Jan. 8, 1963 J. C. KOCI 3,072,756

ELECTRICAL SWITCH ASSEMBLY

Filed Jan. 29, 1960 2 Sheets-Sheet 1

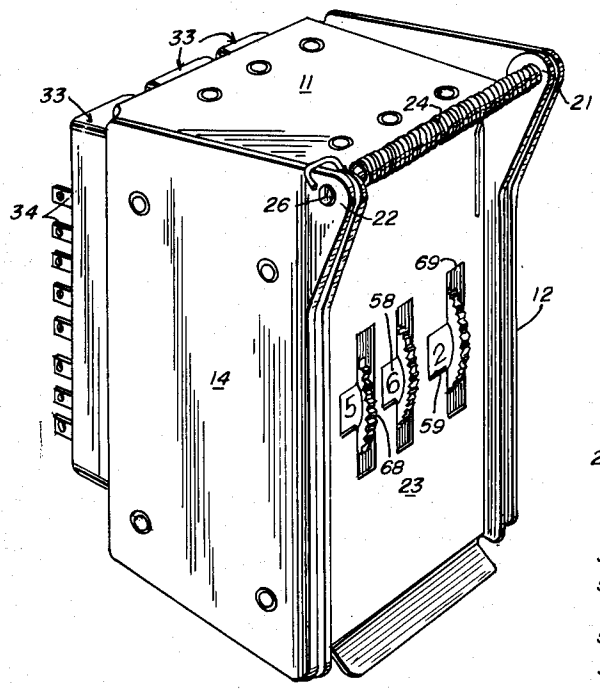


FIG. 1

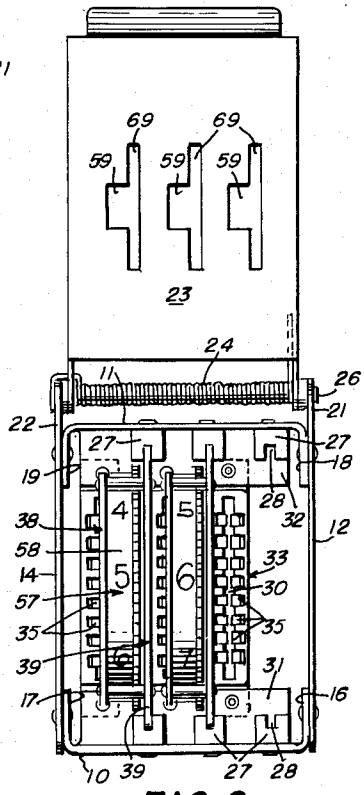


FIG. 2

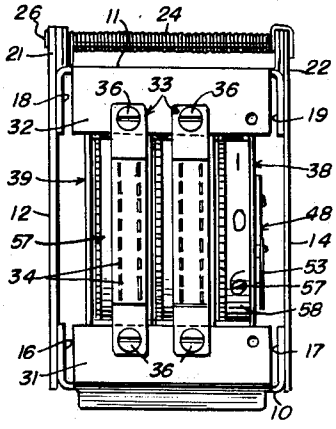


FIG. 3

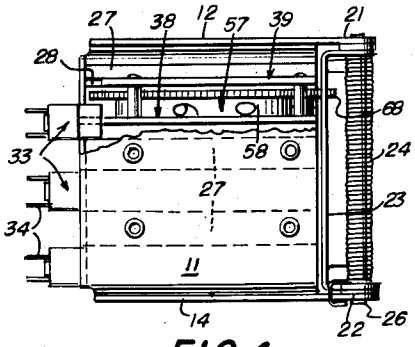


FIG. 4

INVENTOR

JERRY C. KOCI

BY

ATTORNEY

Jan. 8, 1963 J. C. KOCI 3,072,756

ELECTRICAL SWITCH ASSEMBLY

Filed Jan. 29, 1960 2 Sheets-Sheet 2

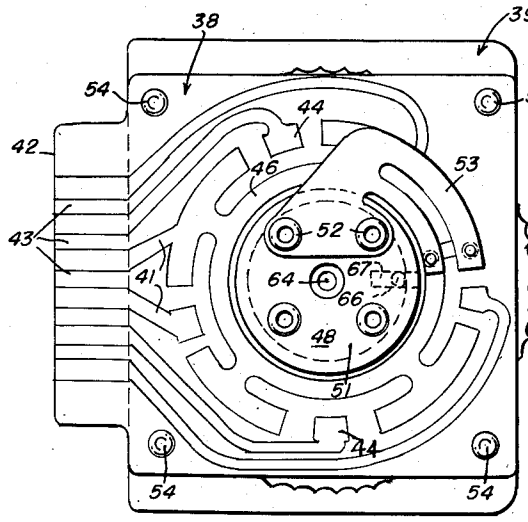


FIG.5

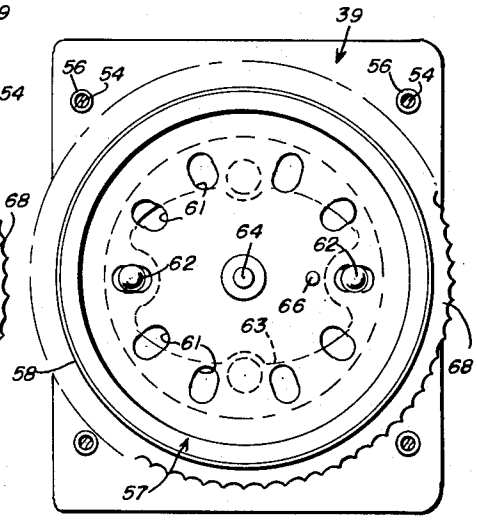


FIG.6

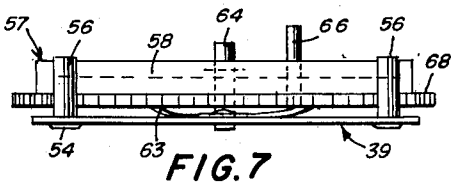


FIG.7

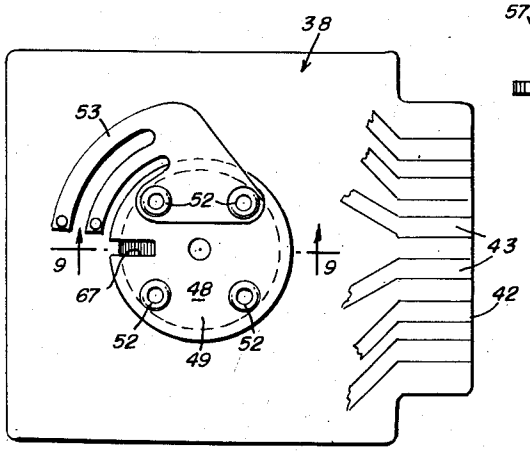


FIG.8

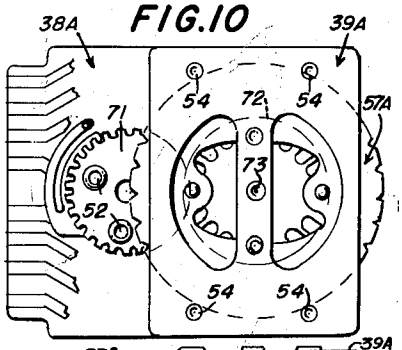


FIG.10

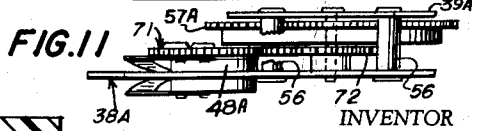


FIG.11

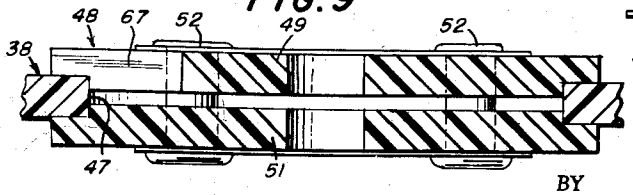


FIG.9

INVENTOR

JERRY C. KOCI

BY

ATTORNEY

United States Patent Office 3,072,756 Patented Jan. 8, 1963

3,072,756
ELECTRICAL SWITCH ASSEMBLY

Jerry C. Koci, Barrington, Ill., assignor to Tabet Manufacturing Company, Inc., Norfolk, Va., a corporation of Virginia

Filed Jan. 29, 1960, Ser. No. 5,395
4 Claims. (Cl. 200—11)

The present invention relates to a circuit making and breaking device formed of a plurality of wafer units each carrying conductors on the face thereof with a rotary device carried by each wafer unit for making and breaking circuit connections to such conductors providing an assembly wherein the wafer units may readily be removed and replaced without detaching any wiring connected to the switch assembly.

