

(No Model.)

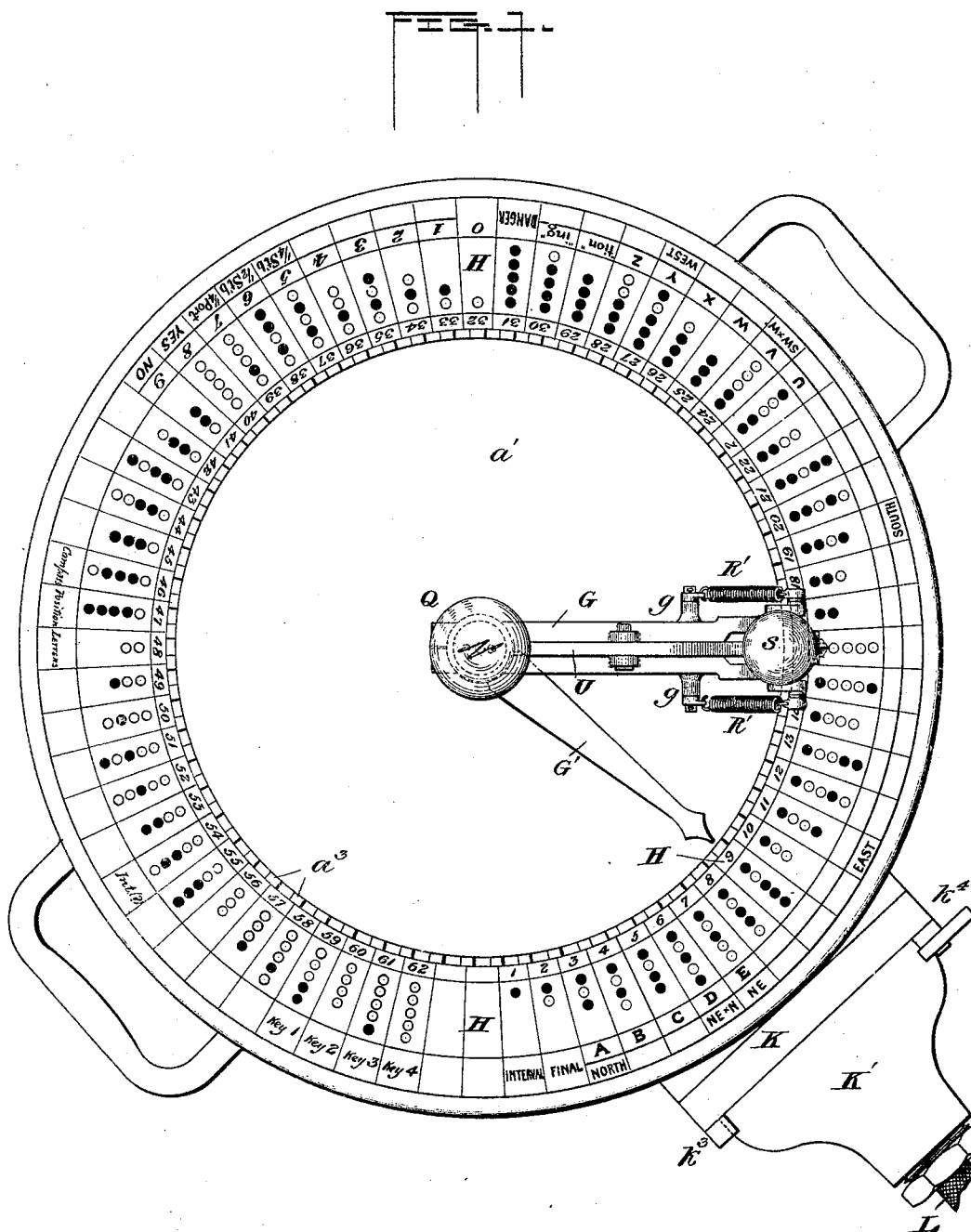
5 Sheets—Sheet 1.

E. R. KNOWLES & E. H. PARK.

SWITCH BOX FOR CONTROLLING ELECTRIC CIRCUITS.

No. 508,625.

Patented Nov. 14, 1893.



Witnesses

Witnesses
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Inventors

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(No Model.)

5 Sheets—Sheet 2.

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FIG. 2.

