Jan. 9, 1968 P. P. SCHWAB 3,363,068

ROTARY SELECTOR SWITCH WITH IMPROVED ROTARY BRUSH CONTACT ASSEMBLY

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FIG. 1

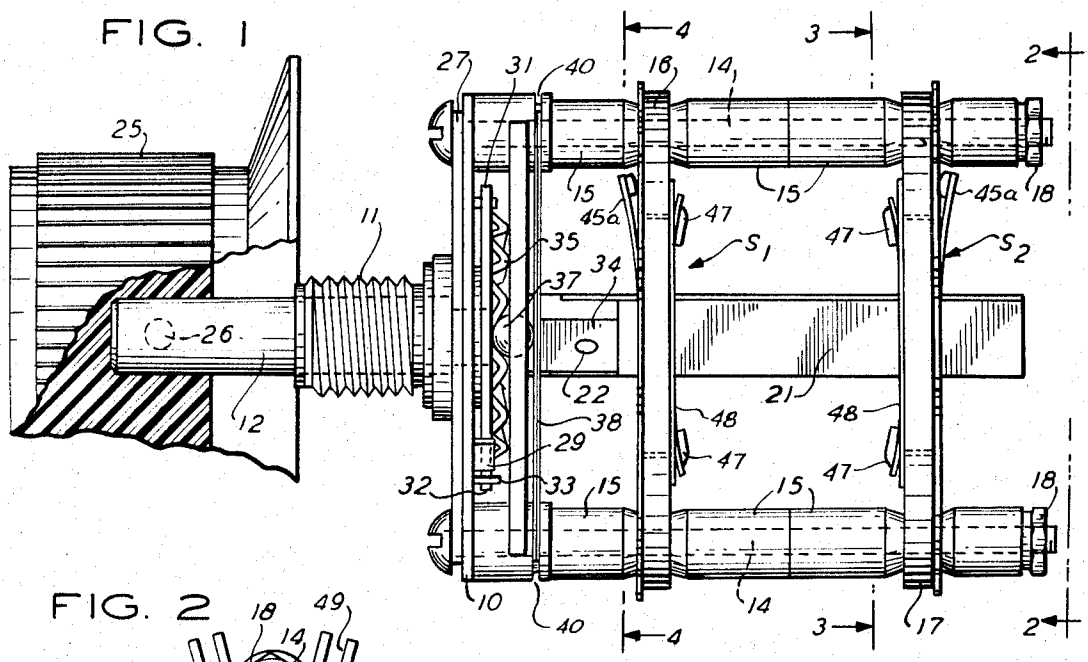


FIG. 2

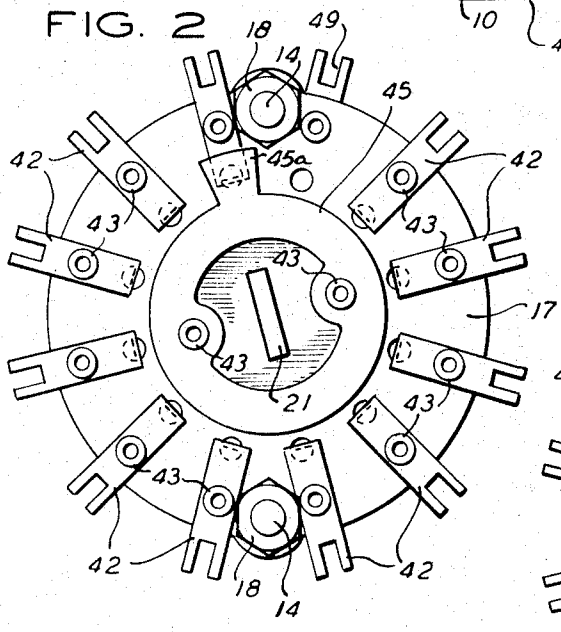
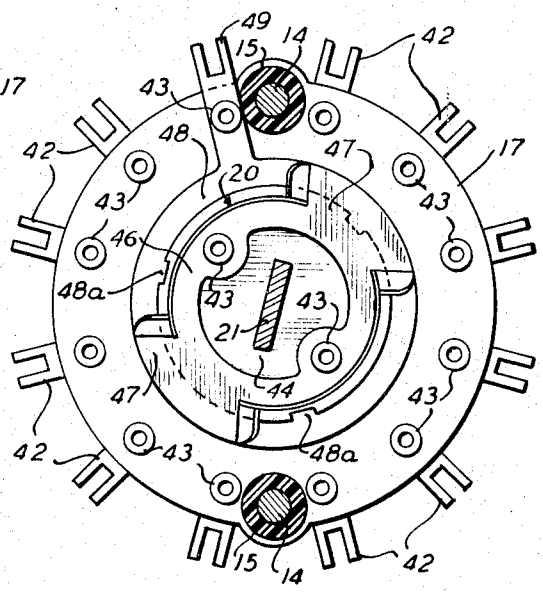


