

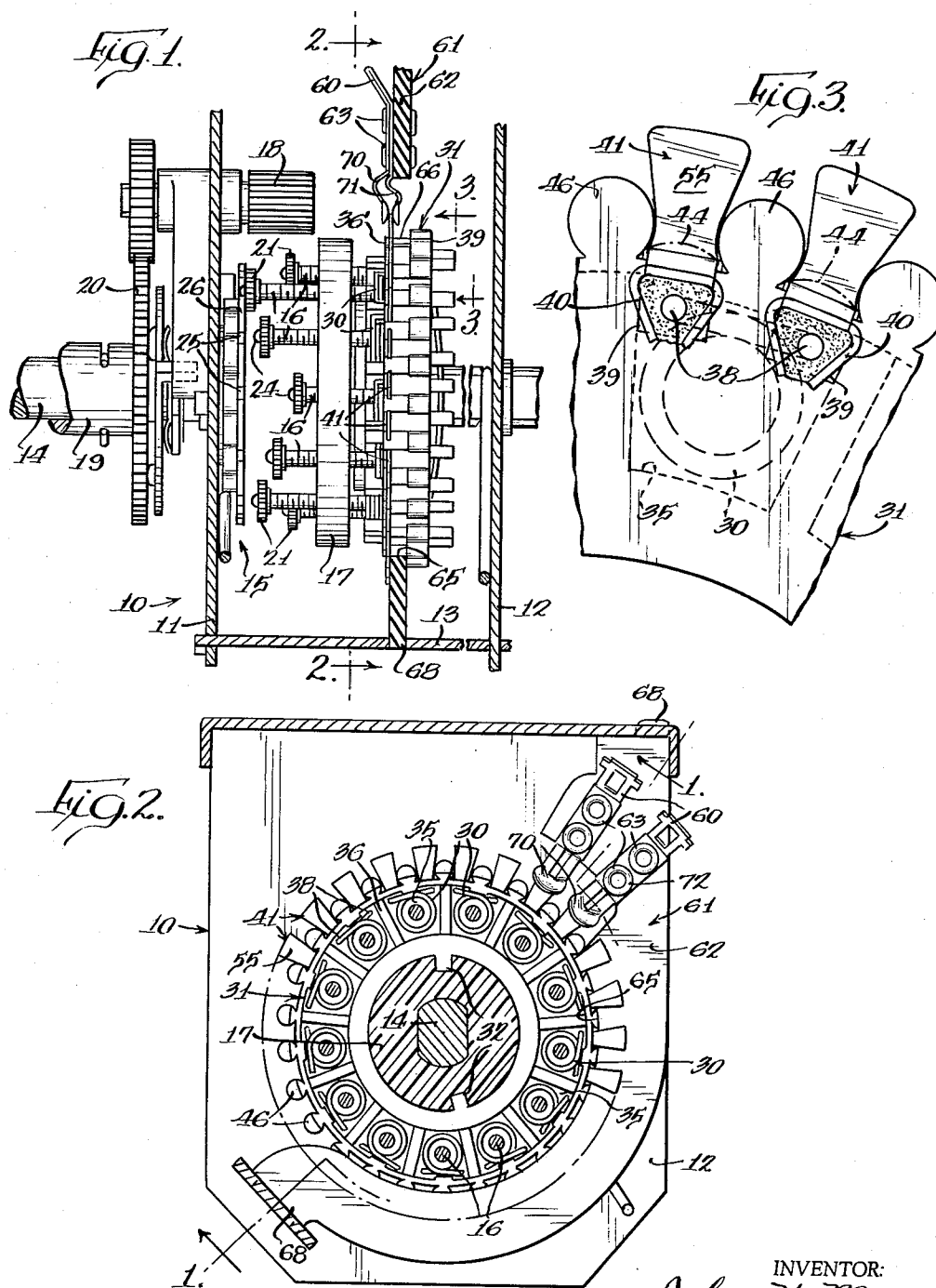
Oct. 5, 1965

J. Y. MA
TIME TUNER ASSEMBLY WITH MOVABLE ELECTRICAL
COMPONENT AND CONTACT STRUCTURE

3,210,485

Filed Oct. 24, 1962

2 Sheets-Sheet 1



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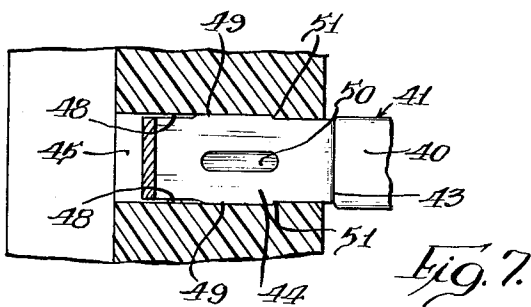
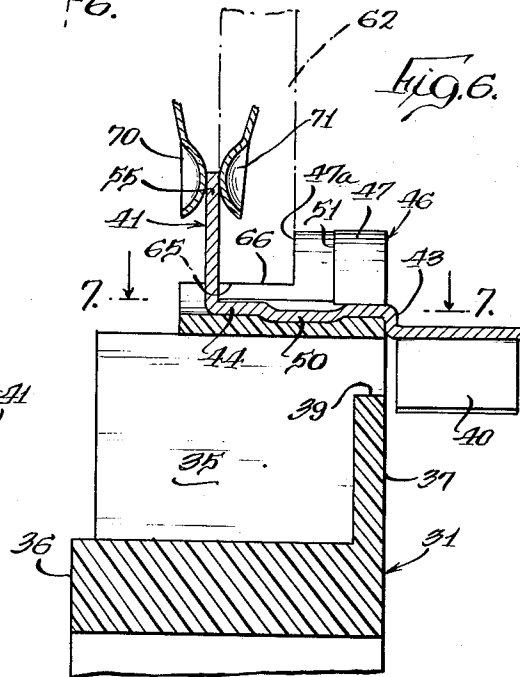
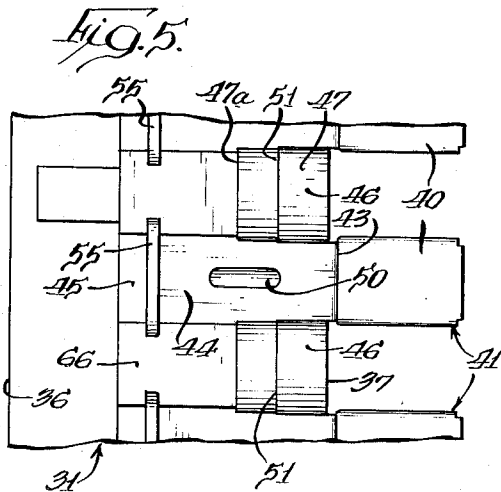
