June 30, 1953 V. W. LEONARD 2,644,047

ELECTRIC SWITCH

Filed Feb. 23, 1951

Fig. 1.

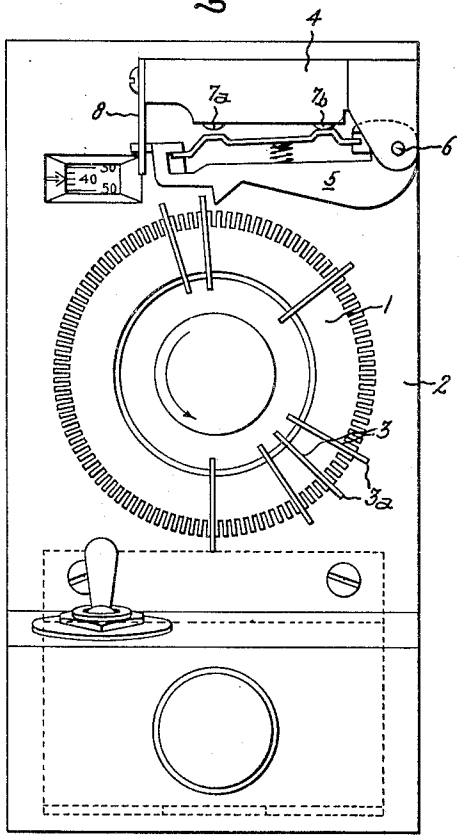


Fig. 2.

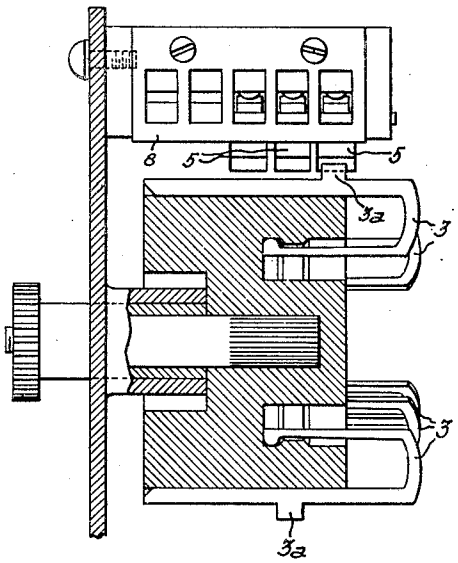


Fig. 3.

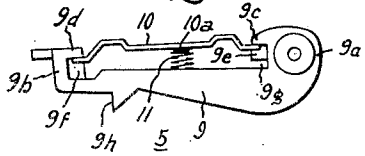
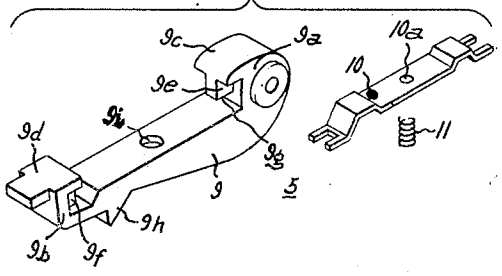


Fig. 4.



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ELECTRIC SWITCH

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My invention relates to electric switch mechanisms, and more particularly to pivoted bridging contact arms for effecting electrical connection between spaced apart fixed contact members.

It is a principal object of my invention to provide a new and improved pivoted bridging contact which is composed of a minimum number of parts and adapted for ready assembly and disassembly without special tools.

The invention is particularly applicable to cycle timer contacts of the type which are recurrently actuated by a rotatable or other movable timing device.

My invention itself will be more fully understood and its various objects and advantages further appreciated by referring now to the following detailed specification taken in conjunction with the accompanying drawing, in which Fig. 1 is a front elevational view of a time switch including a contact mechanism embodying my invention; Fig. 2 is a fragmentary cross-sectional side elevation of the switch shown at Fig. 1; Fig. 3 is a side elevational view of my improved switch mechanism in assembled position but removed from its mounting; and Fig. 4 is an exploded perspective view showing the various parts of my new switch mechanism disassembled.

In carrying out my invention in one form applicable to a cycle timer, I provide a rotatable timing dial having a plurality of contact actuating projections. Mounted adjacent the dial I provide a contact block having at least one pair of spaced apart fixed contacts mounted thereon. On the block I pivotally mount a bridging contact arm which is disposed as to be actuated by contact actuating projections on the dial. The contact arm is formed as a U-shaped member having short side arms and an elongated bight portion, with a pair of coplanar web sections disposed on the inner sides of the short side arms. Between the web sections, and across the bight of the contact arm, there is disposed a movable bridging contact member having bifurcated ends embracing the web sections. The bridging contact member is biased against stops provided at the upper ends of the web sections by means of a single compression spring disposed between the contact member and the bight of the contact arm, the bridging contact member thus being movable to provide contact wipe.

