May 5, 1959 P. R. GOUDY ET AL 2,885,516

CONTACT HOLDER

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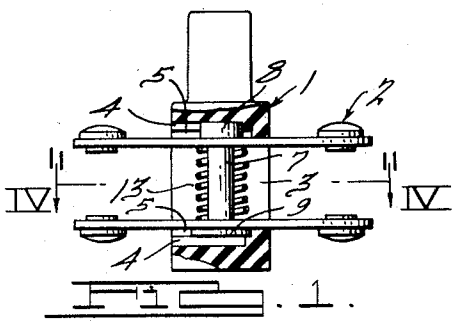


FIG. 1.

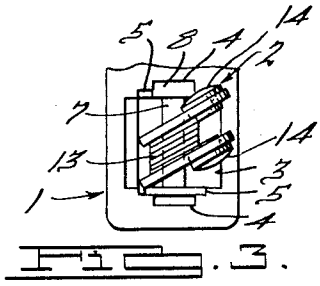


FIG. 3.

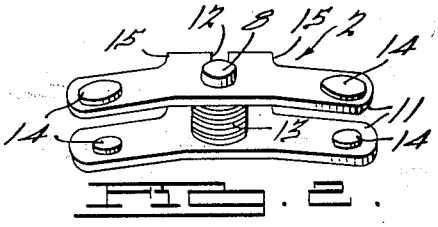


FIG. 2.

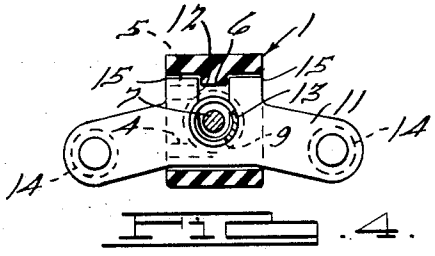


FIG. 4.

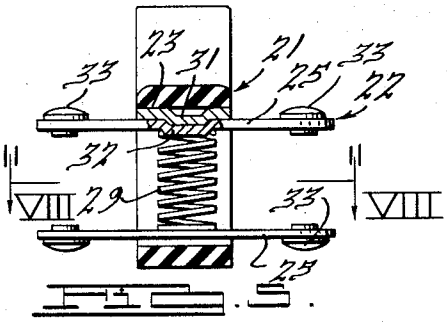


FIG. 5.

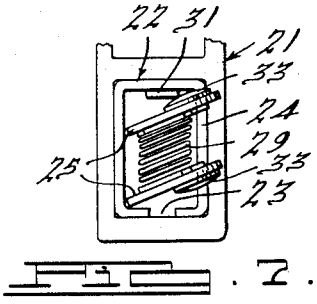


FIG. 7.

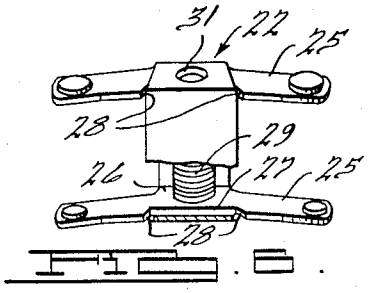


FIG. 6.

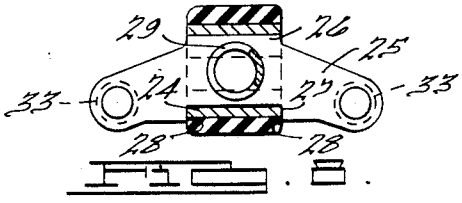


FIG. 8.

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CONTACT HOLDER

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12 Claims. (Cl. 200—166)

This invention relates to contact holders and more particularly to an assembly of contact carriers and support therefor for use with relays or the like employing stationary and movable contacts.

The object of the present invention is the provision of a contact carrier assembly and a holder therefor into which the contact carrier assembly may be readily inserted and securely held.

