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SWITCH SECTION FOR A ROTARY ELECTRIC SWITCH

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FIG. 1.

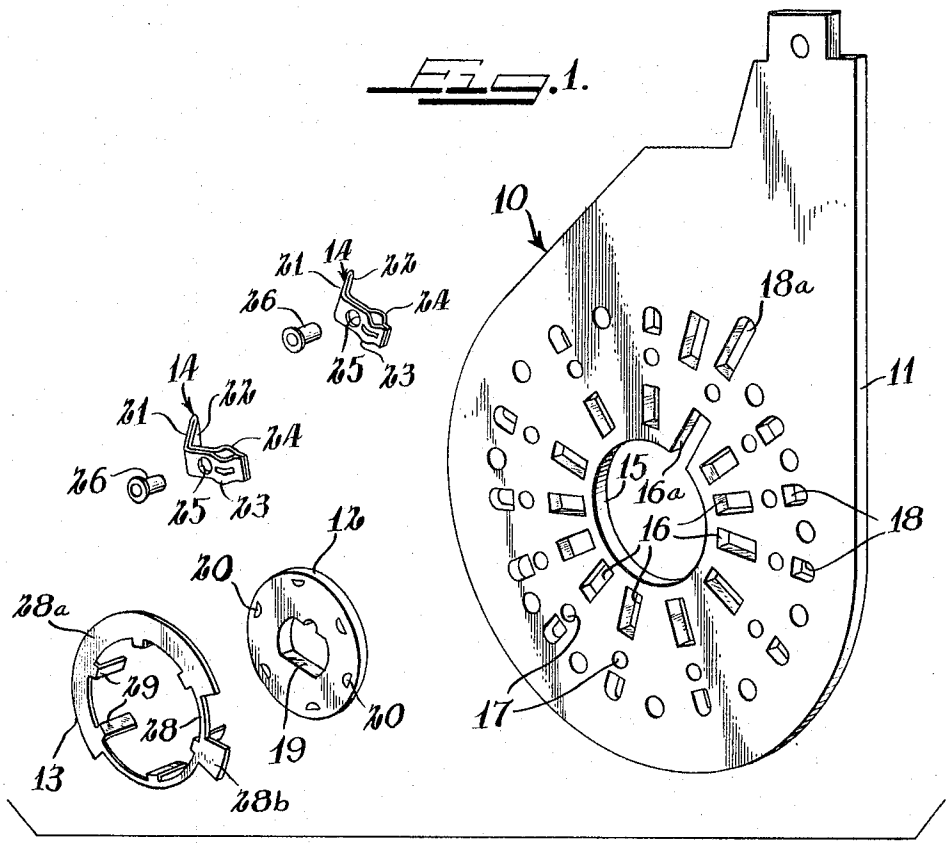


FIG. 3.

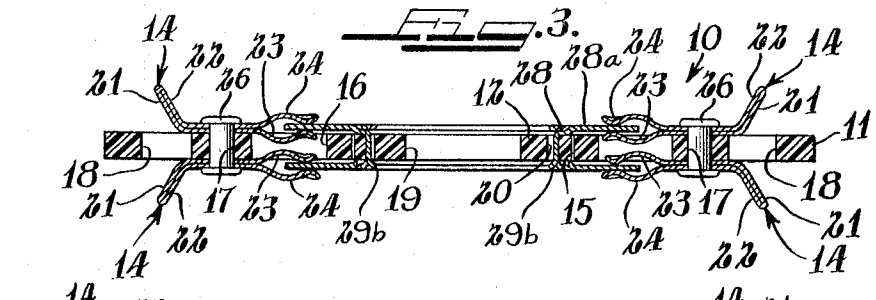
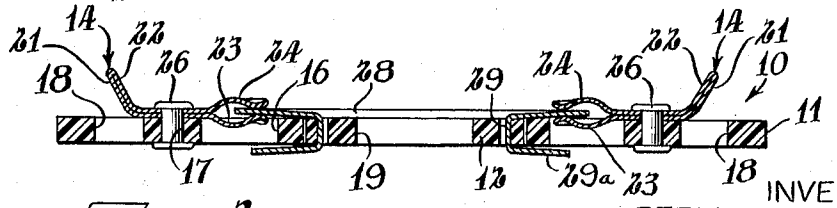


FIG. 2.



