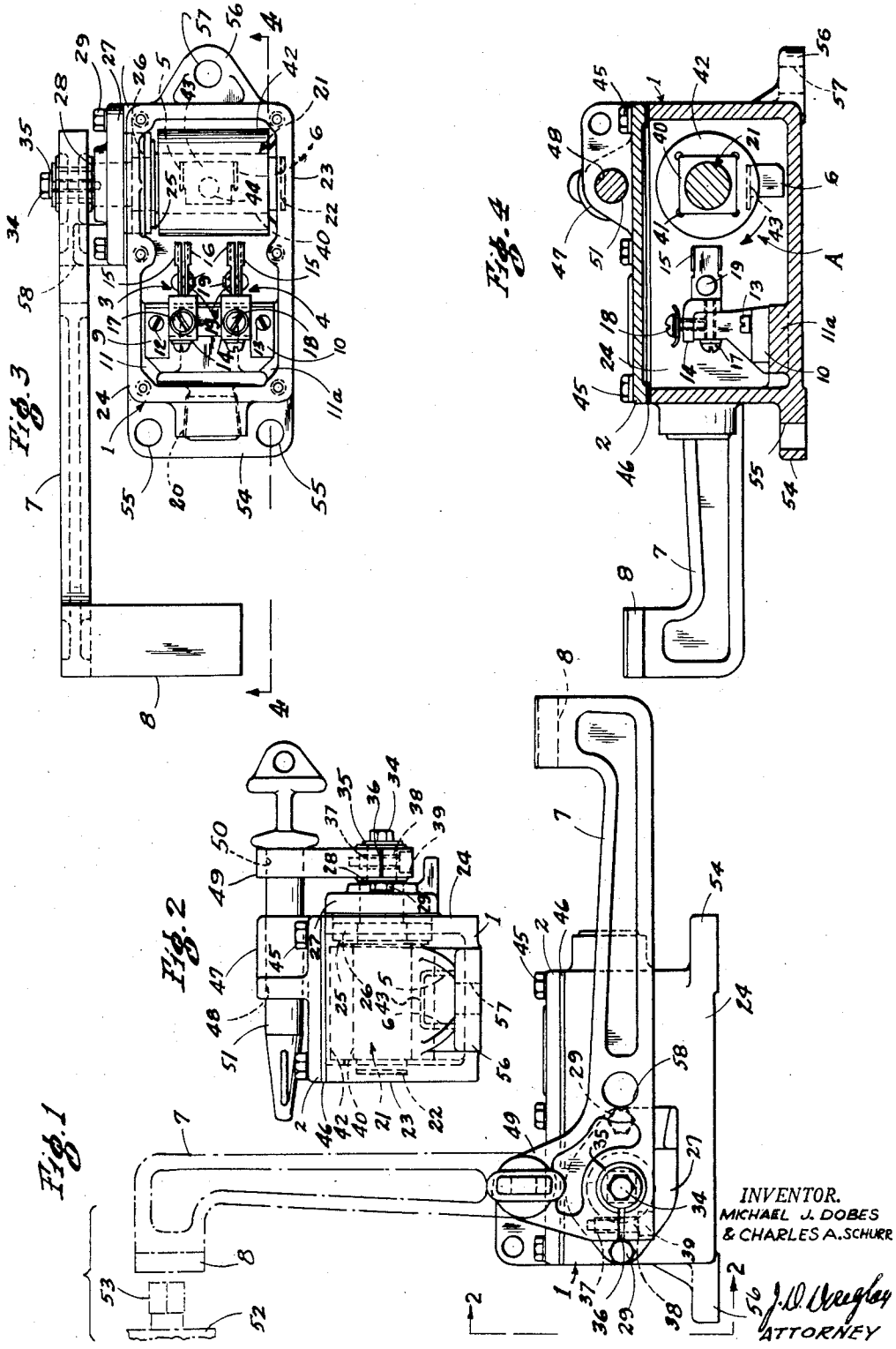
Nov. 11, 1958 M. J. DOBES ET AL 2,860,202

