

July 6, 1948.

M. F. MILLER
CHIME SWITCH

2,444,576

Filed March 10, 1945

2 Sheets-Sheet 1

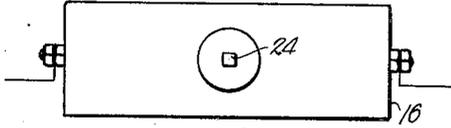


Fig. 1.

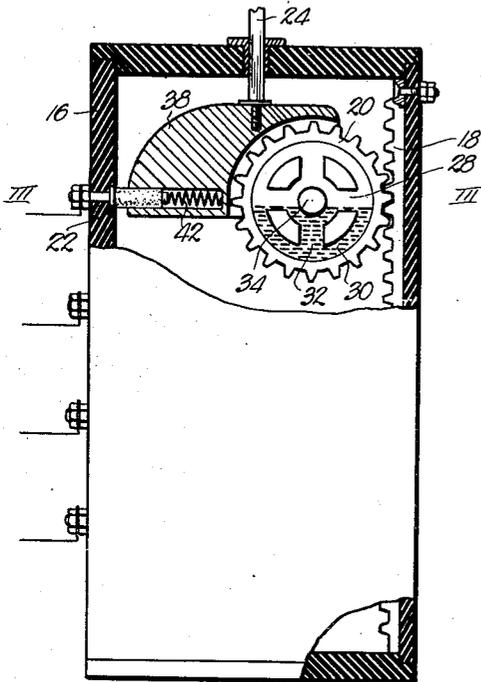


Fig. 2.

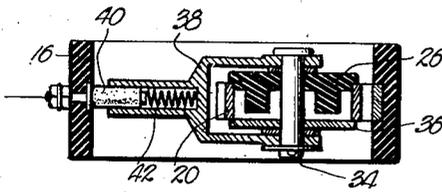


Fig. 3.

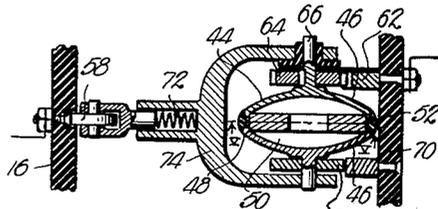


Fig. 4.

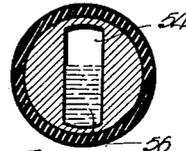


Fig. 5.

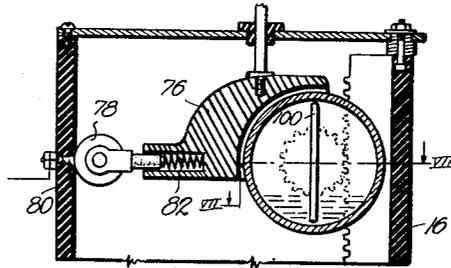


Fig. 6.

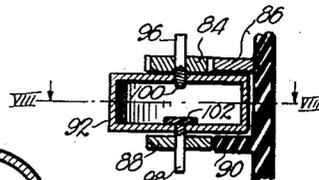


Fig. 7.

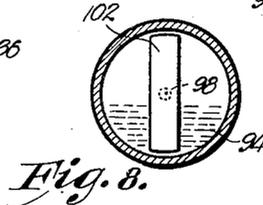


Fig. 8.

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CHIME SWITCH

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2 Sheets-Sheet 2

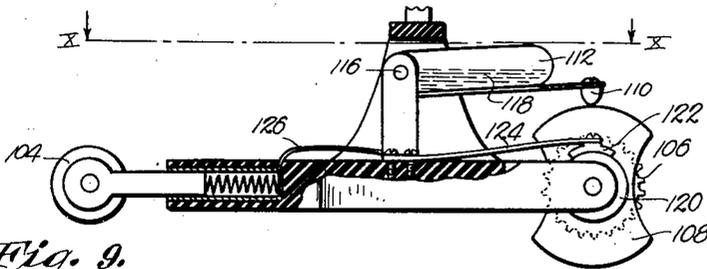


Fig. 9.