Another object of the present invention is a contact holder and contact carrier assembly with provision for interlocking between the contact carrier and the holder for maintaining the contact carrier within the holder and for permitting easy removal of the contact carrier from the holder for inspection of the contacts.

A further object of the present invention is the provision of a contact holder and contact carrier assembly having an interlocking arrangement between the contact carriers and the holder adapted to permit rotational movement of the contact carrier to effect a contact wipe in movement of the contacts to or from closed contact position.

A further object of the present invention is a contact holder and stationary contact assembly wherein the stationary contact assembly is statically maintained in a fixed assembly and may be easily inserted into the contact holder and wherein the contact carriers themselves interlock with portions of the contact holder and are easily tilted in the assembly for movement into interlocking relationship with the contact holder.

Further objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating a certain preferred embodiment in which:

Figure 1 is an elevational view partially in sections of the contact holder and contact carrier assembly within the holder.

Figure 2 is a perspective view of the stationary contact carrier assembly.

Figure 3 is a side elevational view of the contact holder with the contact carriers rotated into position for the insertion of a contact carrier assembly into the holder.

Figure 4 is a sectional view taken on the lines IV—IV of Figure 1.

Figure 5 is an elevational view partially in sections of a modified form of the contact holder and contact carrier assembly of the present invention.

Figure 6 is a perspective view, partially in sections, of the contact carrier assembly of this form of the invention.

Figure 7 is a side elevation view of the contact holder and stationary contact carrier assembly with the stationary contact carriers rotated into position for the insertion of the assembly into the contact holders.

Figure 8 is a sectional view taken along the lines VIII—VIII of Figure 5.

The contact device of the present invention constitutes a contact holder 1 of molded insulating material and a contact carrier assembly 2 which may be inserted into the contact holder to be maintained in interlocking relationship therewith to provide a means for securely holding the contact carriers in position in the holder while permitting ready removal thereof for purposes of inspection or replacement. To accomplish these features of the holder and contact carrier assembly, the holder is provided with an internally apertured portion 3 which may be of a generally square contour provided at the top and bottom thereof, as viewed in Figure 1, with a pair of slots 4 and 5 for the accommodation of portions of the contact carrier assembly 2, as will be more readily apparent hereinafter. It should be noted that the slots 4 are relatively narrow and deep and the slots 5 are relatively shallow and wide and are of different lengths from left to right as viewed in Figure 1. The contact holder is also provided with a central rib 6 at one side surface of the opening 3 and extending from the bottom to the top of the side surface.

The contact carrier assembly 2 for use with the holder of the present invention constitutes a spool-like member having a central shaft 7 with shoulders 8 and 9 at each end thereof. Shoulder 8, at the top of the spool as viewed in Figure 1, is of smaller diameter than shoulder 9, at the bottom as viewed in Figure 1, and is of greater height than the shoulder 9. One or a pair of bridging contact fingers 11 provided with a centrally disposed slot or aperture 12 of width to accommodate the shaft portion 7 are positioned on the spool between the inner surfaces of the shoulders 8 and 9 and are pressed outwardly against the inner surfaces of the shoulders by the bias of a helical coil spring 13. The bias of the spring 13 maintains the contact fingers in the assembly while permitting easy compression towards each other and rotation with respect to the central shaft portion 7 of the spool. Contacts are provided on the contact fingers at 14 in any desired plurality in accordance with the requirements of the device with which the contact holder is associated.

It should be understood that the contact carrier assembly may be provided with only one contact finger 11 in which case the contact finger 11 at the bottom of the showing of Figure 2 will be removed and the spring 13 will operate against the inner surface of the upper contact finger and against the inner surface of the larger shoulder 9. Should it be desired that the single contact carrier be at the bottom of an assembly of the type of Figure 2, it will be necessary to invert the spool to provide the enlarged shoulder 9 at the top of the spool and the smaller shoulder 8 at the bottom which, in effect, is merely a reversal of the contact carrier assembly and a positioning of the contact finger 11 to provide the proper positioning of the contacts thereon. The contact fingers 11 are provided with shoulders 15 at either side of the centrally disposed slot 12 aligning with the edge limits of the aperture 3 in the contact holder 1.