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SWITCH SECTION FOR A ROTARY ELECTRIC SWITCH

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1 Claim. (Cl. 200—11)

This invention relates in general to rotary switches; and more particularly to a new and improved rotary electric switch section, and to the method of manufacturing the same.

Heretofore, the rotor and stator of a switch section have been formed from different pieces of material, with the rotor usually being somewhat thicker than the stator, and carrying one or more rotor contacts which are movable into and out of engagement with stator contacts mounted on the stator. In the past, stator sections have usually been manufactured by die cutting or otherwise perforating a blank to form a bore for rotatably accommodating a rotor, and to provide a plurality of apertures for mounting the stator contacts. Rotor sections have been manufactured by die cutting or otherwise perforating a separate blank to form a bore for a switch shaft, and to form a plurality of apertures for mounting the rotor contacts. It is conventional to stack or laminate a plurality of layers of suitable insulating material to provide a rotor which is somewhat thicker than the stator. The rotor is then assembled in the stator bore, and the rotor and stator contacts are secured to their respective sections, to complete the switch section. The thicker rotor section provides running clearance between the rotor contacts and the stator. Such switch sections have proven to be expensive to manufacture. These switch sections are expensive to manufacture because the portion which is removed from the stator blank to form the stator bore is discarded as scrap and wasted. Accordingly, the general purpose of the present invention is to provide an improved switch section of the character described.

An object of the invention is to provide a rotary electric switch section which is simple in construction, and relatively inexpensive to manufacture and maintain.

Another object of the invention is to provide an improved method for manufacturing a rotary electric switch section as described above.

A further object of the invention is to provide a rotary electric switch as described above wherein the rotor and the stator are provided from the same piece of material.

A related object of the invention is to utilize the portion of the stator section which is removed therefrom to form the stator bore as the rotor section.

A still further object of the invention is to provide a rotary electric switch section wherein the stator and rotor contacts are free to flex transversely of the plane of the switch section so that the rotor contacts can move into and out of engagement with the stator contacts without interference.

Still another object of the invention is to provide a switch section as described above wherein the tail of the rotor contacts retain the rotor against axial movement relative to the stator.

These and other objects of the invention will hereinafter become more fully apparent from the following description taken in connection with the annexed drawing, wherein:

FIGURE 1 is an exploded perspective view of a rotary electric switch section embodying the principles of the present invention;

FIGURE 2 is a generally central sectional view through a switch section such as that shown in FIGURE 1; and

FIGURE 3 is a central sectional view similar to FIGURE 2, but showing a different form of the invention.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawing and will herein be described in detail one specific embodiment and a modification thereof, with the understanding 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 embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawing, wherein like reference characters designate like or corresponding parts throughout the several views, the switch section **10**, illustrated in FIGURE 1, is shown to include a stator **11**, a rotor **12**, a rotor contact **13**, and a plurality of stator contacts **14**. Stator 10 is formed from a suitable piece of insulating material, and includes a bore **15** and a plurality of sets of radially aligned apertures **16**, **17** and **18**. The rotor **12** includes a central opening **19** of the non-circular cross-sectional configuration (as a "Double-D" configuration) for reception of a complementary shaped driving shaft. As can be best seen in FIGURES 2 and 3, the thickness of rotor **12** is substantially the same as the thickness of stator **11**, and the outer diameter of rotor **12** is slightly less than the inner diameter of the bore **15**. Rotor **12** is provided with a plurality of spaced apertures **20** adjacent the outer periphery thereof for mounting of the rotor contact **13**.

The stator contacts **14** are formed from a resilient piece of conductive material which is folded upon itself to define a pair of contact legs **21** and **22**, that terminate in contact jaws **23** and **24**, respectively. Each stator contact **14** is provided with an aperture **25** between the ends thereof, and each of the apertures **25** are positioned in alignment with a stator aperture **17**. The outer end of each stator contact **14** is positioned in alignment with a stator aperture **18**, and the outer ends of the stator contacts are inclined away from the plane of the stator. If desired, the outer ends of the stator contacts may be bent downwardly through its respective aperture **18**. Each pair of stator contact jaws **23** and **24** is positioned in alignment with a stator aperture **16**, and the jaws **23** extend downwardly slightly into the aperture **16**. A suitable fastener, such as rivet **26**, impales each pair of aligned apertures **17** and **25**, and the outer ends of the rivets **26** are deformed into engagement with the stator contact legs **22** to retain the stator contacts **14** on the stator **11**. The rivets **26** urge the stator contact jaws **23** and **24** into engagement with one another in a plane which is spaced slightly from, and parallel with the plane of the stator **11**, and the stator contact jaws **23** and **24** are free to flex transversely of the plane of stator **11** because of their alignment with aperture **16**. Certain of the stator contacts **14** may be longer than the other stator contacts and to receive them, elongated openings **16***a* and **18***a* (FIGURE 1) are provided.