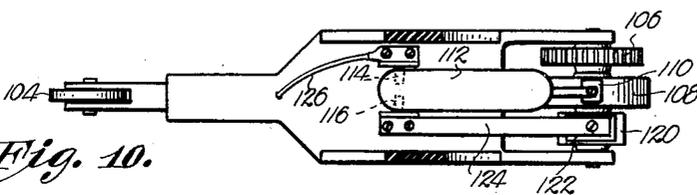


Fig. 10.

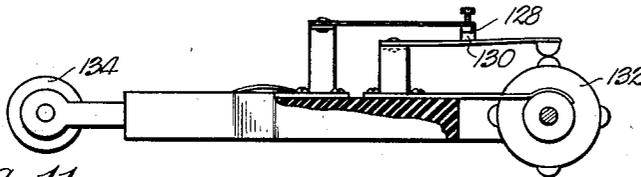


Fig. 11.

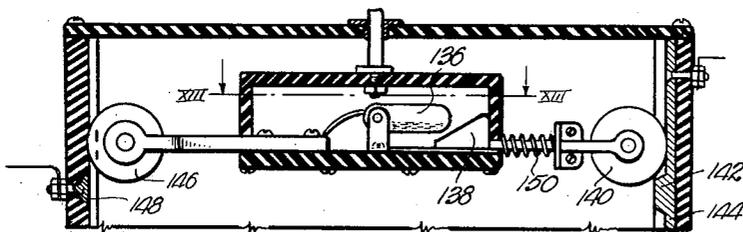


Fig. 12.

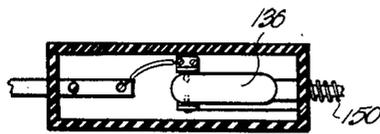


Fig. 13.

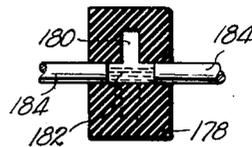


Fig. 15.

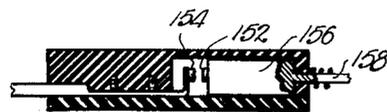


Fig. 14.

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2,444,576

CHIME SWITCH

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7 Claims. (Cl. 200—32)

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This invention relates to switch structures for making and breaking electrical contacts, and has for its primary aim the provision of such an assembly particularly adapted for use with chimes where a number of circuits are to be successively completed.

This application is a continuation in part of my co-pending case, Serial No. 540,586, filed June 16, 1944 for Intermittent switch, now Patent No. 2,407,571, issued Sept. 10, 1946.

In the construction of electrical circuits for chimes it becomes necessary to avoid arcing at the spaced apart contacts as the movable assembly passes from one to the other. One manner of solving the problem has been set forth in my application just identified, and it is the aim of this invention to provide other ways of accomplishing the desired end without the necessity of using complicated and expensive parts and through the employment of elements that are more positive in their action; more durable and rugged; and easier to assemble and maintain.

Details of construction, therefore, embody important objects of the invention and these objects will become apparent as the following specification is applied to the several figures in the drawings, wherein:

Fig. 1 is a top plan view of a chime switch made in accordance with the present invention.

Fig. 2 is a side elevational view thereof, with parts broken away to reveal the movable assembly therein.

Fig. 3 is a cross sectional view taken on line III—III of Fig. 2.

Fig. 4 is a similar sectional view through a chime switch made in accordance with the modified form of the invention.

Fig. 5 is a sectional view taken on line V—V of Fig. 4.

Fig. 6 is a sectional view through the movable assembly of a chime switch made in accordance with a further modification of the invention.

Fig. 7 is a fragmentary detailed sectional view taken on line VII—VII of Fig. 6.

Fig. 8 is a sectional view taken on line VIII—VIII of Fig. 7 and looking in the direction of the arrow.

Fig. 9 is a side elevational view of the movable assembly forming a part of the chime switch made in accordance with a still further modification of the invention.

Fig. 10 is a sectional view taken on line X—X of Fig. 9.

Fig. 11 is an elevational view of the movable assembly of the chime switch, which is made pur-

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suant to a still further modification of the invention.

