

July 7, 1964

J. C. KOCI ETAL
THUMBWHEEL SWITCH HAVING ILLUMINATED
INDICIA-BEARING FACINGS

3,140,377

Filed May 31, 1961

2 Sheets-Sheet 1

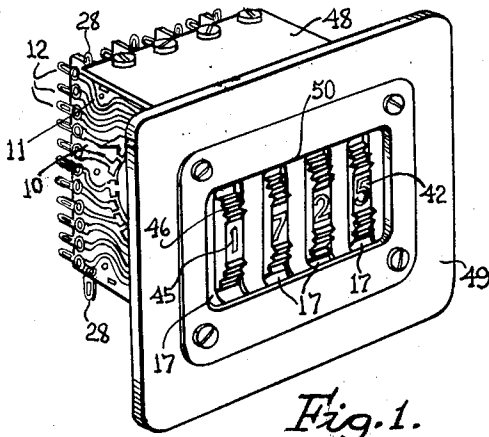


Fig. 1.

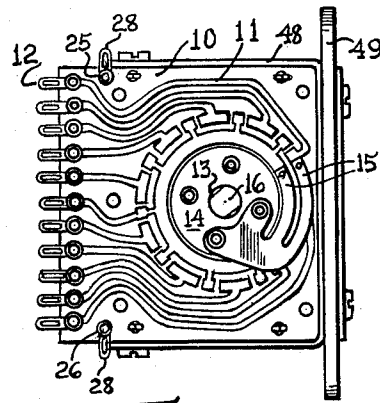


Fig. 2.

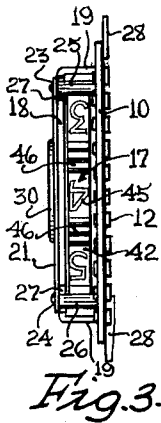


Fig. 3.

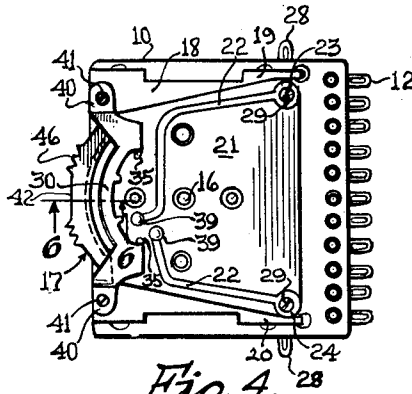


Fig. 4.

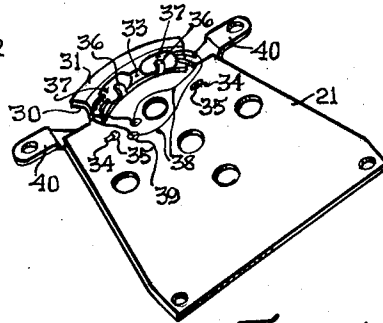


Fig. 5.

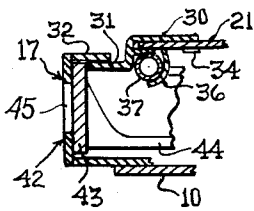


Fig. 6.

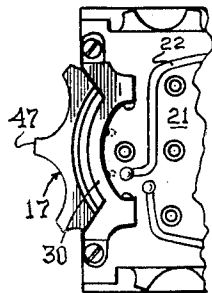


Fig. 7.

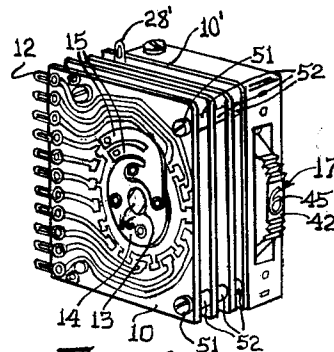


Fig. 8.

INVENTORS
JERRY C. KOCI & STANFORD M. HEIDE
BY *Shreeley & Shreeley*
THEIR ATTORNEYS.