ELECTRICAL SWITCH MECHANISM

Filed Dec. 30, 1954



INVENTOR.
MICHAEL J. DOBES
& CHARLES A. SCHURR

ATTORNEY

United States Patent Office 2,860,202
Patented Nov. 11, 1958

2,860,202

ELECTRICAL SWITCH MECHANISM

Michael J. Dobes, Cleveland, and Charles A. Schurr, Euclid, Ohio, assignors to The National Acme Company, Cleveland, Ohio

Application December 30, 1954, Serial No. 478,584

1 Claim. (Cl. 200—61.58)

The present invention relates to electrical switches which are adapted to be installed on the deck of a ship in proximity to a winch and more particularly to the combination of an electrical switch and an actuating lever or handle therefor, the outer end of which is shaped to provide a guard to prevent manual rotation of the winch when the handle is moved to a position to establish a circuit to a motor for electrically operating the winch.

In ships provided with life boats, it is the practice to provide a winch or hoist for lowering the life boat into the water and for raising it from the water to the deck of the ship. Such winches are usually operated by an electrical motor which is connected through suitable gearing to the shaft of the winch for quickly raising the boat from the water up to a short distance from the deck of the ship. It is then the practice to interrupt the electrical circuit to the motor and to manually operate the winch to raise the boat the remaining distance. To enable the winch to be manually operated, its shaft is arranged at a suitable distance above the desk of the ship and is provided with a portion which projects from the frame of the winch to which is applied a heavy crank having an angularly-shaped recess at one end for engaging the shaft and a handle at its other end to be engaged by the operator.

In such winches, it is essential that the circuit to the motor shall be interrupted, during manual operation of the winch, to prevent accidental operation of the motor and resultant swinging of the hand which would cause serious injury to the operator. In prior practice, an electrical switch supported on a frame extending from the winch was provided for establishing and interrupting the circuit to the motor. In the switch utilized in prior practice, the stationary and movable contacts of the switch were normally maintained in spaced relation by coil springs. The switch was actuated by means of a bar pivotally mounted on the frame, one end of which engaged a plunger extending through one end of a housing for the switch to compress the coil springs and the force of the compressed springs caused the movable contacts to engage the stationary contacts to establish a circuit to the motor, when the bar was moved to a position in which its other end constituted a guard or blocking means for the shaft of the winch. When the bar was returned to its inactive or idle position, the coil springs forced the movable contacts from engagement with the stationary contacts to interrupt the circuit to the motor.

Such structure, however, has many disadvantages. For instance, when the bar is moved to its operative position in which it blocks manual operation of the winch, the actuation of the switch is dependent upon the force of coil springs to establish the circuit to the motor and when the bar is moved to its idle or inactive position, the interruption of the circuit to the motor depends upon the force of the coil springs acting against the inner end of the plunger. It is of course well known that coil springs age in service and lose their resiliency. The metal of the switch housing surrounding the plunger and

the plunger itself are also subject to corrosion which is particularly severe when they are subject to salt water sprays. In such structure, the danger is always present that the plunger of the switch will temporarily stick and fail to interrupt the circuit to the motor when the guard is moved to its idle position.

In accordance with the present invention, a switch housing is provided for the movable and stationary contacts of a switch and a lever or handle arranged outside of the switch housing and connected to the movable switch parts is provided for positively actuating the movable switch parts to establish a circuit to the motor when the handle is moved in one direction and for positively actuating the movable switch parts to interrupt the circuit to the motor when the handle is moved in the opposite direction. In the improved switch structure of the present invention, the switch housing is so constructed that it may be readily secured to the deck or a frame on the ship in proximity to a winch. The protruding shaft of said winch is arranged above the deck of the ship so that it may be readily accessible for manual operation, and the handle and the movable contacts of the switch are so arranged, when the handle is in its lower position, the movable contacts of the switch being in spaced relation to the stationary contacts of the switch, to establish a circuit to the motor. In the present switch construction, the handle or lever of the switch is of sufficient length and is provided at its outer end with a guard or blocking means which extends in front of the shaft of the winch to prevent application of a crank thereto when the movable contacts engage the stationary contacts of the switch to establish a circuit to the motor. A locking pin is associated with the handle and the switch housing and prevents movement of the switch handle between its different positions prior to the removal of the locking pin. Interruption of the circuit to the motor must therefore occur before the crank is applied to the winch for manual operation and the danger to workmen during manual operation of the winch is eliminated.