Fig. 12 is a sectional view through a portion of a chime switch made in accordance with a further modification of the invention.

Fig. 13 is a sectional view taken on line XIII—XIII of Fig. 12.

Fig. 14 is a fragmentary sectional view illustrating another manner of constructing a portion of the movable assembly forming a part of the chime switch, and

Fig. 15 is a sectional view of another form of the invention.

As fully described in my aforesaid co-pending application, the chime switch comprises a housing 16 formed of insulating material and having an attenuated contact member 18 in the form of a rack meshed with wheel 20.

A plurality of spaced apart contacts 22 are carried by housing 16 in opposed relation to member 18 and a movable assembly is interposed between member 18 and contacts 22. This movable assembly is secured to any mechanism for causing the same to travel back and forth along member 18 to successively close a circuit having member 18 and the several contacts 22 therein. A connecting rod 24 attached to any motivating element, serves as the means for moving the assembly.

In the form of the invention illustrated in Figs. 1, 2 and 3, the said movable assembly comprises the hollow wheel 20 formed of conducting material that is always in engagement with member 18. A core 26 of insulating material having radial grooves 28 and an annular, continuous groove 30, is fitted within the hollow of wheel 20 to create a space for the reception of a flowable substance 32 capable of conducting a current. In practice, it has been found that mercury is suitable and that it will always seek the lowermost portions of grooves 28 and 30.

A shaft 34 of conducting material supports wheel 20 in the manner illustrated in Fig. 3, and the cover 36 of insulating material confines substance 32 in place. A yoke 38 mounts shaft 34 and supports a brush 40 behind which a spring 42 is disposed to yieldably urge brush 40 outwardly against contacts 22.

The amount of substance 32 is sufficient to submerge the lower portion of shaft 34 when one of the radial grooves 28 is in a vertical position below shaft 34. These radial grooves 28 have a width slightly less than the outside diameter of shaft 34, and therefore, when substance 32 is as shown in Fig. 2, a contact is made from mem-

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ber 18 through wheel 20, substance 32, shaft 34, yoke 38, brush 40 to one of the contacts 22. Core 36 is, of course, positioned with particular regard to having one of the radial grooves 28 reach a vertical position below shaft 34 just after brush 40 has reached one of contacts 22.

The continued movement of the entire assembly by the application of force to connecting rod 24 will turn wheel 20 to a point where substance 32 breaks the contact just before brush 40 passes from contact 22. This action prevents arcing, insures smooth operation, and positively makes and breaks the chime circuit.

In the form of the invention illustrated in Figs. 4 and 5, the general arrangement of the movable assembly is much the same as just set down. The hollow wheel 44 comprises a pair of opposed sections 46, held apart by insulating material 48 and divided into two compartments 50 by a partition 52 having a perforation 54 therethrough. The precise form of this perforation 54 is illustrated in Fig. 5 and is of elongated nature, allowing the flow of substance 56 to interconnect sections 46 in timed relation with the arrival of brush 58 upon contacts 60. These contacts 60 correspond to contacts 22 in the form of the invention illustrated in Figs. 1 to 3 inclusive.

Attenuated contact member 62 is in the form of a rack and gear 64 is in mesh therewith. This gear is mounted upon shafts 66 extending from one of the sections 46 and a roller 68 is mounted upon the other shaft 66 to ride over a track 70. Thus, equalization of force exerted by spring 72 is insured during the movement of the entire assembly.

Yoke 74 supports shafts 66 and as the entire assembly is moved along member 62, gear 64 will turn wheel 44 and substance 56 will automatically be divided into masses and be allowed to merge into a single mass closing the circuit as perforation 54 reaches a position where its longitudinal axis is disposed vertically and as illustrated in Fig. 5. Thus, such disposition will close the circuit from member 62 through gear 64, shaft 66, sections 46, substance 56, yoke 74 and brush 58.

The timing of this assembly is such as to make the circuit only after brush 58 reaches one of contacts 60.

The form of the invention illustrated in Figs. 6, 7 and 8 is slightly different from the foregoing forms but is generally adapted to accomplish the same purpose.