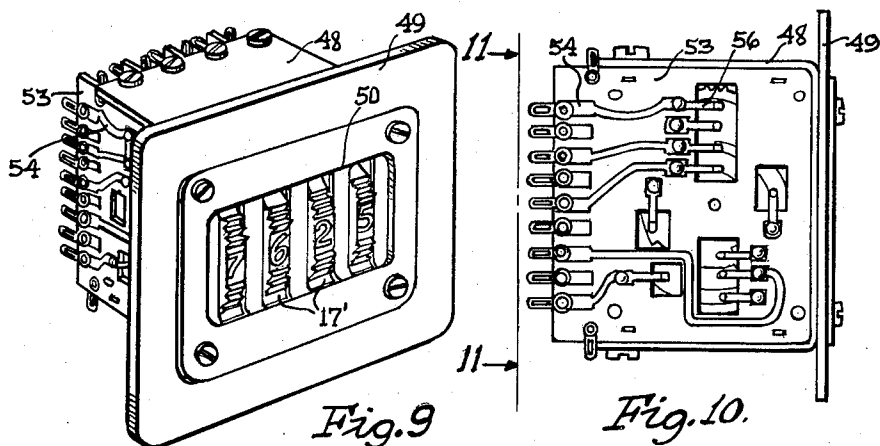
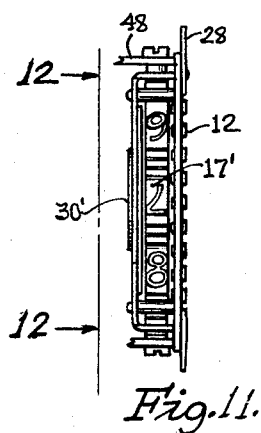
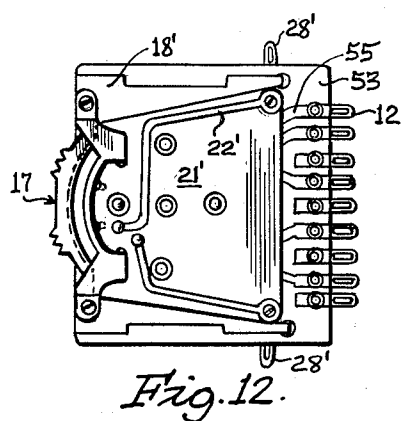
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JERRY C. KOCI & STANFORD M. HEIDE
BY *Shreeley & Shreeley*
THEIR ATTORNEYS.

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THUMBWHEEL SWITCH HAVING ILLUMINATED INDICIA-BEARING FACINGS

Jerry C. Koci, Barrington, Ill., and Stanford M. Heide, Kenosha, Wis., assignors to Chicago Dynamic Industries, Inc., Chicago, Ill., a corporation of Illinois
Filed May 31, 1961, Ser. No. 125,615
4 Claims. (Cl. 200—167)

This invention relates to a new and useful improvement in a thumbwheel switch having illuminated indicia-bearing facings and more particularly to a rotary type switch having a printed circuit wafer.

An important object of this invention is in the provision in a switch of this character of a means for internally lighting selective portions of the thumbwheel for illuminating switch position indicators.

A further object of this invention is in the provision of a switch of this character of a separate removable circuit wafer for supporting the internal lighting means of the switch.

Another equally important object of this invention is in the provision in a switch of this character of an arrangement of parts whereby the brilliancy of the light is concentrated upon a selected movable indicia bearing member.

A still further object of this invention is in the provision in a switch of this character of an arrangement of parts which is simple in construction and economical in manufacture.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a perspective view of a group installation of this improved thumbwheel switch;

FIG. 2 is a side elevational view of the switch grouping of FIG. 1;

FIG. 3 is a rear elevational view of one of the thumbwheel switch units embodying the improved construction of this invention;

FIG. 4 is a side elevational view of one switch unit;

FIG. 5 is a perspective view of the reverse side of one part of the switch unit shown in FIG. 4;

FIG. 6 is a fragmentary detail sectional view taken on line 6—6 of FIG. 4;

FIG. 7 is a fragmentary side elevational view showing a modified form of a thumbwheel;

FIG. 8 is a perspective view of a modified form of switch unit group mounting;

FIG. 9 is a perspective view of a group of thumbwheel switches of a modified form;

FIG. 10 is a side elevational view of the modified form of FIG. 9;

FIG. 11 is a rear elevational view of one of the modified switch units as seen from line 11—11 of FIG. 10; and

FIG. 12 is a side elevational view as seen from line 12—12 of FIG. 11.

The several objects of this invention are accomplished by the forms of construction shown in the accompanying drawings. In this connection the thumbwheel switch includes a wafer plate 10. This wafer 10 is provided on one side thereof with a plurality of printed circuits 11. These printed circuits 11 each terminate into rearwardly extending soldering terminals 12. The wafer 10 is provided with a central opening 13 into which is rotatably journaled a disc 14. This disc 14 has fixedly connected thereto wiper arms 15 adapted to pass over and complete

the circuits through the printed circuits 11 and terminals 12. The disc 14 and wiper arms 15 are connected for rotation to a rotary shaft 16 of the thumbwheel 17. The operation, function and general arrangement of associate parts of the thumbwheel 17 are similar to that shown and described in the co-pending application Serial No. 10,720, filed February 24, 1960, now Patent No. 3,010,101.