It is therefore an object of the present invention to provide an improved switch structure including a housing for the stationary and movable switch parts which housing is adapted to be secured to the deck of a ship in proximity to a winch, and in which a lever or handle arranged outside of the housing is provided for positively actuating the movable parts of the switch to a position in which an electrical circuit is established to the motor for electrically operating the winch when the handle is moved to one position, and for actuating the movable parts of the switch to a second position in which the circuit to the motor is interrupted when the handle is moved to a second position.

Another object of the invention is to provide an improved switch structure including a housing for protecting the stationary and movable contacts of the switch from corrosion which housing is adapted to be secured to a ship in proximity to a winch and in which a lever or handle arranged outside of the switch is connected to the movable parts of the switch and is movable in one direction to interrupt the circuit to the motor and in the opposite direction to establish a circuit to the motor and in which blocking means associated with lever or handle is provided for preventing application of a crank to the shaft of the winch when the handle is moved in a direction to establish a circuit to the motor.

A further object of the invention is to provide an improved switch structure including a housing for the stationary and movable parts of the switch which housing is adapted to be secured to the deck of a ship in proximity to a winch having a shaft projecting above the deck of the ship and which a lever or handle connected to the movable parts of the switch is arranged outside of the

switch housing and is movable from a raised position to a substantially horizontal position along side of the housing to interrupt the circuit to the motor and from a substantially horizontal position to a substantially vertical position to establish a circuit to the motor and in which the lever or handle is provided with a guard which extends in front of the projecting shaft of the winch to prevent application of a crank to the shaft of the winch when the handle is in its vertical position.

The invention will be better understood by reference to the accompanying drawings in which:

Fig. 1 is a side elevational view of the switch structure, showing the handle in full lines in a substantially horizontal position and in dotted lines in a substantially vertical position;

Fig. 2 is an end view of the structure shown in Fig. 1;

Fig. 3 is a plan view of the switch and the housing therefor with the cover of the housing removed; and

Fig. 4 is a cross sectional view taken on a plane passing through the line 4—4 of Fig. 3.

As shown in Figs. 1 to 4 of the drawings, the switch structure includes a casing or housing **1** and a cover **2**. Arranged within the housing are a pair of stationary contacts **3** and **4** and a second pair of contacts **5** and **6** which are movable into and from engagement with the stationary contacts by means of a handle or lever **7** arranged outside of the housing which handle is provided with a guard or blocking means **8** at its outer end.

The stationary contacts **3** and **4** are maintained in spaced relation to each other and to the bottom of the housing by suitable means, such as a pair of spaced supports **9** and **10** formed of electrical insulating material. As shown, support **9** is secured to a boss **11** projecting upwardly from the bottom of the housing adjacent one side wall by means of a bolt **12** and in a like manner support **10** is secured to a boss **11***a* extending upwardly from the bottom of the housing adjacent the opposite side wall by means of a bolt **13**.

As shown in Figs. 3 and 4, each of the stationary contacts consists of an angularly-shaped base **14** and a pair of resilient arms **15** and **16** which may be formed integral with the base or secured thereto by suitable means, such as welding. A screw **17** is provided which extends through the support **9** and one arm of the bracket and a second screw **18** extends through the other arm of the bracket and is threaded into the support. The screw **17** holds the contact in position and the screw **18**, besides assisting in holding the contact provides a means for connecting a conductor thereto.

