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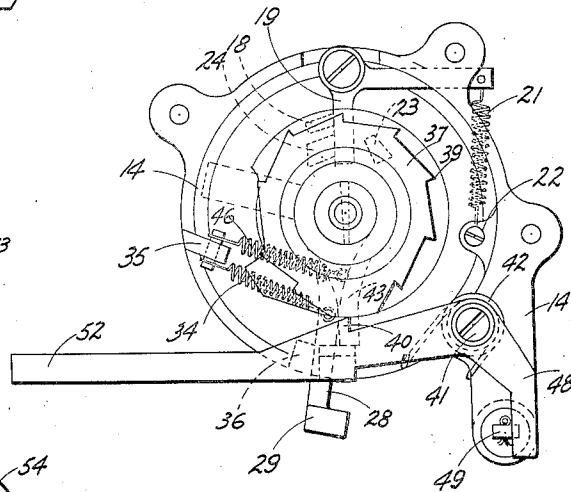
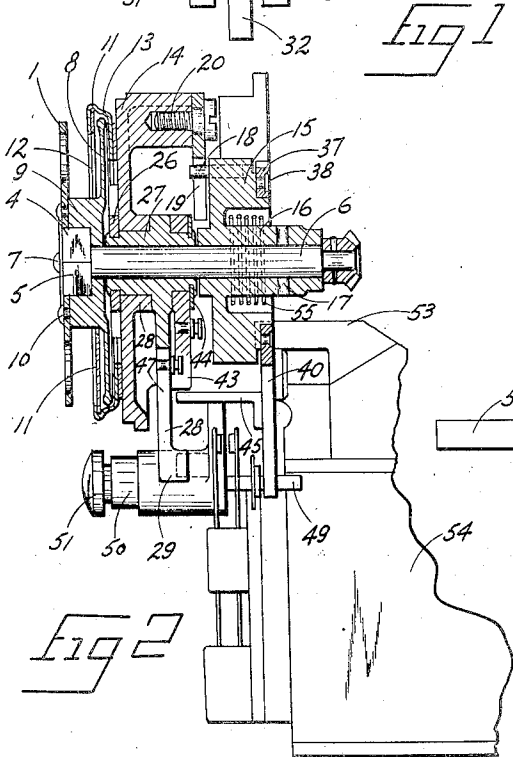
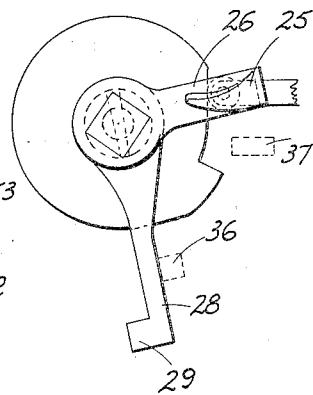
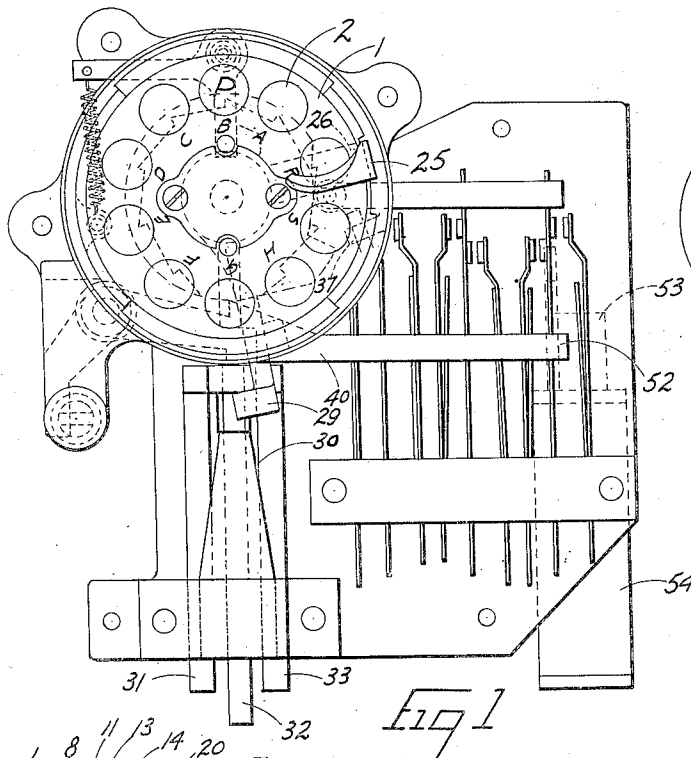
T. H. EICKHOFF