FIG. 3



INVENTOR
PIERRE P. SCHWAB

George H. Fritzinger

BY

AGENT

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FIG. 5

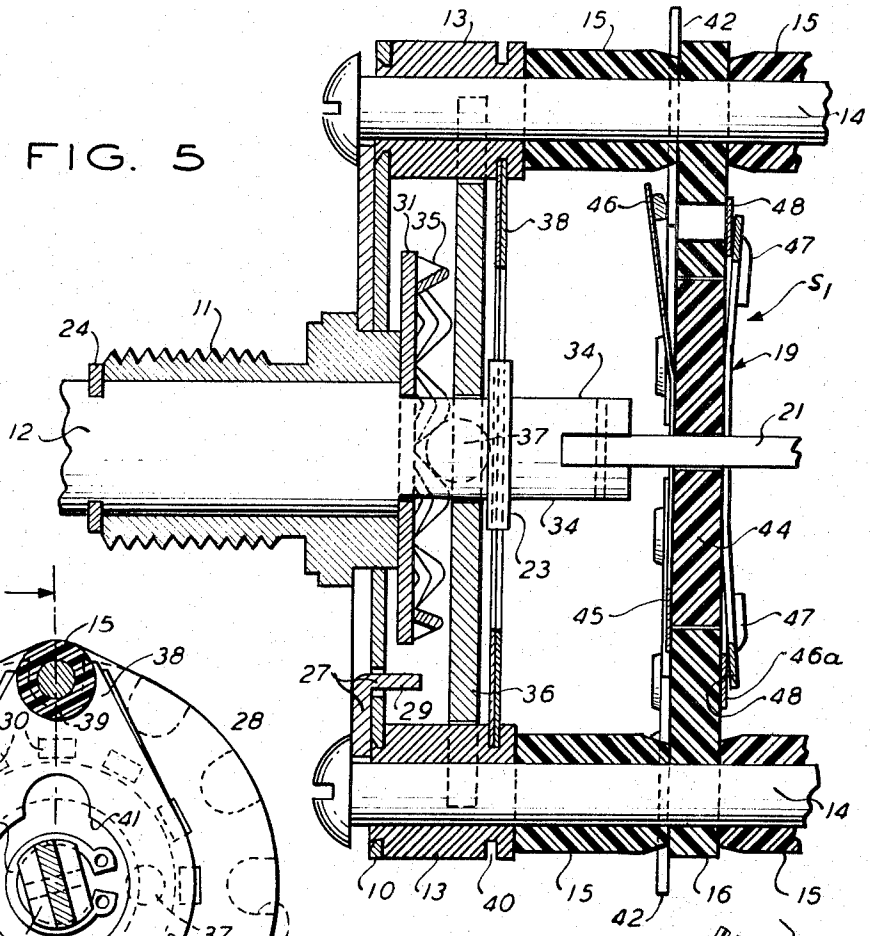
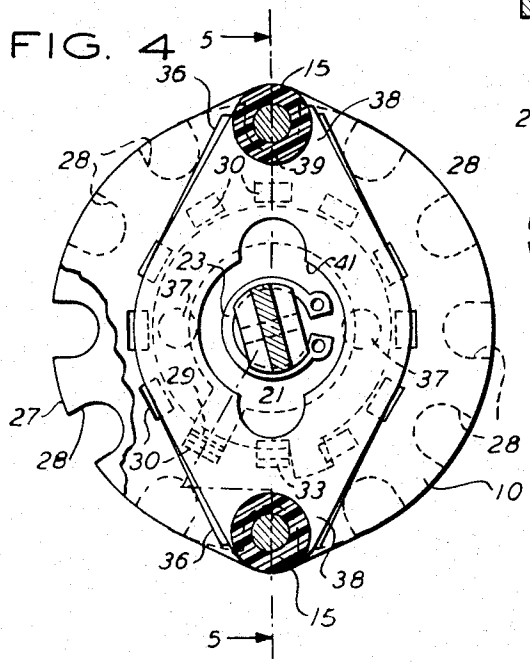