The thumbwheel switch of this application provides a complementary side plate 18 which is disposed in spaced parallel relation with respect to the wafer 10 as seen in FIG. 3. The thumbwheel 17 is disposed between the wafer 10 and the plate 18 on the shaft 16 which is in turn rotatably journaled in both the center openings 13 of the wafer 10 and side plate 14.

The side plate 18 is provided with laterally extending legs 19 which are projected through corresponding openings 20 formed in the wafer 10 (FIGS. 2, 3 and 4). The legs 19 are then swedged so as to fixedly connect the plate 18 to the wafer 10 in a manner that provides a housing for the thumbwheel 17 and its associated parts.

Adapted to be mounted on the side plate 18 is a light circuit plate 21. This circuit plate 21 is formed of a non-conductive material and has printed thereon a light circuit 22. The light circuit 22 terminates at one end into contact points 23 and 24. These contact points 23 and 24 are adapted to be engaged by studs 25 and 26 respectively, which studs 25 and 26 are carried by the wafer 10 and projected laterally therefrom in the direction of the side plate 18. The studs 25 and 26 do not contact the side plate 18 but freely pass through notches 27 formed therein. The studs 25 and 26 are a part of certain soldering terminals 28 carried by the wafer 10 as seen in FIGS. 2, 3 and 4. These studs 25 and 26 have their free ends internally threaded so as to receive screws 29 which connect the circuit plate 21 thereto. These screws 29 together with the studs 25 and 26 also provide electrical connection of the light circuit 22 to the soldering terminals 28.

The opposite or front end of the circuit plate 21 as seen in FIG. 4 is provided with a substantially Z-shaped mounting member 30 which includes a depending arcuated lip 31. This lip 31 is adapted to be inserted beneath a lateral peripheral edge 32 of the thumbwheel 17.

The mounting member 30 also provides a flange 33 which together with the member 30 provides a slot into which projects the end of the circuit plate 21 as seen in FIG. 6. The mounting member 30 is provided with tabs 34 which are projected through suitable holes 35 formed in the plate 21, and bent over into clamping relation with the underside of the plate 21 so as to fixedly mount the member 30 thereon.

The circuit plate 21 has struck therefrom fingers 36 which are adapted to engage and secure to the underside thereof lights 37. These lights 37 are in turn by suitable connectors 38 connected to terminal contacts 39 of the printed circuit 22 carried by the exposed side of the circuit plate 21. The member 30 also includes oppositely extending supports 40 which by means of screws 41 removably connect the front portion of the plate 21 to the side plate 18, when the lip 31 of the member 30 is inserted beneath the lateral edge 32 of the wheel 17.

The thumbwheel 17 consists of circumferential equally spaced facings 42 mounted on a transparent base 43 which include spokes 44 terminating into a center hub not shown, but through which the shaft 16 is fixedly journaled. The circumferential equally spaced facings 42 have cut therein indicia 45 through which the illumination from the lights 37 will be exposed. Between the portions of the indicia bearing facings 42 there are provided operating serrations 46 by which the thumbwheel may be rotated.

Referring to FIG. 7 it is noted that in place of the serra-

tions 46 the peripheral edge of the thumbwheel 17 is provided with radially extending finger prongs 47. These fingers prongs 47 provide a more positive method of rotating the thumbwheel 17 into different switch arrangements.

FIG. 1 discloses a plurality of thumbwheel switches mounted between a U-shaped mounting plate 48 carried by a face plate 49. As seen in FIG. 1 each switch is so mounted in relation to the face plate 49 and the viewing opening 50 formed therein that only a single indicia of each switch is visible. By the arrangement as shown in FIG. 6 the illumination from the lights 37 is concentrated on the exposed indicia of each thumbwheel switch.

FIG. 8 shows a modified form of connecting a plurality of wafers 10 to a single operative thumbwheel. In this connection the switch wafers 10 are mounted in juxtaposition with respect to each other on screws 51. These wafers 10 are maintained in spaced apart relation by spacers 52 carried by the screws 51. The innermost wafer 10' of the unit of FIG. 8 provides through its soldering terminals 28' electrical connection for the thumbwheel 17 associated therewith.

