contact elements in place within the casing, means operable with the exterior of said lid and casing for attaching said lid to said casing, said input contact element including a base, an upturned flange at one end of the base, a vertical portion extending along a wall of said casing, an upper horizontal portion, a downturned flange at the end of said horizontal portion terminating short of said upturned flange, and a contact on said downturned flange, said casing and base having aligned apertures therein, a lead wire extending through said apertures and along at least a part of said vertical portion and a resilient plate biased between said upturned flange and said vertical portion for securing said wire to said input contact element, said output contact element including a base, an upturned flange at one end of said base, a vertical portion extending along a wall of the casing, an arm extending inwardly and downwardly from said vertical portion and terminating in a horizontal portion spaced from said input contact element, said horizontal portion having an opening therein, said casing and base having aligned apertures therein, a lead wire extending through said apertures and along at least a part of said vertical portion, and a resilient plate biased between said upturned flange and said vertical portion securing said wire to said output element, a manually operable tumbler button, a plate having one end in engagement with said button and its other end positioned in the opening of said horizontal portion of said resilient

arm of said output contact element, and a contact on said plate for cooperation with the contact on the downturned flange of said input contact element upon manipulation of said tumbler button.

2. The miniature tumbler switch as claimed in claim 1 in which the vertical portion of each of said input and output elements is provided with a semi-circular slot in which the wire associated therewith is positioned.

3. The miniature tumbler switch as claimed in claim 1 including two pairs of oppositely disposed spaces within said casing and input and output contact elements respectively carried in said pairs of spaces.

4. The miniature tumbler switch as claimed in claim 1 including means associated with said spaces for preventing displacement of said input and output contact elements.

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