FIG. 4



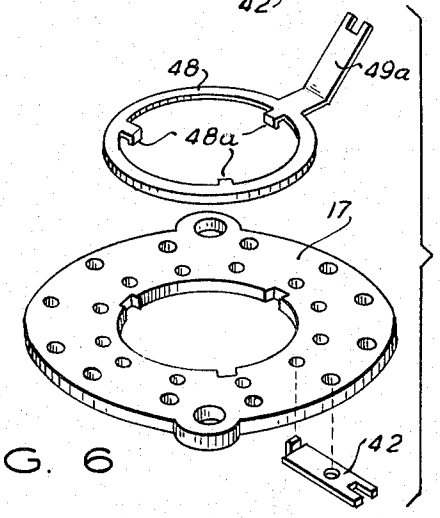


FIG. 6

INVENTOR
PIERRE P. SCHWAB

BY George H. Fritzinger
AGENT

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3,363,068

ROTARY SELECTOR SWITCH WITH IMPROVED ROTARY BRUSH CONTACT ASSEMBLY

Pierre P. Schwab, River Edge, N.J., assignor to McGraw-Edison Company, Elgin, Ill., a corporation of Delaware

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3 Claims. (Cl. 200—11)

ABSTRACT OF THE DISCLOSURE

A rotary selector switch with a stamped contact wafer assembly including a captive rotor brush-contact unit adapted to make a positive electrical circuit connection from an input terminal to the respective output terminals at each position of the switch.

This application relates to rotary wafer-type selector switches adapted for radio frequency circuits.

An object of the invention is to provide a low cost low capacity selector switch which is of a durable and high quality construction.

These and other objects and features of the invention will be apparent from the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawings, of which:

FIGURE 1 is a side elevational view, partly broken away, of a wafer-type rotary selector switch according to my invention;

FIGURE 2 is a rear end view of this switch as seen from the line 2—2 of FIGURE 1;

FIGURE 3 is a transverse sectional view taken on the line 3—3 of FIGURE 1;

FIGURE 4 is another transverse sectional view of the switch taken on the line 4—4 of FIGURE 1;

FIGURE 5 is a fractional sectional view to enlarged scale taken through the axis of the switch; and

FIGURE 6 is a partial exploded view illustrating an alternative embodiment of the invention.

The wafer-type selector switch shown in the accompanying drawing comprises a circular front mounting plate **10** having a central tubular bushing staked thereto forming a bearing **11** for a rotor shaft **12**. Staked also to the front plate **10** are two diametrically opposite tubular studs **13** which extend rearwardly from the back side of the plate. Traversing these tubular studs are long machine screws **14** on which are mounted one or more selector switches at suitable space intervals, there being two such switches S_1 and S_2 herein shown by way of example. For instance, on the screws **14** abutting the back ends of the tubular studs **13** are first tubular spacers **15** of insulative material. Against the spacers **15** is located a stator plate **16** of selector switch S_1 having apertures to receive the machine screws **14**. Next on the machine screws are two insulative sleeves **15** in end-to-end relation and against the back one of these sleeves is a stator plate **17** of the selector switch S_2. Further on the machine screws **14** against the back side of the stator plate **17** are insulative sleeves **15** against which are tightened nuts **18** threaded on the respective machine screws to secure the selector switches in fixed spaced relation to the front mounting plate **10**.