The resilient arms **15** and **16** of each of the stationary contacts are arranged in spaced relation to each other to receive between them one of the movable contacts. A threaded bolt **19** for each pair of arms is provided which extends through apertures in the arms and is provided with an adjustable nut **19***a*. To enable the conductors to be led into and from the terminal posts, the housing is provided with a threaded outlet opening **20** into which a suitable conduit pipe, not shown, may be threaded.

Means are also provided to support the movable contacts and to rotate them in a position in which one of the movable contacts is forced between the resilient arms of stationary contact **3** and the other movable contact is forced between the resilient arms of stationary contact **4**. For this purpose, a shaft **21** is provided, one end of which is journalled in a recess **22** in one side wall **23** of the switch housing and the other end of which extends through an opening in the opposite side wall **24** of the housing. Means is provided to seal the opening and provide a bearing for the shaft. For this purpose, the inner portion of side wall **24** of the housing extends inwardly to provide an abutment **25** for a seal **26** through which the shaft **21** extends. The other bearing for the shaft includes a cap **27** having a central opening through which a reduced portion of shaft **21** extends. The shaft **21** is again reduced in diameter to provide a shoulder **28** and

extends through an aperture in one end of a lever or handle **7**. The cap **27** may be secured to the side wall **24** of the housing by suitable means, such as cap screws **29**.

To positively effect rotation of the shaft within the housing during movement of the handle, means are provided to securely mount the handle on the shaft. A cap screw is threaded into the end of the shaft **21** and engages a washer **35** arranged between the head **34** of the screw and the side of the lever. The handle has a split portion **36** adjacent one side of shaft **21** and a threaded screw **39** which may be threaded into the body of the lever to draw the split portions of the handle toward each other and clamp the shaft.

As illustrated more particularly in Figs. 2 and 3 of the drawings, means are provided on shaft **21** to support the movable contacts. For this purpose, the portion of the shaft within the housing is substantially rectangular in shape as indicated by the numeral **40**. A rotor **42** is disposed on the shaft and is provided with outwardly extending recesses **41** at its corners to enable it to provide a close fit with the shaft. The rotor is molded of insulating material and has embedded therein a plate **43** formed of conductive metal, the opposite ends of which are bent at right angles thereto and extend outwardly through the molded material to form the movable contacts **5** and **6**. To firmly secure plate **43** in place, it may be provided with a central opening **44** through which the molded insulating material extends.

As shown more particularly in Figs. 1, 2 and 4, the cover **2** is secured to the upper side walls of the housing by suitable means, such as cap screws **45** which pass through a suitable sealing gasket **46**.

Means is associated with the cover and the handle for maintaining the handle in its lower horizontal position. For this purpose, the cover **2** is provided with an upwardly extending boss or projection **47** having an aperture **48** therein. The inner portion of the handle is also provided with a projection **49** having an aperture **50** therein which is in alignment with aperture **48** when the handle is in its horizontal position as shown in Figs. 3 and 4 and in full lines in Fig. 1. A pin **51** is provided which extends through the aligned apertures **48** and **50**.

As illustrated in Fig. 1, the switch is adapted to be secured to the deck of a ship adjacent a winch, a fragmentary portion of the frame of which is indicated by the numeral **52**, and as shown, the winch is provided with a shaft **53** having an angularly-shaped end portion for receiving a crank for manual operation. For securing the switch housing to the deck of the ship, the bottom wall of the housing is provided with an extension **54** having a pair of apertures **55** therein and the opposite end of the housing is provided with a foot **56** having an aperture **57**, through which apertures, bolts or screws may be inserted for fastening the housing to the deck of a ship.