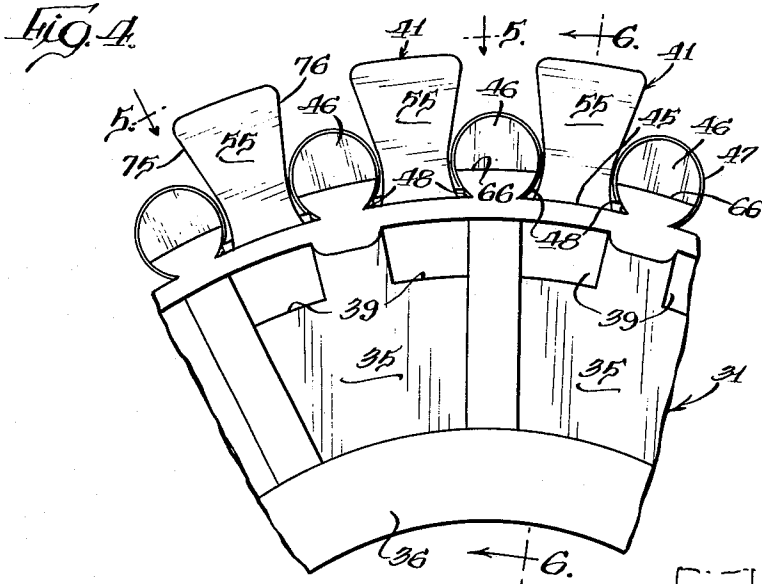
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TIME TUNER ASSEMBLY WITH MOVABLE ELECTRICAL COMPONENT AND CONTACT STRUCTURE

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12 Claims. (Cl. 200—11)

This invention relates to electrical apparatus, and more particularly to cooperating rotor and stator apparatus in a fine tuner as for a television receiver.