It is known in the art to which the invention pertains to provide a frame carrying guideways for receiving edge portions of a wafer unit having conductors on a face thereof which extend to one end of the wafer and are plugged into a multiple contact receptacle carried by the switch frame when the wafer unit is inserted in the frame and it is an object of the present invention to provide improvements in such switch assemblies and particularly the support of the wafer units and to provide means for individually actuating the rotary circuit making and breaking device carried by any wafer unit.

A more specific object of the invention is to provide a plate supporting a panel of insulating material in substantially parallel relationship therewith with the panel having conductors on the face thereof with an actuating mechanism for the rotor mounted between the plate and the panel and with the plate serving to support the panel when it is arranged in guideways carried by the switch frame so that any one wafer unit may be readily removed from circuit relationship with its multiple contact receptacle carried by the frame and readily removed from the guideways so that any one of the wafer units may be readily replaced.

Other objects and features of the invention will be appreciated and become apparent to those skilled in the art to which the invention pertains and further objects and features of the invention will be appreciated as the present disclosure proceeds and upon consideration of the following detailed description taken in conjunction with the accompanying drawings wherein several embodiments of the invention are disclosed.

In the drawings:

FIG. 1 is a perspective view of a switch assembly exhibiting the invention.

FIG. 2 is a front elevational view of the switch assembly showing the hinged closure plate in an open position.

FIG. 3 is a rear elevational view of the switch assembly with one of the multiple contact receptacles omitted.

FIG. 4 is a plan view with portions of the frame broken away.

FIG. 5 is a side elevational view of one of the wafer units on a larger scale.

FIG. 6 is a side elevational view of the plate of one wafer unit showing parts of the switch actuating mechanism.

FIG. 7 is an end view of the structure shown in FIG. 6.

FIG. 8 is a side elevational view of the opposite side of the wafer unit.

FIG. 9 is an enlarged sectional view taken on the line 9—9 of FIG. 8.

FIG. 10 is a side elevational view of a modified wafer unit and driving mechanism for the rotor thereof.

FIG. 11 is a side elevation of the wafer unit shown in FIG. 10.

The invention is directed to an electrical switch assembly which includes a frame carrying a plurality of

guideways for receiving edge portions of the plates of the wafer units. The frame also provides support for a plurality of multiple contact receptacles which is adapted to receive the end portion of a panel of a wafer unit when it is in position in the frame. The panel of each wafer unit carries electrical conductors which engage contacts of a multiple contact receptacle when the wafer unit is in position within the frame. Each wafer unit is provided with an actuating mechanism for the rotary switch thereon and each wafer unit is removable from the frame for ready replacement without disturbing the conductors connected to the switch.

A switch assembly exhibiting such features is shown in the drawings and the frame includes side walls **10** and **11** which are connected by end walls **12** and **14**. The side wall **10** carries inturned lips **16** and **17** and the side wall **11** carries inturned lips **18** and **19**. The lips **16** and **18** may be riveted or otherwise secured to the end wall **12** and the lips **17** and **19** may be riveted to the end wall **14** to provide a substantially rigid open box shaped frame. The side walls **12** and **14** carry ear portions **21** and **22** which provide part of a hinged structure for a swingable closure plate **23**. The hinged plate **23** is biased to a closed position shown in FIG. 1 by means of a helical spring **24** which surrounds a pin **26** and which journals the closure plate for rotation with respect to the ears **21** and **22**.

The frame is provided with guideways for the wafer units and in the embodiment illustrated the side walls **10** and **11** carry elongated block members **27** each of which is provided with a groove **28** which serves as a guideway for the wafer units as hereinafter described. A pair of grooves **28** are provided for each wafer unit and each pair of guideways are aligned transversely of the frame.