Referring now to the drawing, I have shown at Fig. 1 a cycle timer including a rotatable timing dial 1 mounted upon a base 2. The timing dial 1 is provided with a plurality of adjustable keys 3 having contact actuating projections 3a. In

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the particular embodiment of the invention shown, each contact actuating projection 3a extends radially beyond the outer peripheral surface of the timing dial 1.

For cooperation with the timing dial 1 there is mounted upon the base 2 a contact block 4 carrying a plurality of pivoted contact members generally designated as 5, each disposed in the path of movement of at least one of the contact actuating key projections 3a. The contact block 4 is formed of any suitable electric insulating material, such as a molded plastic insulating material, and has mounted thereon a pivot pin 6 disposed in substantially parallel spaced relation with the axis of the timing dial 1. The pivoted contact members 5 are mounted upon the pin 6 and extend substantially tangentially with respect to the dial 1. The contact block 4 is substantially rectangular and has a lower flat surface parallel to the pin 6 upon which are mounted a plurality of pairs of fixed contact members 7a, 7b, each pair of fixed contact members being spaced apart along the length of the associated contact member 5. The free ends of the pivoted contact members 5 extend into rectangular apertures in a positioning plate 8 mounted upon the contact block 4 at the end opposite the pivot pin 6.

The construction of each movable contact member 5 is best shown at Figs. 1, 3 and 4. Each movable contact member comprises a U-shaped contact arm 9 having short parallel side portions 9a and 9b and elongated in the direction of its bight portion. The side portions 9a and 9b are inturned at their upper ends to provide limiting stops 9c and 9d, respectively. Between the inturned end stops 9c and 9d, each contact arm 9 is formed to provide a pair of coplanar webs 9e and 9f, the webs being spaced apart and extending along the inner sides of the side arms 9a and 9b. The web 9f extends the full distance between the inturned stop 9d and the bight of the contact arm 9, while the web 9e on the pivoted end of the contact arm terminates short of the bight portion, thereby to provide a lateral slot 9g between the web 9e and the bight portion of the contact arm itself. Preferably the contact arms 9 are formed of a molded plastic insulating material.

Within each movable contact arm 9, and parallel to its bight portion between the short side arms 9a and 9b there is disposed an elongated bridging contact bar 10 of electric conducting material. The bridging contact bar 10 is slotted, or bifurcated, at its ends to fit slidably over

the coplanar webs 9e and 9f. The depth of the slots in the bridging contact bar 10 is such that when the bar is assembled in position between the webs, as shown at Figs. 1 and 3, only limited longitudinal movement of the bridging bar is permitted. Intermediate its ends, and preferably substantially centrally thereof, each bridging contact bar 10 is provided with a seating projection 10a on the side adjacent the contact arm 9, and in alignment therewith the contact arm 9 is provided with a seating recess 9i. A compression spring 11 is seated in the recess 9h and over the projection 10a between the contact arm 9 and bridging bar 10, thereby normally to bias the bridging bar 10 into engagement with the inturned end stop 9c and 9d, as shown at Fig. 3.

In assemblying the contact member 5, the spring 11 is placed between the contact arm 9 and the bridging bar 10 and the bridging bar is slidably positioned over the web 9f at the free end of the contact arm. The other end of the bridging bar 10 is then depressed and moved laterally into the slot 9g until the other bifurcated end of the bridging bar slides up over the positioning web 9e. As a thus assembled unit, the contact member appears as shown at Fig. 3, with both ends of the bridging bar biased against the stops 9c and 9d by the compression spring 11.

As illustrated at Fig. 1, the pivoted contact member 5 is so mounted on the pivot pin 6 and so positioned by the plate 8 that in the dropped-out position of the contact member, that end of the bridging bar 10 adjacent the pivoted end of the arm is held under pressure against the fixed contact 7b, the bridging bar 10 being held slightly away from the stop 9c by the pressure of the fixed contact. The free end of the contact arm 9 is normally so positioned by means of the plate 8 that the bridging bar 10 is spaced away from the fixed contact 7a.

Each contact arm 9 is provided with a depending ear 9h having an inclined cam surface positioned in the path of movement of at least one of the movable actuating projections 3a on the dial 1. In passing under the ears 9h the projections 3a raise the contact members 5 about the pivot 6 and into bridging engagement with the fixed contacts 7a, 7b. In operation, when any contact member 5 is moved about its pivot 6 towards the fixed contact 7a, a limited amount of overtravel of the contact arm 9 is provided by movement of the free end of the bridging bar 10 along the positioning web 9f.