1,969,926

DIAL AND SWITCH MECHANISM

Filed July 28, 1932

2 Sheets-Sheet. 1



Inventor

THEODORE H. EICKHOFF.

Richy & Hottel Attorney

Aug. 14, 1934.

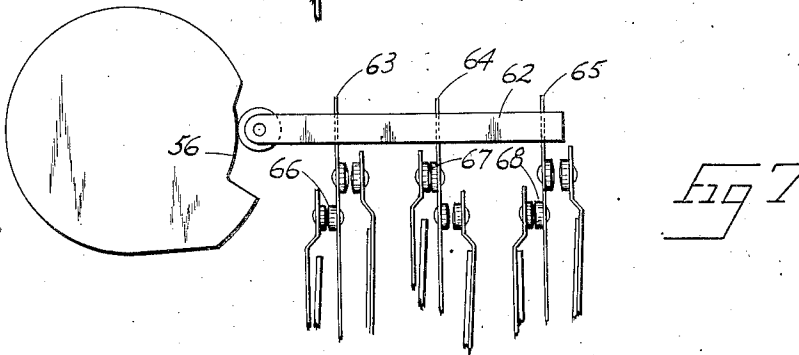
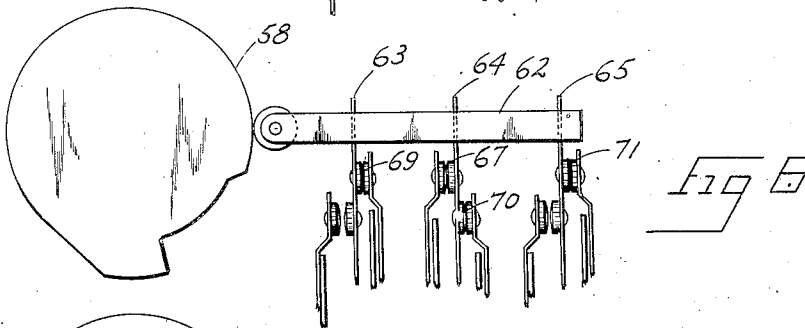
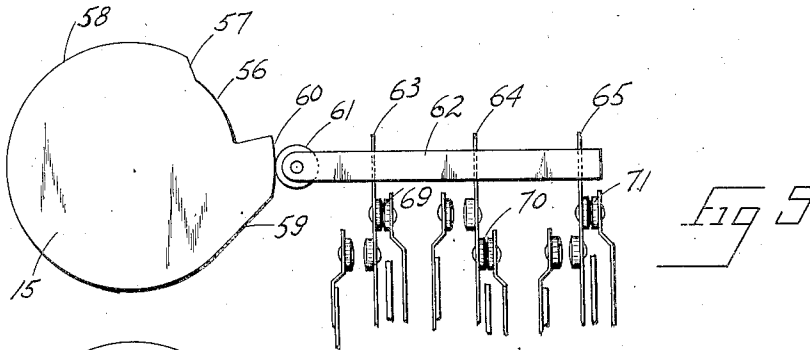
T. H. EICKHOFF

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DIAL AND SWITCH MECHANISM

Filed July 28, 1932

2 Sheets-Sheet. 2



Inventor

THEODORE H. EICKHOFF.

By

Rickey & Hatto
Attorney

UNITED STATES PATENT OFFICE

1,969,926

DIAL AND SWITCH MECHANISM

Theodore H. Eickhoff, Cleveland Heights, Ohio,
assignor, by mesne assignments, to The M. L.
Jeffrey Corporation, Cleveland, Ohio, a corpora-
tion of Ohio

Application July 28, 1932, Serial No. 625,513

9 Claims. (Cl. 200—1)

This invention relates to a dial and switch mechanism.

