Sept. 23, 1958 L. MAUERER 2,853,580

SWITCH

Filed Oct. 3, 1956

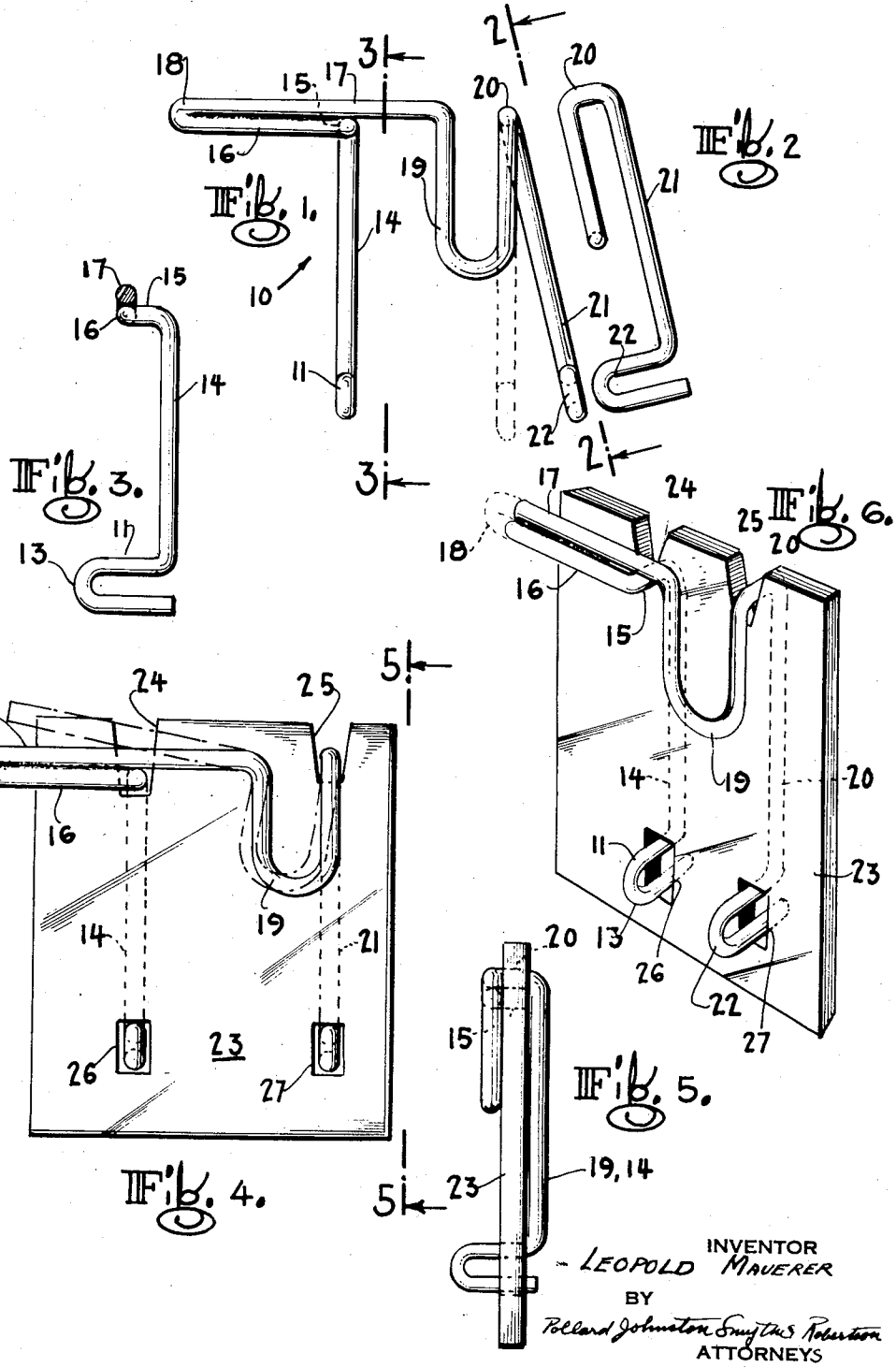


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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United States Patent Office 2,853,580
Patented Sept. 23, 1958

2,853,580

SWITCH

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Application October 3, 1956, Serial No. 613,731

4 Claims. (Cl. 200—113)

The present invention relates to electric current overload disconnectors or switches, and particularly to a new and improved thermal overload disconnector of simplified design and to an inexpensive method of making the same.