Rotor contact **13** includes an annular ring **28** having a first radially enlarged portion **28***a* and a second further radially enlarged portion **28***b*. As is well known in the art, a long stator contact, as for example the stator contact aligned with openings **16***a* and **18***a*, is in constant engagement with rotor contact portion **28**, while rotor contact portion **28***a* may move into and out of engagement with stator contacts of intermediate length, and rotor contact portion **28***b* moves into and out of engagement with the shorter stator contact. A plurality of legs **29** extend generally downwardly from the ring **28** at the inner diameter thereof, and are positioned in openings **20**, as can be best seen in FIGURE 2. The lowermost portion **29***a* of the legs **29** are bent outwardly so as to

underlie the innermost portion of the stator **11**. The bent leg portions **29***a* provide means for positively restraining the rotor **12** against axial movement relative to the stator **11**. Legs **29** are bent so that leg portions **29***a* diverge slightly with respect to contact portion **28**, to provide running clearance for the rotor.

In the embodiment shown in FIGURE 3, it will be noted that pairs of stator contacts **14** are provided on opposite sides of the stator **11**, and are retained by a common rivet **26**. Rotor contacts **13** are provided on both the top and bottom surfaces of the rotor **12**, and the rotor contact legs **29** on each rotor contact pass thrugh alternate openings **20** in the rotor **12**. With such a construction, the lower end of the rotor contact legs **29** are deformed outwardly, as shown at **29***b*, to retain the rotor contacts on the rotor. The annular rotor contact portions **28**, on both the top and the bottom of the rotor are provided with offset portions **28***a* which are spaced from and generally parallel with the plane of the stator to provide suitable running clearance for the rotor.

The aforedescribed switch sections are manufactured by first punching, die cutting, or otherwise forming the openings **16–20** in a single piece of material. The rotor **12** is then cut or otherwise removed from the blank, and the size relationship between the resulting stator bore **15** and the rotor **12** is altered so that the outer diameter of the rotor is less than the inner diameter of the bore. This may be accomplished by either scraping the bore **15** or the outer periphery of the rotor **12**, but it is preferred to scrape the bore **15** to provide a smooth bearing surface on the stator. In an illustrative embodiment, wherein the outer diameter of the rotor is

$$.542^{+.003}_{-.001} \text{ inches}$$

the inner diameter of the bore **15** is shaved to

$$.548^{+.003}_{-.001} \text{ inches}$$

When it is desired to assemble the switch section, the rotor **12** is inserted in the bore **15**, and the contacts **13** and **14** are mounted on the rotor **12** and the stator **11**, respectively. The stator is preferably of an insulating material as a phenolic resin. More particularly, a XXXP, paper base phenolic sheet has excellent properties. The punching operation which removes the rotor **12** from the

stator opening leaves a rough surface in the opening **15**. The shaving process by which the opening is enlarged smooths the surface providing a smooth bearing for the rotor.

From the foregoing it will be readily apparent that the present invention provides a novel and compact switch section which is inexpensive to manufacture and reliable in use, and which fully accomplishes each of the objects of the invention.

We claim:

A multi-position rotary switch of the character described, comprising a stator having a rotor opening therein with a plurality of wiper clips thereon, surrounding the rotor opening, and a rotor in the rotor opening with a switch blade thereon for coaction with said wiper clips, said stator and rotor being of a phenolic resin material of the same thickness, the switch being formed by

removing a disc from a composite stator-rotor blank, forming the rotor opening, the disc forming the rotor,

scraping one of the peripheral facing surfaces of the stator and rotor to provide clearance and a smooth bearing surface between the stator and rotor, and

mounting plate means on the rotor, said plate means including said switch blade, which extend outwardly from the periphery of the rotor and have outer edge portions on each side of the stator surface surrounding said rotor opening, the outer edge portions of said plate means being spaced apart a distance greater than the thickness of said sheet material to provide running clearance with said stator.

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