In certain forms of electrical apparatus an example of which is disclosed in the copending application of Max L. Jeffrey, et al, Serial No. 573,018 filed November 4, 1931, it is desirable to provide selectively operable switches and it is convenient to provide a dial mechanism for effecting such operation. Accordingly, it is an object of this invention to provide a novel form of dial and switch mechanism which affords many novel features of operation and function that may better be understood by reference to the above mentioned copending application. The various advantageous features of the present invention will appear more clearly in the following detailed description taken in connection with the accompanying drawings in which:

Fig. 1 is a view in elevation of a dial and switch mechanism embodying the principles of my invention.

Fig. 2 is a view in cross section taken diagrammatically through the dial mechanism illustrated in Fig. 1.

Fig. 3 is a detailed view in rear elevation of the dial mechanism illustrated in Fig. 1.

Fig. 4 is a view in elevation illustrating certain parts of the invention in detail.

Figs. 5, 6 and 7 are diagrammatical views illustrating the selective operation of the switches.

In some types of electrical devices, such as that disclosed in the aforesaid application, various selectable electrical circuits are provided the functions of which are associated with definite predetermined actions on the part of the person who manipulates the device. It is desirable to provide a selective switch mechanism to control such selectable circuits such that the nature or character of the activity on the part of the operator will be represented by the selected operation of the switch mechanism. Also, it is desirable that the selective switch mechanism afford a plurality of selective manipulations corresponding to the selective circuits which are designated with certainty so that an operator may effect such operation of the switch mechanism easily and certainly. According to this invention a dial mechanism for selectively operating switches is provided to effect such results.

In order to afford certain and facile selective operation the dial 1 is provided with a plurality of apertures 2 into which the finger may be inserted for operating the dial. The dial 1 bears symbols 3 adjacent each of the apertures 2 so as to inform an operator which aperture to select

in operating the dial for any particular reason. The symbols 3 may connote the nature or the reason for the action which leads him to manipulate the dial 1. The dial 1 is centrally apertured, as indicated at 4, to receive the squared end 5 of the shaft 6, suitable means such as a screw and washer 7 being provided to secure the dial 1 upon the squared end of the shaft 6. Operation of the dial 1 rotates the shaft 6.

In order to avoid confusion in reading the symbols upon the dial mechanism it is desirable to provide for a conspicuous display of any one only of the symbols, which is indicative of the position of the dial and connotes the nature of the activity in which the operator is then engaged. According to this invention, a disc 8 is mounted by hub 9 upon the squared end of the shaft 6 and carried in rotation therewith. The dial 1 and the disc 8 may be united by pins 10 upstanding from the hub 9 and engaging in apertures in the disc 1 in register with the pins 10. The disc 8 carries symbols which are the counterpart of the symbols 3 upon the dial 1. A shield 11 overlays the disc 8 and hides the symbols upon that disc from view except for an aperture 12 in the shield 10 which may be located in any desired angular position on the disc 8, the aperture 12 being arranged to register with the apertures 2 in the disc 1 when the latter disc is in proper angular position. When the operator inserts suitable means into an aperture 2 and manipulates the dial 1 to a particular position, which is determined in a manner later to be described, the corresponding symbol will be displayed through aperture 12 in the shield 11 and that aperture 2 in register therewith. Suitable clips 13 support the shield 11 and are secured in any suitable way as by means of screws to base member 14.

In order that the dial mechanism may be employed to selectively operate a switch and in order that the various dial apertures, with their associated symbols, may have definite significance it is necessary to provide initial and final positions of operation of the dial. To provide the initial position for the dial and associated parts, a disc member having the hub 16 through which the shaft 6 extends and is secured thereto by pins 17 passing through the hub 16 and the shaft 6. An abutment 18, which may take the form of a pin, extends from the disc 15. The abutment 18 is arranged to bear against the stop 19 which conveniently takes the form of a bell crank as shown in Fig. 3. The stop 19 is supported upon the base member 14 by suitable means such as the screw 20. The stop 19 provides a suitable position de-