The side wall **10** carries an inturned flange **31** and the side wall **11** carries an inturned flange **32**. The flanges **31** and **32** provide support for a plurality of multiple contact receptacle **33**. Each multiple contact receptacle **33** has a plurality of terminals **34** which are in circuit relationship with contacts **35** arranged along opposite faces of a slot **30** (FIG. 2) in each multiple contact receptacle. The multiple contact receptacles **33** may be secured to the flanges **31** and **32** by means of screws **36**. The terminals **34** all extend from the rear of the switch frame and are readily accessible for connection to conductors extending to and from the switch assembly.

A panel **38** formed of insulating material and a plate **39** formed of any suitable material such as metal form the principal parts of each wafer unit. The panel **38** carries conductors **41** thereon as shown in FIG. 5 which may be applied by printed circuit methods. These conductors extend to the end edge **42** of the panel **38** and the portion **43** of the conductors are adapted to engage the contacts **35** of a multiple contact receptacle **33** at one side of the slot **30**. The conductors **41** extend to circumferentially spaced contacts **44** and to a conductive ring **46** which is arranged around a central opening **47** (FIG. 9) in the panel **38**. A rotor **48** is mounted on the panel **38** for rotation and it may be formed of two parts **49** and **51** which overlie the panel **38** around the perimeter of the opening **47** as shown in FIG. 9. The parts **49** and **51** are formed of insulating material and are secured to each other by a plurality of rivets **52**. The rivets **52** also serve to attach wiper arm means **53** to the rotor and the wiper arms are adapted to move over the conductive ring **46** and the contacts **44**. A wiper arm device may be provided at both faces of the panel **38** and contacts and conductors may be carried by both faces as indicated in FIGS. 5 and 8.

The plate **39** and the panel **38** are maintained in spaced substantially parallel relationship by means of rivets **54**

and spacer elements **56**. Actuating means for the rotor **48** is arranged between the panel **38** and the plate **39**. The actuating means includes a wheel **57** having a knurled periphery. A rim portion **58** of each wheel carries numerals as shown in FIGS. 1 and 2. The hinged closure plate **23** is provided with slots **69** through which the knurled portion of each wheel **57** extends and a window **59** is provided for exposing a portion of the rim **58** so that the indexed position of the rotor **44** may be observed from the exterior of the switch frame when the hinged plate **23** is in the closed position shown in FIG. 1.

Each wheel **57** is provided with circumferentially spaced openings **61** (FIG. 6) into which spring-pressed balls **62** are resiliently urged. The openings **61** are so spaced circumferentially of the wheel **57** that when the balls **62** are in the openings **61** as shown in FIG. 6 the wheel **57** is releasably retained in one of its indexed positions. The balls **62** are urged towards the opening **61** by means of a leaf type spring **63** which is arranged between one face of the wheel **57** and an inner face of the plate **39** as shown in FIG. 7. The wheel **57** rotates about a stub shaft **64** which extends into an opening at the axis of the rotor **48**. The wheel **57** carries a pin **66** which is adapted to extend into a radially disposed aperture **67** carried by the peripheral portion of the rotor **48**. The pin **68** provides a driving connection between the wheel **57** and the rotor **48**. The panel **38** and the plate **39** when secured to each other by the rivets **54** maintain the actuating mechanism in cooperative association with the rotor and the panel **38** and the plate **39** substantially house the actuating mechanism for the switch parts carried by one wafer unit.