The insertion of the stationary contact carrier 2 into the holder 1 is accomplished by positioning the shoulders 8 and 9 in the grooves 4 and 5, either at the top or bottom depending upon the relative position of the carrier assembly with respect to the holder, and the insertion of the carrier assembly into the holder until the carrier assembly comes to a stopped position. At this point the shoulders 15 will engage the nearest edge of the rib 6, the left side as viewed in Figure 4, and cannot be inserted further until the contact carriers 11 are rotated to a position to permit further insertion to allow the slots 12 to be aligned with the rib 6. To accomplish this alignment the contact fingers are compressed toward each other against the bias of spring 13 and rotated as a unit with respect to the central shaft 7 of the spool to be inclined within the cutout 3 of the holder. The fingers are rotated sufficiently to permit their effective lateral dimension to be reduced to the point that they can be

slid further into the holder along the grooves 4 and 5 until the slot 12 is aligned with the rib 6. The fingers 11 may then be released to be rotated under the bias of the spring 13 into paralleling alignment with the upper and lower surfaces of the cutout 3 when the grooves 12 are properly aligned with the rib 6. In this position the contact carrier assembly 2 cannot be removed from the holder 1 except by rotation of the contact fingers 11 and will be securely maintained in position in the holder for movement parallel to the axis of the spool carrier and for slight rotational movement with respect to the spool.

The contact holder 1 may now be moved between the limits of stationary contacts associated with the contacts 14 on the contact fingers 11 to make and break electrical circuits therethrough and, because of the accentric positioning of the contacts 14 (as viewed in Figure 4) a slight wiping action will be effected between the stationary and movable contacts to provide good electrical contact upon engagement.

Figures 5 through 8 illustrate a modification of the contact holders of Figures 1 through 4 and constitute a contact holder 21 and contact carrier assembly 22. The contact holder 21 is provided with a central aperture 23 into which the contact carrier assembly 22 will be inserted. The contact carrier assembly constitutes a channel-like member 24 formed to be non-continuous at the bottom thereof for a minor amount of movement to provide for the accommodation of the assembly within the recess 23 of the holder 22. At least one or a pair of stationary contact fingers 25 are adapted to be supported within the member 24 and have a general contour similar to the contact fingers 11 of the disclosure of Figures 1 through 4. The contact fingers 25 are provided with a barrier 26 at one side and a cutout 27 at the other providing shoulders at 28 and are positioned within the member 24 with the barrier 26 against one of the inner vertically extending surfaces of the member 24 and the recess 27 accommodating the other of the vertically extending surfaces. A helical coil spring 29 is positioned within the member 24 and biases the contact fingers against the upper and lower inner surfaces of the member 24. The upper surface of the member 24 is provided with an indented guide 31 and the contact fingers 25 are provided with a pressed guide 32 adapted to cooperate with the guide 31 to maintain the contact carrier in alignment within the member 24 and to function at the other surface as a guide for the spring 29, as shown in Figure 5. It should be noted from the showing of Figure 8 that the cutout 27 is of greater depth than the thickness of the member 24 such that the shoulders 28 of the contact fingers 25 extend beyond the member 24.

The contact carrier assembly 22 is adapted to be inserted within the aperture 23 in the holder 21 with the member 24 positioned within the recess 23 and the contact fingers 25 aligned with the edges of the holder 21. The contact carrier assembly 22 must be manipulated in a similar manner to the contact carrier 2 of the holders of Figures 1 through 4 to be positioned within the holder 21. To accomplish this positioning, the contact fingers 25 are compressed together to reduce their effective lateral dimension and to bring the shoulders 28 into effective alignment with the edges of the member 24 such that the assembly 22 may be inserted into the recess 23 of the holder 21. Once positioned and aligned within the holder 21 the contact fingers 25 may be released and the bias of spring 29 will align them in parallelism with the inner surfaces of the member 24. In this position the extending portions of the shoulders 28 will align with the exterior surfaces of the holder 21 to maintain the assembly 22 in secured position within the holder 21.