The primary object of this invention is to provide new and useful electrical apparatus.

An important object is to provide a novel and practical electrical assembly which is dependable, durable and relatively inexpensive to manufacture.

Another object is provision of new and useful fine tuner apparatus having a rotor and stator interlocked for operatively positioning improved electrical contact means which cooperate in mounting electrical components on the rotor. A related object is provision of such an interlocked assembly wherein the stator is received in a rotor channel defined in part by rotor contacts. Still another related object resides in the previously mentioned electrical components being received in rotor compartments and secured therein by component leads secured to the rotor contacts.

A further object is provision of new and useful construction for mounting contacts wherein the contacts are held on a mount prior to securing the contacts to the mount.

A still further object is provision of new and useful cooperating blade and jaw contacts wherein the blade forces the jaws apart from an inner portion of the jaws outwardly.

Another object is provision of new and useful means for mounting components on a body.

Other objects and advantages of the invention will become readily apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a fragmentary sectional view taken generally along the line 1—1 of FIGURE 2 with certain parts broken away for clarity;

FIGURE 2 is a vertical sectional view taken generally along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged, fragmentary view taken generally along the line 3—3 of FIGURE 1, with phantom lines indicating a portion of contact structure prior to being fixedly secured to a rotor;

FIGURE 4 is a view similar to FIGURE 3 but looking in the opposite direction;

FIGURE 5 is a fragmentary view taken generally along the line 5—5 of FIGURE 4;

FIGURE 6 is a fragmentary sectional view taken generally along the line 6—6 of FIGURE 4; and

FIGURE 7 is a fragmentary sectional view taken generally along the line 7—7 of FIGURE 6.

While an illustrative embodiment of the invention is shown in the drawings and will be described herein, the invention is susceptible of embodiment in many different forms, and it should be understood that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

The illustrated embodiment of the present invention relates to improvements in a "Fine Tuner" as disclosed in Serial Number 204,182, filed June 21, 1962, and reference may be had thereto for a further description of the general environment described hereinafter.

As is more fully described in the previously mentioned patent application, and as may best be seen in FIGURES 1 and 2, a fine tuner includes a chassis 10 having a front wall 11 and rearwardly thereof another wall 12, these walls being suitably interconnected as by a bottom wall 13. A channel selecting shaft 14 extends rotatably through walls 11 and 12 and is suitably held against axial movement. Indexing means, as 15, suitably couple chassis 10 and shaft 14 for providing step-by-step rotation of the shaft in selecting successive channels. Fine tuning adjusting screws 16 concentric about shaft 14 are threadedly mounted in a support 17 for movement generally parallel to the axis of shaft 14, and support 17 is suitably keyed to shaft 14 for rotation therewith in order to position the adjusting screw corresponding to the channel selected by shaft 14 in operative position for engagement by a gear 18. This gear is operated by rotating a fine tuning shaft 19 telescoped over shaft 14 and coupled with gear 18 by suitable drive linkage 20 for moving gear 18 into engagement with a gear head 21 of the adjusting screw corresponding to the channel selected and for rotating this adjusting screw to move it axially, thus affecting fine tuning of the local oscillator for the selected channel, as will be more fully discussed hereinafter. As may be best seen in FIGURE 1, gear head 21 of each adjusting screw is provided with a knob or boss 24. By operation of fine tuning shaft 19, the adjusting screw corresponding to the channel selected may be threaded axially to seat its boss 24 in a peripheral notch 25 in a disc 26 of index mechanism 15, so that during automatic operation of the tuner, a homing control will by-pass any inactive channels, as is fully described in a U.S. patent application of Kornacker for a "Tuning Homing Control," Serial No. 232,722 filed October 24, 1962.