The plate **39** has a greater width than the associated panel **38** as will be apparent by a consideration of FIG. 5. The wheel **57** and particularly the knurled portion is of such diameter that a segmental portion **68** projects beyond the edges of the panel **38** and the plate **39** so that it may be engaged by the thumb or fingers for rotating the wheel **57**. It is the segmental portion **68** which extends through a slot **69** in the closure plate **23** as shown in FIG. 1 so that any one of the actuating mechanism may be operated from a position outside the housing. The edge portions of the plate **39** which project beyond the edges of the panel **38** are for the purpose of entering the guideways or the grooves **28** so that each wafer unit may be moved into the frame in a sliding movement. The end portion of the panel **38** adjacent the end edge **42** is adapted to enter the slot **30** in a multiple contact receptacle **33** and it is for this purpose that each multiple contact receptacle **33** is displaced from the plane of a pair of confronting grooves **28**. In the embodiment illustrated three pairs of guideways or grooves **28** are provided along the side walls **10** and **11** but the number may be increased by lengthening the side walls **10** and **11**. When the plate **39** of each wafer unit is moved into the frame the portions **43** of the conductors **41** engage the contacts **35** of the associated multiple contact member **33** and connections are thus established to the contacts **44** and the conductive ring **46**. The hinged closure plate **23** may then be released to swing to the closed position shown in FIG. 1. The knurled portions of each wheel **57** extends through the slot **69** so that the rotors **48** of any one of the rotor units may be turned to any of its switches making and breaking positions. Each of the wafer units may be readily removed from the frame by swinging the closure plate **23** to the open position shown in FIG. 2 when the wafer unit may be withdrawn from the assembly.

A modification of a wafer unit for a similar switch assembly is shown in FIGS. 10 and 11. In this embodiment a gear wheel **71** is secured to one face of the rotor **48A** carried by the panel **38A**. The gear wheel **71** may be formed of insulating material and attached to the rotor **48A** by means of rivets. A plate **39A** is maintained in substantially parallel spaced relationship with the panel **38A** by means of rivets and spacer elements **56**. A knurled wheel **57A** is arranged between the plate **39A** and the panel **38A**. The knurled wheel carries a gear wheel **72** which meshes with the teeth of the gear wheel **71**. An indexing mechanism is provided similar to the one described in connection with the gear wheel **57** provides for releasably retaining the knurled wheel **57A** in any one of its indexed positions. The wheel **57A** is supported for rotation by means of a shaft **73** supported by the plate **39A** and the panel **38A**.

While the invention has been described with reference to specific structural features it will be appreciated that changes may be made in the details as well as the overall organization. Such changes and others may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. An electrical switch assembly comprising, a frame having spaced walls, means carried by said walls providing aligned guideway grooves, a multiple contact receptacle carried by said frame, said multiple contact receptacle having a slot therein spaced from the plane of said guideway grooves, contacts supported by said receptacle along said slot, an insulating panel and a metal plate, means maintaining said panel and said plate as a unit in substantially parallel spaced relationship corresponding to the spacing of said slot from the plane of said guideway grooves opposite side edge portions of said plate extending into said guideway grooves, said panel having an end portion projecting beyond an associated end of said plate, spaced conductors on the face of said panel extending to said end edge thereof with the end portions of the conductors engaging said contacts when said unit is in position within the frame, a rotor mounted for rotation on said panel in the plane thereof, wiper arm means carried by said rotor adapted to engage and disengage said conductors during rotation of the rotor, a shaft disposed substantially at right angles to said panel supported by said plate with the ends of said shaft terminating substantially flush with an outer surface of the plate and an outer surface of the panel, an actuating wheel arranged between said panel and said plate and mounted for rotation about the axis of said shaft, a peripheral portion of said wheel projecting beyond the other end of the panel and beyond the corresponding end of said plate, and means transmitting rotation of said wheel to said rotor.

2. An electrical switch assembly according to claim 1 wherein the means transmitting rotation of said wheel to said rotor including a pin carried by said wheel extending into engagement with a peripheral portion of said rotor.

3. An electrical switch assembly according to claim 1 wherein the means transmitting rotation of said wheel to said rotor includes a gear wheel carried by the rotor and a gear wheel carried by said actuating wheel.

4. An electrical switch assembly according to claim 1 wherein the opposite side edge portions of the plate project beyond correspnding edges of said panel.

References Cited in the file of this patent

UNITED STATES PATENTS

2,414,191	Coon	Jan. 14, 1947
2,507,428	Williams	May 9, 1950
2,671,830	Gallagher et al.	Mar. 9, 1954
2,799,740	Blackman	July 16, 1957
2,841,660	Tabet	July 1, 1958
2,845,501	George	July 29, 1958
2,853,564	Gahagan	Sept. 23, 1958
2,938,987	Brown	May 31, 1960
2,971,066	Tabet	Feb. 7, 1961
2,988,607	Tabet	June 13, 1961