The stator plates **16** and **17** have central openings receiving respective rotors **19** and **20**. The rotor shaft **12** terminates short of the first selector switch S_1 and is provided with a diametrical slot in which is received an extending rotor blade **21** of insulative material secured to the rotor shaft by a cross pin **22**. The rotors **19** and **20** have rectangular apertures receiving the rotor blade **21** so as to couple the rotors to the shaft. The rotor shaft **12** is

secured against outward movement by an inner retainer ring **23** (FIGURE 5) and against inward movement by abutment of an outer retainer ring **24** against the bearing **11**. The rotor is turned by a manual knob **25** secured thereto as by a set screw **26**.

The switch has a stop detent mechanism comprising a stop plate **27** overlying the front mounting plate **10**. This stop plate has twelve equally spaced peripheral notches **28** (FIGURE 4) to clear the diametrically opposite mounting screws **14** in each of the different twelve positions in which the stop plate can be mounted. Lanced inwardly from the stop plate is a lug **29** which traverses the front mounting plate via a respective rectangular aperture **30** therein, there being twelve such rectangular apertures to allow the stop plate to be located in any one of twelve equally spaced positions. Secured to the rotor **12** against the back end of the bearing **11** is a detent stop disk **31** having a radial finger **32** for abutment against the lug **29** to serve as an adjustable stop for the rotor. Additionally, there is a fixed lug **33** struck inwardly from the front mounting plate **10** at one of the apertures **30** against which the radial finger **32** will abut to serve as a permanent stop for the rotor. In the broader aspects of the invention, as later explained, it will be understood that the permanent stop as well as the adjustable stop may both be eliminated so that the switch may be adjusted into any one of its twelve different positions.

The portion of the rotor shaft **12** extending beyond the bearing **11** has two diametrically opposite flats **34**, and the detent stop disk **31** has a non-circular hole fitting this portion of the rotor shaft so that the disk is splined to the shaft. Formed in the rearward side of the disk **31** are twelve corrugations at equal angular intervals about the center of the disk. Mounted rearwardly of the detent stop disk **31** is a detent ball plate **36** of an oval shape (FIGURE 4) having diametrically opposite notches receiving the tubular studs **13** to hold the detent ball plate from turning about the shaft. This detent ball plate has two diametrically opposite holes receiving respective spherical balls **37** in position to engage the corrugated portion of the detent stop disk **31**. Directly behind the detent ball plate is a flat detent spring **38** also of an oval shape having diametrically opposite portions with recesses **39** which engage respective grooves **40** in the tubular studs **13** to hold the detent spring against movement in both axial and rotational directions. This detent spring provides a yieldable backing for the respective spherical balls **37** to provide a yieldable engagement of the balls with the corrugated portion of the detent stop disk. Since the spherical balls **37** are confined by the detent ball plate and are urged yieldably by the detent spring **38** against the detent stop disk **31**, the rotor **12** becomes detented in each of twelve equally spaced positions. It is by abutment of the retainer ring **23** against the back wall of the detent ball plate **36** that the shaft **12** is confined against outward movement. A central opening **41** in the detent spring **38** provides clearance for the retainer ring **23**.

Each stator plate **16** and **17** is provided with eleven switch contact terminals **42** secured thereto by eyelets **43** in positions corresponding to the positions of the rotor determined by the detent mechanism above described, there being one vacant switch position when the switch is provided with the permanent stop **33** above described. The stator plates are in the form of circular disks of insulative material having large central openings to accommodate the respective rotors **19** and **20**. Each rotor comprises a disk **44** of insulative material having a clearance fit in the central opening of the respective stator disk. Each rotor is held captive with the respective stator plate. For example, on the side of the rotor corresponding to the side of the stator plate on which the contact

terminals 42 are mounted is an annular contact wiper 45 of a suitable metallic spring material which extends beyond the central opening of the stator plate and which has a contact finger 45*a* for engaging the ends of the respective terminals 42 as the rotor is turned through its respective switch positions. This contact wiper 45 is also secured to the rotor disk by eyelets 43. Electrically and mechanically secured by the same eyelets 43 to the opposite side of the rotor disk is a common ring wiper 46 of a metallic spring material. This wiper has two diametrically extending portions forming brushes 47 which extend beyond the central opening of the stator plate and ride on a common ring 48 mounted on the back side of the stator disk opposite the contact terminals 42. The common ring 48 is in concentric relation to the shaft of the switch and is held against turning by three anchoring lugs 48*a* turned inwardly to engage respective apertures in the stator disk. The common ring 48 has one radially extending terminal 49 at the vacant position of the switch terminals 42 before mentioned, which may also be secured to the stator disk by an eyelet 43 (FIGURES 2 and 3). Thus, an electrical circuit connection is completed from the fixed terminal 49 via the common ring 48, brushes 47, common ring wiper 46, central rotor eyelets 43 and contact wiper 45 to the respective stator terminals 42 depending on the positioning of the switch.