Fine tuning of the channel selected through indexed operation of shaft 14 is effected, in the illustrated embodiment, by varying the inductance of the oscillator coil for the channel selected. Herein each channel is provided with an inductor in the form of a coil 30 and the end of the corresponding adjusting screw 16 opposite gear head 21 provides a slug movable axially in the coil to vary the inductance of a circuit responsive to operation of fine tuning shaft 19. Coils 30, or other suitable electrical components, are secured to a rotor 31 mounted on shaft 14 for rotation therewith, as by co-operating keying 32 on the rotor and support 17. More particularly, each coil 30, or other suitable electrical component, is received in a compartment 35 of a series of compartments concentric about the shaft and extending longitudinally in a direction generally parallel to the axis of the shaft, with one end of each compartment 35 opening through a side 36 of the rotor and the opposite end of each compartment closed by an opposite side 37 of the rotor, as may best be seen in FIGURE 6. Referring to FIGURE 3, each coil 30 has a pair of leads 38 extending from the inner end of the coil through a pair of openings 39 in rotor side 37, one such pair of openings for each compartment 35. Each lead 38 is secured, as by solder, to a respective terminal portion 40 of a rotor contact 41, these contacts being paired corresponding to the channel selected, and firmly mounted on rotor 31 as will be described hereinafter. Thus means is provided securely holding the respective coil 30 in its compartment 35.

With particular reference to FIGURE 6, in assembling rotor 31, contacts 41 are held in position on the periphery of the rotor by a stepped portion 43 seated against rotor side 37, with an arched body portion 44 (phantom lines in FIGURE 3) extending transversely from shoulder portion 43 and received in a channel 45 defined by surfaces of ribs 46 extending longitudinally

of the shaft axis and along the outer peripheral edge of the rotor. Each rib has a generally circular part 47 extending from rotor side 37 to a shoulder 47a so as to define a generally undercut portion 48 adjacent the bottom of the respective channel, as may best be seen in FIGURE 4. When contact body 44 is in its initially arched form, it may be slipped into its channel with opposed side edges 49 of body 44 received in adjacent undercuts 48 and contact shoulder portion 43 seated against rotor side 37. Contact body 44 is initially arched so that a concave face is facially opposed to the bottom of the channel, and upon distending contact body 44 laterally, for example by indenting the arched portion as at 50 in FIGURE 6, side edges 49 are moved into tight engagement with undercut portions 48, thus holding the contact on the rotor. In order to firmly secure the contact to the rotor, circular rib portions 47 are provided with aligned shoulders 51 extending transversely across the ribs and facing in a direction away from rotor side 37. Thus, when arch contact body 44 is distended outwardly, the side edges 49 bend about shoulders 51 to prevent the contact from being moved outwardly of its channel past rotor side 37. As may best be seen in FIGURE 6, indentation 50 in contact body 44 may indent rotor 31 to further interlock the contact with the rotor.

Each rotor contact 41 is provided with a contact blade, as 55, extending radially outwardly from the peripheral edge of rotor 31. Upon indexed rotation of channel selector shaft 14 the pair of rotor contact blades 55 corresponding to coil 30 of the channel selected are engaged by a pair of contact clips 60 of a stator 61. Stator 61 has a relatively rigid body 62 to which the stator contacts 60 are firmly secured in any suitable manner as by rivets 63.

In order to retain stator contact 60, properly aligned with rotor contacts 41, the stator body is provided with a circularly arched inner peripheral edge 65 received in a circumferentially extending peripheral channel 66 in rotor 31. In the illustrated embodiment, rotor channel 66 is defined by the series of rotor contact blades 55 and adjacent shoulders 47a on ribs 46, as illustrated in FIGURE 6. Suitable means, such as stator body tabs 68, received in openings in chassis 10 hold stator 61 operatively positioned in channel 66 to maintain a stator accurately aligned and interlocked with rotor 31.

Accurate alignment of the stator and rotor contacts is particularly desirable in providing improved cooperation between the contacts. In the illustrated embodiments, stator contacts 60 each have opposed resilient jaws 70 and 71 normally urged against each other and between which rotor contact blades 55 are gripped as they slide in a circular path between the jaws. Improved performance is provided by means forcing stator jaws 70 and 71 apart from the inside of each stator contact clip outwardly toward rotor 31 upon engagement of a blade with the jaws, and reverse operation as the blade and jaws part. It should be noted that stator contactor clip jaws 70 and 71 are joined to each other by a rivet 72 at an inner portion of the respective contact, and the jaws extend outwardly from this fixed inner portion along an axis disposed radially of the shafts, in the illustrated embodiment. Each rotor contact blade 55 is fan-shaped with opposite edges 75 and 76 diverging inwardly along the stator jaw axis toward the inner jaw portion when the rotor blade is in normal engagement with the jaw. Thus, as the rotor blade moves into engagement with a stator jaw, as 70 or 71, a leading blade edge, as 76, defines, with the axis of the cooperating jaw, an acute angle opening generally outwardly from the stator contact rivets 72 between approaching portions of the axis and blade edge, thus first engaging an inner portion of the jaws and spreading jaws apart in a direction outwardly along the respective jaw axis. Simi-