termining the initial angular position of the dial 1 and associated parts. In order that the dial and associated parts will be not subjected to violent shock when reaching the initial position it is desirable to afford shock absorbing means by gradually absorbing the momentum of the returning elements. The stop 19 may conveniently be employed as a part of the shock absorbing means and for that purpose the spring 21 may be connected between one arm of the bell crank 19 and a lug 22 on frame member 14. Abutment 23 limits the movement of the stop 19 when struck by the abutment 18. The spring 21 provides a progressively increasing force which slows up and stops the dial and associated parts gradually when they reach the initial position. The force exerted by the spring 21 is sufficiently great to turn the dial and associated parts in a forward direction until the motion of the stop 19 is limited by the abutment 24. With the spring 21 maintaining the stop 19 against the abutment 24 and with the abutment 18 bearing against the stop 19 the initial position of the dial and its associated parts is determined.

In order that the dial may be turned through various angles, as designated by symbols on the dial 1, it is desirable to provide limiting means to determine the final position of the dial which will engage with the finger or other object inserted into an aperture 2 for manipulating the dial 1. Accordingly, a guard or stop 25 is provided to overlay the apertures 2 in the dial 1 so that the finger or like object inserted into an aperture 2 will strike the guard 25 as the dial 1 is turned in a clockwise direction. The guard 25 is carried upon an arm 26 extending back of the dials 1 and 8 and fixed on the end of hub 27 by peining the end of the hub 27 over the margin of the aperture in the arm 26 through which the end of the hub 27 extends. The hub 27 is mounted for rotation in the journal 28 of frame 14. The shaft 6 passes through and is journaled in the hub 27.

While for certain purposes of the invention the stop 25 may be made rigid, other elements of the invention performing their functions in an unhindered manner, it is desirable, in other instances of use of the present invention such as that disclosed in the copending application, to utilize the guard 25 to perform functions in addition to that serving as a limit stop to determine the final position of the dial. Thus where it is desirable to effect the control of electrical circuits incident to each forward operation of the dial 1 the stop or guard 25 may be conveniently employed for that purpose, although, the alternative of providing a rigid stop together with other suitable means operated in any suitable manner with each forward movement of the dial to effect suitable circuit control operations are contemplated within the scope of this invention. Also, it may be desirable, as in the instance of the electrical device disclosed in the aforesaid copending application, to provide for operation of the circuit control mechanism under the influence of the guard 25 or its equivalent element independent of the operation of the dial 1. That additional function may be imparted to the stop or guard 25 or may be effected by suitable means independent of the guard and/or independent of the operation of the dial 1 as desired.

Where the three functions of providing a final limiting position of the operation of the dial 1, of providing for a circuit control operation incident to the operation of the dial 1, and of pro-

viding for a circuit control operation independent of manipulation of the dial 1 are combined in one unitary system of elements, the construction may take the form illustrated in the drawings. In order to effect a circuit control operation incident to manipulation of the dial 1 the arm 26 is connected to the hub 27 from which the arm 28 extends and is rigid therewith. The arm 28 is provided with shoe 29 arranged, when rotated in a clock-wise direction from the position illustrated in Fig. 1, to strike switch blade 30 thereby closing and/or opening electrical circuits through a plurality of conductors 31, 32 and 33 in any desired combination. When the dial 1 is manipulated to a final position the finger or like object strikes the guard 26 and turns the hub 27 and arm 28 to effect the circuit control operation. In order that the guard 25 may be employed to effect the circuit control operations independent of manipulation of the dial 1 the hub 27 is arranged to turn freely upon the shaft 6 so that the arms 26 and 28 together with hub 27 form a unit operable independently of the dial 1. Spring 34 is connected at one end to the arm 28 and at the other to the lug 35 upon the frame 14. When the force exerted on the guard 35 is relieved the spring 34 returns the guard 25, the arm 26, the hub 27, the arm 28, and the shoe 29 to the position illustrated in Figs. 1, 3 and 4, which position is determined by the stop or abutment 36 on the frame 14 against which the arm 28 strikes. The guard 25 serves as a limit stop to determine the final position of rotation of the dial 1 by virtue of an abutment or stop 37 carried by the frame 14 against which the arm 26 strikes when turned in a clock-wise direction. The abutment 37 also serves to limit the clock-wise movement of the unit composed of the arm 26, hub 27 and arm 28.