In operation, the modifications of Figures 1 through 4 and 5 through 8 operate in substantially the same manner; that is, the contact carriers may be moved with the holder into and out of engagement with associated stationary contacts to provide making and breaking from electrical circuits with which the holders will be associated. The contact fingers 25 of the modification of Figures 5 through 8 provide contact surfaces at 33 in a slight eccentric position with respect to the generally central axis of the holders to provide for a wiping action between the stationary contacts with which they will cooperate. The contact fingers 25 may be readily removed from the holder 21 with the member 24 for inspection or replacement and may be readily repositioned into interlocking relationship with the holder in a position of secure fitting.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest interpretation within the terms of the following claims.

We claim:

1. A contact device comprising an insulating slide bar having a transverse aperture, a contact supporting assembly including at least one contact finger, a spool shaped carrier, and a biasing means, said contact finger adapted to be supported on said spool and maintained in supported position by said biasing means, said contact finger being rotatable with respect to said carrier while being maintained thereon by said biasing means, said assembly being supported on said slide bar in said transverse aperture, and means on said contact finger cooperating with means on said aperture for securing said assembly to said slide bar, said assembly being removable from said aperture when said contact finger is released from cooperating engagement with said means on said aperture.

2. A contact device comprising an insulating slide bar having a transverse aperture, a contact supporting assembly including a plurality of contact fingers, a biasing means and a spool-shaped carrier, an aperture on said contact fingers whereby said fingers may be positioned on said spool-shaped carrier and maintained thereon by said biasing means, grooves in said transverse aperture at the top and bottom thereof, a rib in said aperture on one side surface thereof, said assembly being supported on said slide bar in said transverse aperture with the ends of said spools cooperating with said grooves and said aperture on said contact finger cooperating with said rib on said aperture, said assembly being removable from said slide bar aperture when said finger apertures are released from cooperating engagement with said rib on said slide bar aperture.

3. A contact device comprising an insulating slide bar having a transverse aperture, a contact supporting assembly including a plurality of contact fingers, a biasing means, and a spool-shaped carrier having a central shaft and shouldered ends of larger diameter than said shaft, said contact fingers being positioned in said assembly on said central shaft of said spool carrier and being biased to engagement with the inner surfaces of said shoulders by said biasing means, said contact fingers being rotatable with respect to said carrier while being maintained thereon, grooves in said transverse aperture at the top and bottom surfaces thereof, a rib in one side surface of said transverse aperture, said assembly being insertable into supported position on said slide bar in said transverse aperture upon rotational movement of said contact fingers with respect to said carrier with said grooves on said transverse aperture cooperating with said shoulders of said carrier, and means on said contact fingers cooperating with said rib on said aperture for securing said assembly into supported position on said slide bar, said assembly being removable from said aperture when said contact fingers are released from cooperating engagement with said rib on said aperture.

4. A contact device comprising an insulating slide bar and having a transverse aperture, a contact supporting as-

sembly including at least one contact finger, a biasing means and a substantially continuous channel-shaped carrier, said contact finger adapted to be supported on said carrier and maintained in supported position by said biasing means, said contact finger being rotatable with respect to said carrier while being maintained thereon, said assembly being supported on said slide bar in said transverse aperture, and means on said contact finger cooperating with means on said aperture for securing said assembly to said slide bar, said assembly being removable from said aperture when said contact finger is released from cooperating engagement with said means on said aperture.