Prior-known disconnectors of the type referred to usually comprise a plurality of components requiring stampings, rivets, and jigs in their fabrication. Fixtures are often required to maintain the components in proper relation to each other during assembly, including the soldering operation to join the parts that are adapted to separate in order to break the circuit in the event of overload.

The principal object of this invention is to provide a simple thermal overload disconnect that can be fabricated with ease.

Another object of the invention is to eliminate the need for stamped-out components for riveting to the disconnect base and for separate fastening means to hold the current-carrying conductor on said base.

One aspect of the present invention contemplates the use of a resilient electrical conductor having diverging leg portions, each having a terminal portion for connection into a transformer circuit or the like. The terminal portions can have suitable wires soldered or fastened thereto for connecting the disconnector in the circuit. An intermediate portion of the conductor between the diverging leg portions includes a pair of parallel axially-contacting portions formed by bending the conductor back on itself through 180. The parallel axially-contacting portions are soldered together with a solder having a predetermined melting point, and the elbow joining the axially-contacting portions is then severed from the conductor. In assembling the conductor to the base member, which may be of thin insulating material, the diverging legs are forced toward each other, so that a torsional stress is set up in the conductor tending to separate the soldered parallel axially contacting portions. Preferably, a clip portion is arranged to cooperate with holding means on said base. The holding means may comprise notches on openings in the base spaced so as to hold the legs in a manner tending to separate the axially-contacting portions. In one aspect, the notches can have tapered margins so that when the formed conductor is forced therein as it is mounted on the base, a prestressing of the parts will take place, also tending to cause the parallel axially-contacting portions to separate. In operation, any dangerous overload current passing through the circuit including the disconnect will cause heating of the transformer or the like which will result in melting of the solder and consequent separation of the soldered portions, thereby breaking the circuit. In such a structure when used in conjunction with a transformer or the like, the heat causing the melting of the solder may be supplied mainly by the transformer coil, or it may be supplied in whole or part by the overload current itself. In one form, the device can be fastened with ease by tape, string or similar means to the periphery of a coil or other parts of an electrical device in which heat is generated.

The above, other objects and novel features of the invention will become apparent from the following specification and accompanying drawing, which are merely exemplary:

In the drawings:

Fig. 1 is a view of a current-carrying conductor at one stage of its fabrication and to which the principles of the invention have been applied;

Fig. 2 is a view of a portion of the conductor of Fig. 1 as viewed by looking in the direction of the arrows along line 2—2 of Fig. 1;

Fig. 3 is a view of another portion of the conductor of Fig. 1 as viewed by looking in the direction of the arrows along line 3—3 of Fig. 1;

Fig. 4 is a front elevational view of an overload disconnect to which the principles of the invention have been applied;

Fig. 5 is an end elevational view of the disconnect of Fig. 4 as viewed by looking in the direction of the arrows along line 5—5 of Fig. 4; and

Fig. 6 is a perspective view of the disconnect of Figs. 4 and 5.

Referring to the drawing, and in particular to Fig. 1, a current-carrying conductor **10**, preferably having a substantial degree of inherent resilience in the order of that possessed by an alloy wire, e. g., a #20 gage Phosphor bronze, includes a terminal portion **11** formed by bending a short length of said conductor back on itself to form two short parallel closely-spaced or contacting leg portions which are joined by a semicircular elbow **13**. The conductor **10** extends at right angles to, but in the same plane as the leg **11**, for a substantial distance forming another leg **14**. From the end of leg **14**, opposite leg **11**, conductor **10** extends for a short distance at right angles to and within the same plane as that including legs **11** and **14**, forming a portion **15** (Fig. 3) for a purpose to be described later. At the end of the portion **15** opposite its connection to leg **14**, conductor **10** extends at right angles, and within a plane at right angles to the plane including legs **11** and **14**, forming a leg **16**. The conductor **10** is then bent back on itself, forming a leg **17** in the same plane as, and in axial contact with the leg **16**, and joined to the latter by a semicircular elbow portion **18**. At the end of the leg **17**, opposite elbow **18**, conductor **10** extends substantially in the form of a U-shaped clip **19** lying within the same plane including legs **16** and **17**. At the end of the U-shaped clip **19**, opposite its connection to leg **17**, conductor **10** extends for a short distance, forming a portion **20** within a plane at right angles to the plane including U-shaped clip **19** for a purpose to be described later. Finally, the conductor **10** extends at right angles to the portion **20**, forming a leg **21** that lies within a plane diverging from the plane including leg **14**, and at an acute angle to the plane including the portion **20** and one leg of the U-shaped clip **19**. At the free end of the leg **21** a terminal portion **22** is provided that is identical with terminal portion **11**.