When it is desired to actuate the switch to a position in which a circuit is established to electrically operate the motor, pin **51** is removed from the aligned apertures **48** and **50** in the cover and the handle is moved to the dotted line position shown in Fig. 1. When the handle is rotated in a clockwise direction as shown in Figs. 3 and 4, contacts **5** and **6** are also rotated in a clockwise direction as indicated by arrow A in Fig. 4 and contacts **5** and **6** are moved between the resilient arms **15** and **16** of stationary contacts **3** and **4**, respectively, to establish a circuit to the motor for electrically operating the winch. When the lever or handle **7** is moved to a substantially vertical position, the guard or blocking means **8** is arranged in front of the angularly-shaped end portion of shaft **53** of the winch to prevent manual operation of the winch.

The handle is also provided with an additional opening **58** which is arranged in alignment with the opening **48** in the boss **47** of the cover when the handle is in its vertical position as shown in dotted lines in Fig. **1**, in

which case **51** may be inserted through the aligned openings **58** and **48** to maintain the switch in position to establish a circuit to the motor for electrically operating the winch and for preventing the application of the crank to the winch shaft.

When it is desired to interrupt the circuit to the motor, pin **51** is withdrawn from apertures **58** and **48** and the handle is moved to the full line position shown in Figs. 1, 3 and 4 at which time the circuit to the motor is interrupted and access is provided to shaft **53** to manually rotate the winch. At this time, aperture **50** in the handle is in alignment with aperture **48** in the boss **47** of the cover, and the pin **51** may be inserted through the aligned openings to lock the handle in its horizontal position.

It will thus be seen that we have provided a switch which is fully protected from the elements and one wherein the mechanism is greatly simplified and which is positive in its operation. Its simplicity makes it easily installed and economical to manufacture. Since there are no springs to rust, corrode or fatigue it is capable of an extremely long life without need for service. Since the operation is positive both on opening and closing there is no danger due to a circuit being closed when it should be open. Furthermore since the operating lever also acts as a protective guard against the installation of a handle on a winch when the switch is closed it eliminates the danger of the motor circuit being energized when the manual hand crank is in position. Inasmuch as the operating hand is directly connected to the movable switch contacts there is no lost motion and the contacts may be quickly engaged and disengaged. This structure also lends to a compactness which also increases its versatility of installation.

Having thus described our invention we are aware that numerous and extensive departures may be made from the structure shown without departing from the spirit of the invention as is set forth in the appended claim.

We claim:

A switch comprising a housing which defines a chamber, a rotor of insulation material rotatably mounted in said chamber, a pair of fixed contacts mounted in said chamber at one side of the rotor and spaced apart from each other lengthwise of the rotor, each of said fixed contacts comprising a pair of resilient contact arms in closely positioned confronting relationship to each other, each of said contact arms projecting toward the rotor and terminating in a free end spaced from the periphery of the rotor, a metal plate embedded in the rotor and extending lengthwise of the rotor and having out-turned ends which project out beyond the periphery of the rotor transverse to the axis of rotation of the rotor and which constitute mobile contacts, said mobile contacts being spaced apart lengthwise of the rotor a distance corresponding to the spacing between the fixed contacts and being aligned with the fixed contacts to engage between the arms of the respective fixed contacts when the rotor is turned, a handle outside the chamber connected to the rotor at one side of the housing and extending transverse to the axis of rotation of the rotor, said handle being mounted to extend horizontal along said one side of the housing to position the rotor with said mobile contacts projecting down from the rotor and spaced from said fixed contacts, said handle being movable from said horizontal position up to a vertical position to turn the rotor to carry said mobile contacts up into engagement between the respective arms of the fixed contacts, and a guard on said handle away from the connection of the handle to the rotor, said guard extending transverse to the handle and extending across an end of the housing when the handle is horizontal and extending across the top of the housing when the handle is vertical.

References Cited in the file of this patent

UNITED STATES PATENTS

1,304,655	Buchanan	May 27, 1919
1,785,194	Hammerly	Dec. 16, 1930
1,795,641	Dante	Mar. 10, 1931
1,872,249	Corbett	Aug. 16, 1932
2,404,153	Wilhelm	July 16, 1946
2,651,698	Gracey	Sept. 8, 1953
2,727,953	Wilhelm	Dec. 20, 1955