5. A contact device comprising an insulating slide bar having a transverse aperture, a contact supporting assembly including a plurality of contact fingers, a biasing means, and a substantially continuous channel-shaped carrier, means on said carrier and means on said contact fingers for aligning said contact fingers in said carrier, said contact fingers being rotatable with respect to said carrier while being maintained thereon, means on said contact fingers cooperating with said contact carrier for maintaining said contact fingers in alignment on said carrier, said assembly being supported on said slide bar in said transverse aperture, and said means on said contact fingers cooperating with said carrier also engaging the side surfaces of said aperture for securing said assembly to said slide bar, said assembly being removable from said aperture when said contact fingers are released from cooperating engagement with said side surfaces of said aperture.

6. A contact device comprising an insulating slide bar having a transverse aperture, a contact supporting assembly including a plurality of contact fingers, a biasing means and a substantially continuous channel shaped carrier, a recess in said contact fingers, shoulders formed in said contact finger by said recess, said contact fingers being supported on the inner surfaces of said carrier and aligned by cooperation of said shoulders with said carrier and biased against said inner surfaces by said biasing means, said contact fingers being rotatable with respect to said carrier while being maintained thereon, said assembly being insertable into said aperture upon rotation of said contact fingers with respect to said carrier, and said shoulders on said contact fingers cooperating with exterior surfaces of said slide bar for securing said assembly to said slide bar, said assembly being removable from said aperture when said shoulders are released from cooperating engagement with said exterior surfaces of said slide bar.

7. A contact supporting assembly including a plurality of contact fingers, a biasing means, and a contact carrier, said carrier being spool shaped and having a centrally cylindrical shaft with end shoulders of larger diameter than said shaft, said contact fingers being apertures to slidably fit around said central shaft, and said biasing means biasing said contact fingers into engagement with the interior surfaces of said shoulders to maintain said fingers in position in said assembly.

8. A contact device comprising; an insulating bar having a transverse aperture therein, a movable contact assembly including; a carrier, at least one bridging contact finger having contact portions on the remote ends thereof, a biasing means arranged to position the finger on the carrier, said carrier, finger and biasing means being movable as an assembly into a predetermined position in the aperture and means on the finger for maintaining the assembly in the position in the aperture.

9. A contact device comprising; an insulating bar having a transverse aperture therein, a movable contact assembly bodily movable into a predetermined position in the aperture; said assembly including; a carrier, at least one contact finger positionable on the carrier and a biasing means for maintaining the finger in position on the carrier and means on the finger for maintaining the assembly in position in the aperture after the assembly is bodily moved into said position in the aperture.

10. A contact device comprising; an insulating bar having a transverse aperture therein, a movable contact assembly bodily movable as a unit into a predetermined position in the aperture, said assembly including; a carrier, at least one contact finger having spaced contact portion thereon, and a biasing means for positioning the finger on the carrier, and means including notched portions on said finger for maintaining the assembly in the predetermined position in the aperture after the assembly is bodily moved therein.

11. A contact device comprising; an insulating bar having an aperture extending therethrough, a movable contact assembly bodily movable into a predetermined position in the aperture; said assembly including; a carrier, at least one contact finger, each of said fingers being positionable in a predetermined position on the carrier and having contact portions thereon, spring means for normally maintaining each finger in the predetermined position on the carrier, said fingers being rotatable relative to the carrier to permit insertion of the assembly in the aperture and being rotatable relative to the bar and carrier when the assembly is in the aperture to provide a wiping action for the contact portions when the contact portions engage other contacts, and a notch in at least one of the fingers for maintaining the assembly in the predetermined position in the aperture.

12. In a contact device, the combination comprising; a member having an aperture extending therethrough, a movable contact assembly bodily insertable as a unit into a predetermined position in the aperture, said assembly comprising a carrier, a pair of contact fingers and spring means for maintaining said fingers in spaced positions on the carrier, and means on at least one of the fingers for maintaining the assembly in the predetermined position after the assembly is bodily inserted into the position in the aperture.

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