The contacting legs **16** and **17** are joined by solder while being held in close proximity by elbow **18**, the solder being chosen to melt at a predetermined temperature. In use in conjunction with transformers or similar electrical devices it is desirable that the heat of the transformer cause operation. Thus, the melting point of the solder should be such that the switch will open before damage is done, for example, before the winding conductors burn open. After the soldering operation, the elbow **18** is severed from the conductor **10** as shown in Figs. 4 and 6.

Referring to Figs. 4 and 6, the disconnect of this invention contemplates the use of an insulating base that may be made of any insulating material of any suitable thickness. In the embodiment disclosed, it is shown as comprising a thin, fibrous sheet **23** having notches **24**

and 25 with tapering margins in its one edge, spaced apart a distance equal to the distance between the portions 15 and 20 of the conductor 10. Holes 26 and 27 are formed within the sheet 23 a distance apart equal to the distance between the notches 24 and 25, and preferably located in alignment therewith.

The length of the portions 15 and 20 of the conductor 10 is slightly greater than the thickness of the base 23 so that upon assembling the conductor 10 and the base 23, the legs 14 and 21 lie on the one side of the base 23, while the legs 16, 17 and U-shaped clip 19 lie on the opposite side of base 23. With the terminal 11 extending through the opening 26, the terminal 22 does not align itself with opening 27 in base 23. This is due to the angularly-disposed plane including leg 21. However, forcing leg 21 to a position where terminal 22 thereof registers with, and extends through opening 27 places a torsional stress in the leg of U-shaped clip 19 connected to leg 21. Accordingly, this torsional stress is transmitted to leg 17, tending to separate it from contact with leg 16 against the holding force of the soldered joint between legs 16 and 17. The loop between notches 24 and 25 also is tensioned or prestressed in such a manner as to tend to cause opening as a result of sliding the same down or along the tapered walls of notches 24 and 25.

With the terminals 11 and 22 connected into a circuit including the low-voltage secondary coil of a transformer or the like, upon any secondary short circuit, the transformer will heat up until the solder of the connection between legs 16 and 17 melts, whereupon the leg 17 will separate form leg 16 due to the torsional stress in U-shaped clip 19 and the prestressing of the loop, thereby opening the secondary circuit of the transformer.

Although the various features of the new and improved disconnector have been shown and described in detail to fully disclose one embodiment of the invention, it will be evident that numerous changes may be made in such details, and certain features may be used without others without departing from the principles of the invention except as defined in appended claims.

What is claimed is:

1. In an overload disconnect having a base including spaced notches and perforations aligned therewith, an electrical conductor having inherent resilience; said conductor having two leg portions in parallel contacting relation and joined together by solder having a predetermined melting point; normally diverging legs connected to said legs that are soldered together, the angle between said diverging legs differing from that defined between said notches and aligned perforations, said normally diverging legs being mounted in said notches and perforations and urged thereby toward parallelism with respect to each other so as to set up a torsional stress in one

of the soldered legs, tending to separate it from the other soldered leg.

2. In a thermal overload disconnect, a base; a conductor lying along one face of said base; another conductor parallel with said conductor and joined thereto by solder having a predetermined melting point; leg portions attached to and normally diverging away from said parallel soldered conductors; a terminal at the free end of each of said leg portions; and means on said base for maintaining said diverging leg portions in relation to each other different from their normal relation so as to tend to separate said leg portions.

3. In a thermal overload disconnect, an insulating base; a conductor lying along one face of said base; another conductor parallel with said conductor and joined thereto by solder having a predetermined melting point; a leg portion extending at substantially right angles from said one parallel conductor; another leg portion normally extending at an obtuse angle from said other parallel conductor; an intermediate portion between said other leg portion and its corresponding parallel conductor; and means on said base for maintaining said diverging leg portions in relation to each other different from said obtuse angle so as to set up a torsional stress tending to separate the conductors joined with solder.

4. An overload disconnect comprising an insulating base adapted to be placed adjacent to a device to be controlled, said base having perforations therein; an electrical conductor having a pair of legs joined by soldering and legs extending from each of said pair of legs, said last mentioned legs being mounted in said perforations and on said base so as to hold said last mentioned legs at a different angle relative to each other than when in their normal free condition, thereby setting up a stress tending to separate said pair of legs joined by solder and break the circuit, said conductor being mounted on said base with terminal portions extending through said perforations to which other conductors can be joined for connecting said overload disconnect into a circuit to be controlled.

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