larly, as a blade 55 moves out of engagement with a jaw, a trailing blade edge, as 75, moves out of engagement with the jaws from outer portions of the jaw inwardly along the respective jaw axis.

I claim:

1. In electrical apparatus: a rotor having a side, an axis of rotation transverse to said side, and compartments about said axis for receiving electrical components, and apertures in said side one opening into each compartment, said rotor having an outer peripheral surface and a series of channels in said surface, each channel defined by a pair of spaced apart ribs with each rib being provided with a surface having shoulder means facing away from said side, rotor contacts, one for each channel, each rotor contact having a portion seated against said side and a body transverse to said portion and received in the respective channel, said body having opposite edges, one edge extending along each of the adjacent ribs in tight engagement with the adjacent ribs and shoulder means for firmly anchoring said rotor contacts on said base, and said rotor having a circumferentially extending stator receiving channel; a stator having contacts each with resilient jaws selectively receiving said rotor contacts, the jaws of each stator contact being joined at an inner portion and extending outwardly therefrom, and a stator body mounting said stator contacts and slidably received in said stator receiving channel to maintain the rotor and stator contacts operatively aligned; means comprising cooperating portions of said rotor contacts and stator jaws opening each jaw in a direction from the respective inner portion outwardly along the respective jaw axis as a jaw and blade move into engagement with each other; electrical components, one seated in each of said compartments and having a lead extending through the respective aperture; and means securing the lead of each component to an adjacent rotor contact to hold the respective component in its compartment.

2. In a tuner: a rotor including a base having opposite sides and an axis of rotation transverse to said sides, said base having compartments about said axis with an end of each compartment opening through one of said sides for insertion of an electrical component into the respective compartment, and pairs of apertures, one pair extending through the other side of said base and opening into each compartment, an outer peripheral surface of said base having a series of channels each defined by spaced apart ribs, said ribs having shoulder means facing away from a first of said sides and aligned outwardly extending shoulders generally parallel to said side, contacts, one for each channel, each contact having a portion seated against the first side and a body transverse to said portion and received in the respective channel, said body having opposite edges, one edge extending along each of the adjacent ribs in tight engagement with the adjacent rib and shoulder means, each contact having a blade extending outwardly from said base and spaced from and generally parallel said rib shoulders to define therewith a stator receiving channel; a stator having contacts with resilient jaws selectively receiving said blades, the jaws of each stator contact being joined at an inner portion and extending outwardly therefrom along a generally radial axis, and a body mounting said stator contacts and having an edge portion slidably received in said stator receiving channel to maintain said rotor and stator contacts operatively aligned; means holding said edge portion in the last said channel; means comprising cooperating portions of said blades and jaws opening each jaw in a direction from the respective inner portion outwardly along the respective jaw axis as a jaw and blade move into engagement with each other and closing each jaw in a direction inwardly along the respective jaw axis toward said inner portion as a jaw and blade part; electrical components, one seated in each of said compartments and having a pair of leads, one extending through each aperture of the respective pair of apertures; and

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means securing the leads of each compartment to adjacent rotor contacts to hold said components in said compartments.

3. In electrical apparatus: a rotor including a base having opposite sides and an axis of rotation transverse to said sides, said base having a series of compartments concentric about said axis and extending longitudinally in the general direction of said axis with an end of each compartment opening through one of said sides for insertion of an electrical component therethrough and into the respective compartment, and pairs of apertures, one pair extending through the other side of said base and opening into each compartment, rotor contacts firmly anchored on said base; electrical components, one in each of said compartments and having a pair of leads, one extending through each aperture of the respective pair of apertures; and means securing the leads of each component to adjacent rotor contacts to hold said components in said compartments.