While various elements of the invention and the mode of operation together with their uses as so far described may be employed by effecting the instantaneous or momentary operation of the dial 1 and allowing it to return or causing it to return to an initial position either at once or according to a predetermined time schedule yet according to certain uses of this invention, such as that disclosed in the copending application, it is desirable to maintain the dial and associated parts in a particular position to which it has been adjusted for a period of time under the control either of an operator or an auxiliary associated force or event. In order to provide for maintaining the dial and associated parts of the mechanism a predetermined position of adjustment a ratchet 37 is mounted upon the disc 15 in any suitable manner as by rivets 38. The ratchet 37 is provided with serrations 39 arranged to cooperate with a pawl 40 so as to prevent return movement of the dial. The pawl 40 is conveniently mounted upon the frame 14 by suitable pin or pivot 41 about which the spring 42 may be coiled the ends of the spring engaging with the frame 14 and with the pawl 40 respectively. The spring 42 is arranged to urge the pawl 40 into engagement with the ratchet 37. During return movement of the dial it is necessary to maintain the pawl 40 out of engagement with the ratchet 37. To effect that result a latch 43 is provided which is mounted for rotation upon the hub 27, being held thereon by suitable washer 44. The lower end of the pawl 43 is arranged to abut against the projection 45 extending laterally from the pawl 40 adjacent to the end of the latch 43. A spring 46 connected at one end with the latch 43 and at the other end with the lug 35 on the

frame 14 tends to maintain the latch 43 in the position illustrated in Fig. 3 wherein the projection 45 abuts against the end of the latch 43 and the pawl 40 is held out of engagement with the latch 37. When the dial is turned to a final position and the guard 25 is actuated, the arm 28, which is carried with the movement of the guard 25, strikes against the laterally projecting finger 47 on the latch 43 and moves the latch in a counter-clock-wise direction, as viewed in Fig. 3, so as to clear the projection 45 and allow the pawl 40 to be moved into engagement with the ratchet 37 under the action of spring 42. Thus the guard 25 and associated element performs the fourth function of releasing the pawl to lock the dial and associated parts in adjusted position.

In order to provide for the release of the dial and associated parts before they return into initial position the pawl 40 is provided with an arm 48 arranged to be engaged by the cam bar 49 having a sloping surface and being reciprocable in guide 50 supported on the frame 14 and having a head 51 which may be pressed to move the cam bar 49 against the arm 48 to effect rotation of the pawl 40 in a counter-clock-wise direction, as viewed in Fig. 3, thereby disengaging the pawl 40 from the ratchet 37. The movement of the pawl 40 under the influence of the cam bar 49 carries the projection 45 beneath the end of latch 43 and the spring 46 moves the latch 43 into engaging position so that when the cam bar 49 is released the pawl 40 will be held out of engagement with the ratchet 37 by the latch 43. The arm 28, associated with the guard 25, is maintained in the position illustrated in Fig. 3 by the spring 34, as before described, in which position the return of the latch 43 to its engaging position is unhindered. A suitable spring may be provided within the guide 50 for returning the cam bar 49 to a position such as to free the pawl 40 for movement into engagement with the ratchet 37 when the occasion arises. Thus means are provided to effect the release of the dial and associated mechanism for returning to initial position which means are actuatable by manual manipulation.

The latch 40 may have the extension 52 arranged to be engaged by hook 53 on electro-magnet 54. The electro-magnet may be under control in accordance with any desired event associated with the system involving the dial mechanism of this invention and may be employed upon actuation to withdraw the pawl 40 from engagement with latch 37 and permit the return of the dial and associated parts to initial position. The dial and associated parts may be returned to initial position by manual manipulation, under the influence of an auxiliary force controlled in accordance with any desired event, or, preferably, the dial and associated parts may be returned automatically to initial position when released under the influence of spring 55 coiled about the hub 16, one end of the spring 55 being connected with the disc 15 and the other end with frame 14.