The movable assembly in this instance comprises a yoke 76 similar to the one illustrated in Fig. 4, in that it has a wheel shaped brush 78 to ride over the several contacts 80. Spring 82 yieldably maintains brush 78 against contacts 80 and also holds gear 84 in mesh with attenuated contact 86 that is in the form of a rack. A roller 88 rides over track 90.

Hollow wheel 92 contains mercury or a similar substance 94, and as wheel 92 is rotated about the axis of aligned shafts 96 and 98, the circuit is made and broken. A plate 100 on the inner end of shaft 96 cooperates with plate 102, rigid to the inner end of shaft 98. These plates are of different widths as illustrated in Fig. 7, and as the wheel 92 is rotated, the wider plate 102 enters substance 94 just ahead of the entrance of plate 100. Such is the manner in which the circuit is actually made and broken. It is obvious that when plates 100 and 102 do not have portions thereof submerged in substance 94, no circuit is made.

The form of the movable assembly shown in

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Figs. 9 and 10, accomplishes the desired results and forms the broad objects of this invention and is made to embody a brush 104 which rides over the several contacts of a suitable housing not here shown. The form of housing and contacts may be as illustrated in Figs. 1, 2 and 3.

The gear or roller 106 rides over the attenuated contact and turns cam 108 so that the face thereof will frictionally engage the free end of arm 110 anchored to hollow body 112. This body 112 is supported by opposed pintles 114 and 116, the inner ends whereof are spaced apart. Substance 118 closes the distance between the inner ends of pintles 114 and 116 when body 112 is in the elevated position shown in Fig. 9. This body 118 tips downwardly from that said position when the head of arm 110 rides into the depressions formed on cam 108.

Cam 108 is insulated from roller 106 and drum 120 is in wiping contact with shoe 122 on arm 124. This arm 124 is electrically joined to pintle 116, and pintle 114 is electrically joined to brush 104 through wire 126 and as clearly shown in Fig. 9. Thus, as the entire assembly is moved along the attenuated contact member or rack, the make and break is so timed as to occur after brush 104 is positioned upon one of the plurality of separate contacts.

The form of the invention shown in Fig. 11 is similar to that illustrated in Figs. 9 and 10, but the contacts 128 and 130 are moved toward and from each other by a cam 132 rotated in the same way as is cam 108. Brush 134 serves the same purpose as brush 104 and therefore, as cam 132 makes and breaks the circuit, brush 134 arrives at the several contact stations in properly timed relation.

In Fig. 12 the movement of hollow body 136 is caused by head 138. This head reciprocates because roller 140 rides over the specially formed attenuated contact member 142. The several projections 144 on member 142 is such as to cause body 136 to close the circuit as brush 146 reaches one of the plurality of contacts 148. Spring 150 maintains roller 140 against member 142.

In Fig. 14 contacts 152 and 154 are opened and closed by the reciprocation of head 156, which is disposed on the end of shaft 158 that is similar to the shaft which interconnects head 138 and 140 as disclosed in Fig. 12.

Fig. 15 illustrates the manner in which wheel 178 of the aforementioned assembly, may be made with a T-shaped cavity 180 having mercury 182 therein in an amount sufficient to join the ends of shafts 184 when the stem of the cavity is in a perpendicular position above the head of the cavity. When in the position illustrated, the mercury is in the stem and the switch is open.

All of the forms of the invention above described and shown in the accompanying drawings, are capable of fulfilling the broad objects of my invention, and since chime switches require circuit opening and closing assemblies having the peculiar characteristics of all the forms disclosed, it will be understood that modifications might be made without departing from the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In switch structure for periodically making and breaking a circuit, an attenuated contact member; a plurality of spaced apart contacts; and a movable assembly forming a connection between said member and the contacts adapted to

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make and break the circuit each time the assembly engages one of the plurality of spaced apart contacts, said assembly comprising a hollow wheel of conducting material in engagement with the attenuated contact, a core of insulating substance having radial grooves in the hollow of the wheel, a shaft of conducting material rotatably supporting the core and wheel, a quantity of flowable substance in the grooves of the said core, said substance having current conducting properties, and in an amount sufficient to fill one groove when the groove is in a vertical position below the shaft whereby to interconnect the shaft and the wheel, and a yoke joining the shaft and the spaced apart contacts as the assembly is moved from one to the other with the wheel engaging the attenuated contact member.