4. A rotor comprising: a generally cylindrical base having opposite sides and an axis of rotation transverse to said sides and centrally thereof, said base having a plurality of rotor contacts firmly mounted thereon; a series of compartments in said base concentric about said axis and extending longitudinally in the general direction of said axis with an end of each compartment opening through one of said sides for insertion of an electrical component therethrough; a component in at least one of said compartments; and means defining pairs of apertures concentric with said axis, one pair extending through the other side of said base and opening into each compartment, said apertures each receiving therethrough one lead of a pair of leads on the electrical component in the respective compartment whereby said leads are secured to one of said rotor contacts to hold said components in said compartments.

5. In electrical apparatus: a rotor including a base having an external side and an outer peripheral surface transverse to said side with a series of channels in said surface, the rotational axis of said rotor being transverse to said side, each channel defined by a pair of spaced apart ribs having opposite ends, each rib having shoulder means between the ends thereof facing away from said side, and contacts, one for each channel, each contact having a portion seated against said side and a body transverse to said portion and received in the respective channel, said body having opposite edges, one edge extending along each of the adjacent ribs in tight engagement with the adjacent rib and shoulder means, for firmly anchoring said contacts on said base.

6. In electrical apparatus: a base having a side and transverse thereto a channel defined by a pair of spaced apart ribs having opposite ends, each rib having a shoulder between the ends thereof facing away from said side; and a contact having a portion seated against said side and a body transverse to said portion and having opposite edges, one extending along each of said ribs and held in tight engagement with the respective rib and shoulder for firmly anchoring said contact on said base.

7. In electrical apparatus: a yieldable base having a generally planar side and transverse thereto a channel; and a generally L-shaped contact having a first leg received in said channel with an off-set portion thereof seated against said planar side to position said contact on said base, said contact having a second leg extending outwardly from said channel spaced from and in substantial parallelism with said side.

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8. In the apparatus of claim 7, wherein said first leg is provided with opposite edges in tight engagement with said base along said channel.

9. In electrical apparatus: a rotor including a base having an outer peripheral surface with a series of channels in said surface, each channel defined by a pair of spaced apart ribs having opposite ends, each rib having shoulder means between the ends thereof, and contacts, one for each channel, each contact having a body received in the respective channel, said body having opposite edges, one edge extending along each of the adjacent ribs in tight engagement with the adjacent rib and shoulder means, for firmly anchoring said contacts on said base.

10. In electrical apparatus: a base having an external channel on an outer surface thereof, said channel being defined by spaced apart sides having opposite ends, each side being provided with an abutment between the ends thereof transverse to the axis of said channel; and a contact having a portion received in said channel, said contact having opposite edges, one extending along each of said sides and held in tight engagement with the respective side and abutment.

11. In electrical apparatus: a rotor including a base having an axis of rotation and an outer peripheral surface about said axis, said surface having aligned outwardly extending shoulder means integral with said base and transverse to said axis, contacts firmly anchored on said base, each contact having a blade extending outwardly from said base, the blades being spaced from and generally parallel to said shoulder means to define therewith a stator receiving channel; a stator having contacts selectively engaging said blades, and a body mounting said stator contacts and having an edge portion snugly and slidably received in said stator receiving channel to maintain said rotor and stator contacts operatively aligned; and means holding said edge portion in the last said channel.

12. In rotary switch: rotor and stator members having cooperating contacts, one of said members having a channel with a side thereof defined by the contacts of the last said member, and the other of said members having an edge portion snugly and slidably received in said channel to maintain said stator and rotor contacts operatively aligned; and means to hold said edge portion in said channel.

References Cited by the Examiner

UNITED STATES PATENTS

1,731,756	10/29	Snyder	200—16
1,746,911	2/30	Smart	200—16
2,039,957	5/36	Hall	200—166
2,177,483	10/39	Hall	200—15
2,431,366	11/47	Buell	
2,535,686	12/50	Lawrence	200—11
2,554,724	5/51	Williams	200—11
2,650,960	9/53	Allison	200—15
2,828,393	3/58	Wingard	200—166 X
2,878,330	5/59	Grashoff et al.	200—8
2,900,461	8/59	Allison	200—11 X
2,949,511	8/60	Glueckstein et al.	200—166 X
2,949,522	8/60	Glueckstein et al.	200—11 X
2,976,476	3/61	Snowdon	336—150 X

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