FIGS. 9 and 10 are similar to FIGS. 1 and 2 but show a modified form in which the wafer 53 thereof carries on either side thereof printed circuits 54 and 55 which are in turn connected to stationary wiper fingers 56. The thumbwheel 17' of this modified switch in turn carries the printed circuit in a manner shown and described in the aforementioned co-pending application.

With reference to FIGS. 11 and 12 the thumbwheel switch 17' shown therein contains the identical structure and arrangement of parts as shown and described in FIGS. 3 and 4 and such parts are correspondingly numbered and identified by the addition thereto of a prime indication.

From the foregoing it is apparent that this invention provides a means for illuminating a thumbwheel switch which means includes a removable circuit plate which provides thereon a printed circuit, lights, means for connecting the printed circuit to the soldering terminals and a method of mounting the lights and circuit plate so that the illumination therefrom is retained and concentrated on a preselected point. It is apparent that if the thumbwheel switch is to be used without the lights the circuit plate 21 may be simply removed through the removal of the screws 29 and 41. In the event that either one or both of the lights 37 become exhausted they may be quickly replaced without interrupting the operative circuits of the thumbwheel switch.

While we have illustrated and described the preferred form of construction carrying our invention into effect, this is capable of variation and modification without departing from the spirit of the invention. We, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail ourselves of such variations and modifications as come within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. A thumbwheel type switch comprising
 - (a) a housing,
 - (b) said housing having on one interior wall thereof a printed circuit,
 - (c) a thumbwheel circuit selector rotatably carried by and within the housing and adapted for selective contact with said printed circuit,
 - (d) said circuit selector having circumferentially spaced facings provided with indicia cut-out portions,
 - (e) illuminating means to the rear of said circumferential facings for successively illuminating said indicia so as to indicate a selected point of said circuit selector with respect to said printed circuit,
 - (f) a plate supporting said illuminating means and

arranged in said housing adjacent said circuit selector and having a circuit thereon for said illuminating means,

- (g) and means connecting said plate to said housing permitting removal of said plate together with said illuminating means from said housing without disturbing any electric circuit connections of said printed circuit.

2. A thumbwheel type switch comprising

- (a) a housing having spaced apart wall members,
- (b) a rotatable shaft carried by and extending between said wall members,
- (c) a thumbwheel carried by and rotatable with said shaft and arranged within said housing with a portion thereof extending exteriorly of the housing and providing circumferentially spaced apart indicia bearing faces,
- (d) illuminating means for said thumbwheel,
- (e) means carried by one of said wall members for supporting said illuminating means in juxtaposition beneath the exterior portion of said thumbwheel,
- (f) and means for removably connecting said illuminating supporting means to said one of said wall members and providing electrical connection for said illuminating means.

3. In a thumbwheel type switch comprising a rotatable thumbwheel circuit selector, a housing containing said thumbwheel including a printed circuit plate having a plurality of electrical connector terminals, said thumbwheel providing circumferentially spaced apart indicia-bearing facings, said thumbwheel having a portion thereof of exterior of said housing, a light for providing illumination of that portion of said thumbwheel that extends beyond said housing so as to indicate the selected circuit position thereof, a removable light circuit plate carried by said housing, means on said light circuit plate for positioning said light beneath that portion of said thumbwheel that extends beyond said housing, means on said light circuit plate for providing electrical circuit connections between certain of said electrical connector terminals provided by said circuit plate and said light, and means permitting the removal of said light circuit plate together with said light from said switch without disrupting any electrical circuit connections of said circuit plate.

4. In a thumbwheel type switch comprising a rotatable thumbwheel circuit selector, a housing containing said thumbwheel including a printed circuit plate having a plurality of electrical connector terminals, said thumbwheel providing circumferentially spaced apart indicia-bearing facings, said thumbwheel having a portion thereof exterior of said housing, means for providing illumination of that portion of said thumbwheel that extends beyond said housing so as to indicate the selected circuit position thereof, a removable light circuit plate carried by said housing, an arcuate lip carried by said light circuit plate for positioning said light beneath that portion of said thumbwheel that extends beyond said housing, means on said light circuit plate for providing electrical circuit connections between certain of said electrical connector terminals provided by said circuit plate and said illuminating means, and means permitting the removal of said light circuit plate together with said illuminating means from said switch without disrupting any electrical circuit connections of said circuit plate.

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