2. A switch structure as defined in claim 1, wherein the core has the radial grooves therein in communication with an annular groove at the periphery of the core to provide a passage for the quick flow of the said substance from one radial groove to another as the wheel is turned about the axis of said shaft.

3. In a switch structure for periodically making and breaking a circuit, an attenuated contact member; a plurality of spaced apart contacts; and a movable assembly forming a connection between said member and the contacts adapted to make and break the circuit each time the assembly engages one of the plurality of spaced apart contacts, said assembly comprising a hollow wheel of conducting material having a perforated partition in the hollow thereof to electrically isolate two sections of the wheel and form two chambers therein, a shaft rigid to each section and on the axis of the wheel, a flowable substance in the hollow of the wheel, a roller on one of the shafts and in engagement with the attenuated contact member, and a yoke joining the shafts and the spaced apart contacts as the assembly is moved from one to the other, the perforation of the partition being formed to periodically cause the substance to electrically join the two sections of the wheel as the roller is moved along the attenuated contact member and only when the yoke is in engagement with one of the spaced apart contacts.

4. In switch structure for periodically making and breaking a circuit, an attenuated contact member; a plurality of spaced apart contacts; and a movable assembly forming a connection between said member and the contacts adapted to make and break the circuit each time the assembly engages one of the plurality of spaced apart contacts, said assembly comprising a hollow wheel of non-conducting material, a pair of shafts disposed radially to support the wheel, an axially disposed plate on each shaft respectively, said plates being in opposed relation, a flowable substance in the hollow of the wheel, a roller on one of the shafts and in engagement with the attenuated contact member, and a yoke joining the shafts and the spaced apart contacts as the assembly is moved from one to the other, the plates being electrically connected by the substance as the roller is moved along the attenuated contact

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to rotate the wheel and only when the yoke is in engagement with one of the spaced apart contacts.

5. A switch structure as defined in claim 4, wherein the opposed plates are of different widths to enter the substance one ahead of the other as the wheel is turned.

6. In a switch structure for periodically making and breaking a circuit, an attenuated contact member; a plurality of spaced-apart contacts; and a movable assembly forming a connection between said member and the contacts adapted to make and break the circuit each time the assembly engages one of the plurality of spaced-apart contacts, said assembly comprising a wheel of non-conducting material, having a cavity formed therein, said cavity being substantially T-shaped in cross-sectional contour, a pair of shafts of conducting material disposed radially to support the wheel, one leg of said cavity being disposed co-axially between said shafts and in communication therewith, a flowable substance in said cavity, a yoke joining the shafts and the spaced-apart contacts as the assembly is moved from one to the other, and means interconnecting one of said shafts and the said attenuated contact member for rotating said wheel to periodically cause the substance to electrically join the shafts as the assembly is moved along the attenuated member and only when the yoke is in engagement with one of the spaced-apart contacts.

7. In switch structure for periodically making and braking a circuit, an elongated contact member; a plurality of spaced apart contacts arranged in a line disposed in spaced substantial parallelism to said member; and a reciprocable assembly interposed between and forming a connection between said member and the contacts, said assembly being adapted to make and break the circuit each time the same engages one of the plurality of spaced apart contacts, said assembly comprising a pair of spaced apart conductors, a shiftable element adapted to contain a quantity of flowable substance movable to and from a position for closing the space between the conductors as the element is shifted to thereby complete the circuit, and co-acting apparatus forming parts of the elongated contact member and the shiftable element respectively, for actuating the shiftable element to and from the space closing condition in timed relation with the arrival of the movable assembly on each of the plurality of spaced apart contacts, said parts being operably interconnected whereby the said element is shifted as the assembly is reciprocated.

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