In an alternative embodiment illustrated in FIGURE 6 the stator disk is provided with twelve switch contact terminals 42—one at each of the twelve positions of the switch—and the common ring 48 is held in place solely by engagement of the anchor elements 48*a* with the stator disk and by the common ring wiper brushes 47 bearing against the common ring to hold it in engagement with the stator disk. The radial terminal 49*a* of the common ring is now bent obliquely upwardly away from the stator disk to clear the respective eyelet 43 which holds the switch contact terminal 42 in this twelfth position of the switch. Further, in this alternative embodiment, both the fixed stop 33 and the adjustable stop 29 are removed so that the switch can be turned into each of its twelve respective positions. Thus, the switch has an operative switch position in each of twelve equally spaced detented positions about the shaft of the rotor.

The embodiment of my invention herein particularly shown and described is intended to be illustrative and not necessarily limitative of my invention since the same is subject to changes and modifications without departure from the scope of my invention, which I endeavor to express according to the following claims.

I claim:

1. A wafer-type rotary selector switch comprising a front mounting panel having a central bearing, a rotor shaft journaled in said bearing, mounting rods on said front panel parallel to said shaft, a stator plate of insulative material supported by said mounting rods at right angles to said shaft and having a central opening concentric with the shaft, a set of spaced electrical terminals mounted on one side of said stator plate in an outer circle concentric with said shaft, a common connector ring on the other side of said stator plate in concentric relation with said shaft having anchor elements engaging said stator plate, and a rotor disk of insulative material in the central opening of said stator plate secured to said shaft and having a wiper brush on one side yieldably slidably engaging said common ring and a radial contact finger on the other side electrically connected to said brush for selectively engaging said respective electrical terminals with contact pressure as said rotor is turned to successive switch positions.

2. The wafer-type rotary selector switch set forth in claim 1 including a detent disk at the back side of the mounting plate splined to said rotor and having radial corrugations in a circular arrangement to define the respective positions of said switch, a stationary detent ball plate at the back side of said detent disk held against rotation by said mounting rods, said detent ball plate having a plurality of apertures overlying the corrugations of said detent disk, spherical balls in said respective apertures, and a flat detent spring at the back side of said detent ball plate secured at its outer edge to said mounting rods against rotational and axial displacement for providing a yieldable backing for said spherical balls whereby the engagement of the spherical balls with said detent disk serves to detent the rotor in its respective switch positions.

3. A wafer-type rotary selector switch comprising a front mounting panel having a central bearing, a rotor shaft journaled in said bearing, mounting rods on said front panel parallel to said shaft, a stator plate of insulative material supported by said mounting rods at right angles to said shaft and having a central opening concentric with the shaft, a set of spaced electrical terminals mounted on one side of said stator plate in an outer circle concentric with said shaft, a rotor of insulative material in the central opening of said stator plate secured to said shaft, an annular conductor member on one side of said rotor having an outer edge overlapping the inner circular edge of said stator plate and having a radial contact finger moved successively into contact with the inner end portions of said terminals as said rotor is turned, a conductor ring on the other side of said stator plate located within the circle of said terminals, said ring having anchor elements engaging said stator plate and having a radially extending contact terminal, a brush member on the other side of said rotor having a plurality of radial fingers riding slidably on said ring, and connector elements traversing said rotor for electrically and mechanically connecting said brush member to said annular conductor member whereby the contact finger of said conductor member is caused to exert pressure against said respective terminals and the radial fingers of said brush member to exert pressure against said conductor ring to provide an electrical circuit connection from said radial connector terminal to said respective stator terminals.

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ROBERT K. SCHAEFER, *Primary Examiner.*

J. R. SCOTT, *Assistant Examiner.*