While I have described only a preferred embodiment of my invention by way of illustration, many modifications will occur to those skilled in the art and I, therefore, wish to have it understood that I intend in the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a cycle timer, a rotatable timing dial having an actuating key carried thereby, a contact block mounted adjacent said dial and having a pivot pin fixed thereon, a contact arm formed of insulating material and pivotally mounted at one end upon said pin, said contact arm having a cam surface thereon, stop means engaging the other end of said contact arm normally to hold said cam surface in the path of movement of said actuating key, a bridging contact member resiliently mounted on said contact arm in substantially parallel spaced relation therewith, and a pair of fixed contact members mounted on said block and positioned to be engaged by opposite ends of said bridging contact member.

2. In a cycle timer, a base, a timing dial rotatably mounted on said base, an actuating key carried by said dial, a contact block mounted on said base radially adjacent said dial and having a pivot pin fixed therein and disposed in parallel spaced relation with the axis of said dial, a pair of fixed contact members mounted on said block and spaced apart along a line substantially perpendicular to said pin, a movable contact arm of insulating material pivotally mounted on said pin in substantially tangential relation with said dial and adjacent said fixed contact, said contact arm having a cam surface intermediate the ends thereof on the side adjacent said dial, stop means on said block engaging the free end of said contact arm and holding said arm normally with said cam surface in the path of movement of said actuating key, and a bridging contact member loosely mounted at opposite ends of said contact arm for engagement with said fixed contact.

3. In a cycle timer, a base, a timing dial rotatably mounted upon said base, an actuating key carried by said dial, a contact block mounted upon said base radially adjacent said dial and having a pivot pin mounted thereon, said pivot pin being disposed in parallel spaced relation with the axis of said dial and one surface of said block, a pair of fixed contact members mounted upon said block at said surface and spaced apart along a line perpendicular to said pin, a movable contact arm of insulating material pivotally mounted at one end upon said pin and disposed in substantially tangential relation with said dial and adjacent said fixed contacts, said contact arm being U-shaped and elongated in the direction of its bight portion with short side arms having inturned ends providing limiting stops, a pair of coplanar webs formed internally of said side arms, a camming projection on said contact arm extending toward said dial, an elongated bridging contact member having bifurcated ends disposed to embrace said web portions and engage said limiting stops, spring means disposed between said bridging contact member and said bight portion of said contact arm, stop means mounted upon said block and engaging the free end of said contact arm to hold said contact arm normally with said camming projection in the path of movement of said actuating key and one end of said bridging contact member in engagement with one of said fixed contact members.

4. In an electric switch, a contact block formed of electric insulating material, a pivot pin mounted upon said block in parallel spaced relation with one surface of said block, a pair of fixed contact members mounted upon said block at said surface and spaced apart in a direction perpendicular to the axis of said pin, a movable contact arm of electric insulating material U-shaped in the direction of its length and pivotally mounted at one end upon said pin for pivotal movement about the axis of said pin, a bridging contact member disposed across the bight of said contact arm and loosely mounted at its ends upon said arm for engagement with said fixed contact members, stop means limiting movement of the ends of said contact member relative to said contact arm, and a compression spring between the center portion of said contact member and the bight of said contact arm, said pivot pin being positioned to retain said contact member in contact with one of said fixed contact members at all times.

5. In an electric switch, a contact block formed of electric insulating material, a pivot pin mounted upon said block in parallel spaced relation with one surface of said block, a pair of fixed contact members mounted in said block at said surface and spaced apart in a direction perpendicular to the axis of said pin, a U-shaped movable contact arm formed of electric insulating material and pivotally mounted at one end upon said pivot pin, said arm being elongated in the direction of its bight and having short side portions in parallel spaced relation at opposite ends thereof, said side portions having inturned outer ends and having coplanar webs extending between said inturned ends of said bight, a movable bridging contact bar slotted at its ends and positioned with said slotted ends slidably embracing said webs, and spring means disposed between said contact bar and the bight of said contact arm thereby normally to bias said contact bar against said inturned ends.

6. In an electric switch, a contact block formed of electric insulating material, a pivot pin mounted upon said block in parallel spaced relation with one surface of said block, a pair of fixed contact members mounted in said block at said surface and spaced apart in a direction perpendicular to the axis of said pin, a U-shaped movable contact arm formed of electric insulating material and pivotally mounted at one

end upon said pivot pin, said arm being elongated in the direction of its bight and having short side portions in parallel spaced relation at opposite ends thereof, said side portions having inturned outer ends and having coplanar webs extending between said inturned ends and said bight, the web at the pivoted end of said contact arm being slotted adjacent said bight, a movable bridging contact bar slotted at its ends and positioned with said slotted ends slidably embracing said webs, spring means disposed between said contact bar and the bight portion of said contact arm substantially centrally of the length of said contact arm thereby normally to bias said contact bar against said inturned ends, and an apertured plate mounted upon said block and fitting over the free end of said contact arm to limit movement of said arm away from said fixed contact, said apertured plate normally holding said contact arm in such position that said bridging contact bar engages the fixed contact nearest said pivot pin under the pressure of said spring means.

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