The various positions to which the dial mechanism and associated parts may be adjusted may be conveniently translated into control effects upon the electrical circuits in any desired manner. Conveniently, the disc 15 may be provided with a cam face affording the dwell 56, the rise 57, the dwell 58, the rise 59, and the dwell 60. A cam follower in the form of a roller may ride upon the surface of the cam disc 15. A bar 62 may have the roller 61 journaled therein and be

actuated in reciprocation from the cam disc 15. The various dwells and rises of the cam disc 15 may be associated in any desired combination and order with the various positions of adjustment of the dial and associated parts. Likewise the positions of the cam disc 15 may be translated into any desired combination of circuit control effects through the bar 62 or through any other suitable means. A particular illustration of the circuit control effects which may be obtained are illustrated in Figs. 5, 6 and 7. Fig. 7 may illustrate the original position of the adjustment of the dial in which the cam follower rides or rests on dwell 56. In that position the switch blades 63, 64 and 65, which are under the control of the bar 62, are positioned to close contact pairs 66, 67 and 68 to effect a suitable circuit control. In other positions of the dial the cam follower 61 may ride upon or rest upon the dwell 58 in which position the contact strips 63, 64 and 65 are positioned so as to make contact at contact pairs 69, 67, 70 and 71. When the cam disc 15 is in the position illustrated in Fig. 5, which may correspond to the position of maximum rotation of the dial 1, the cam follower 61 rests or rides upon the dwell 60 and the bar 62 is in such position that contact strips 63, 64 and 65 effect contact with contact pairs 69, 70 and 71 only.

While the invention has been described in detail by way of illustration it is not intended so to limit the invention inasmuch as modifications and variations in the construction and arrangement of the parts and their sequence and inter-relation of operation may be made as will be apparent to one skilled in the art without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. In combination, a manually operable dial, one or a plurality of contact switches, means associated with said dial for operating said switches, and means having limited movement with the dial for automatically locking the dial and switches in a predetermined position.
2. In combination, a manually rotatable dial, one or a plurality of contact switches, means operable through rotation of said dial for operating said switches, a movable guard member mounted adjacent said dial and adapted to be contacted by the finger of an operator when the dial is rotated to a certain position, and means actuated by said guard member for locking said dial and switches in a predetermined position.
3. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam rotatable with said dial for operating said switches, a movable guard member mounted adjacent said dial and having means associated therewith for locking the dial and switches in a predetermined position, and electrical means for unlocking said dial and switches.
4. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam rotatable with said dial for operating said switches, a movable finger guard member mounted adjacent said dial, and means rendered operable through movement of said guard member for locking the dial and cam in a predetermined position of rotation.
5. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam rotatable with said dial for operating said switches, a movable finger-actuated member mounted adjacent said dial, means associated

with and rendered operable through movement of said member for automatically locking the dial and cam in a predetermined position of rotation, and a manually operated means for unlocking said dial and cam to permit them to return to their initial positions.

6. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam movable with said dial for operating said switches, a movable guard member mounted adjacent said dial and having means associated therewith for locking the dial and cam in a predetermined position of rotation, and one or more independent switches operable through movement of said guard member.

7. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam rotatable with said dial for closing said switches, a movable guard member mounted adjacent the path of rotation of said dial and having means associated therewith for locking the dial and cam in a predetermined position of rotation, one or more contact switches independent of said first-named switches, and means associated with said

movable guard member for operating said second-named switches.

8. In combination, a manually rotatable dial, one or a plurality of contact switches, a cam rotatable with said dial for closing said switches, a movable finger-actuated member mounted over said dial and having means associated therewith for locking the dial and cam in a predetermined position of rotation, and both manually and electrically operated means for unlocking said dial and cam to permit them to return to their initial positions.

9. In combination, a rotatable dial, a movable stop member arranged to be contacted by the finger or other dial engaging means used by an operator to rotate the dial, said stop member having limited movement with the dial, a switch, means associated with said stop member for actuating said switch, means for locking said dial in a predetermined adjusted position, said stop member being independently movable to operate said switch.

THEODORE H. EICKHOFF.

25	100
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35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150