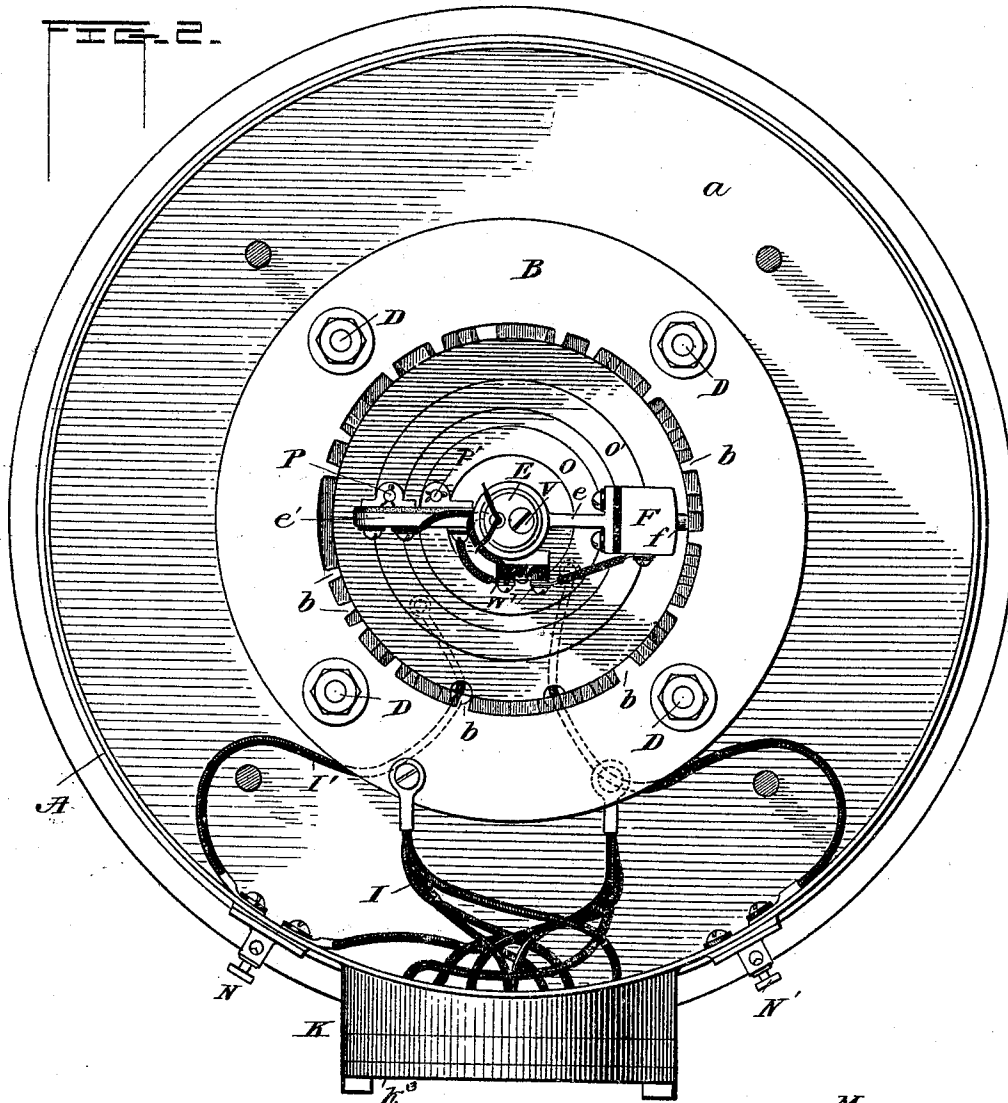
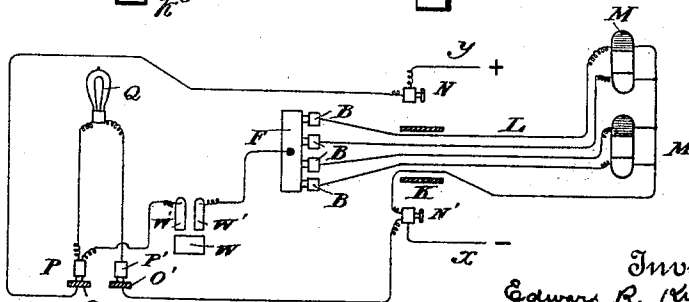


FIG. 3.



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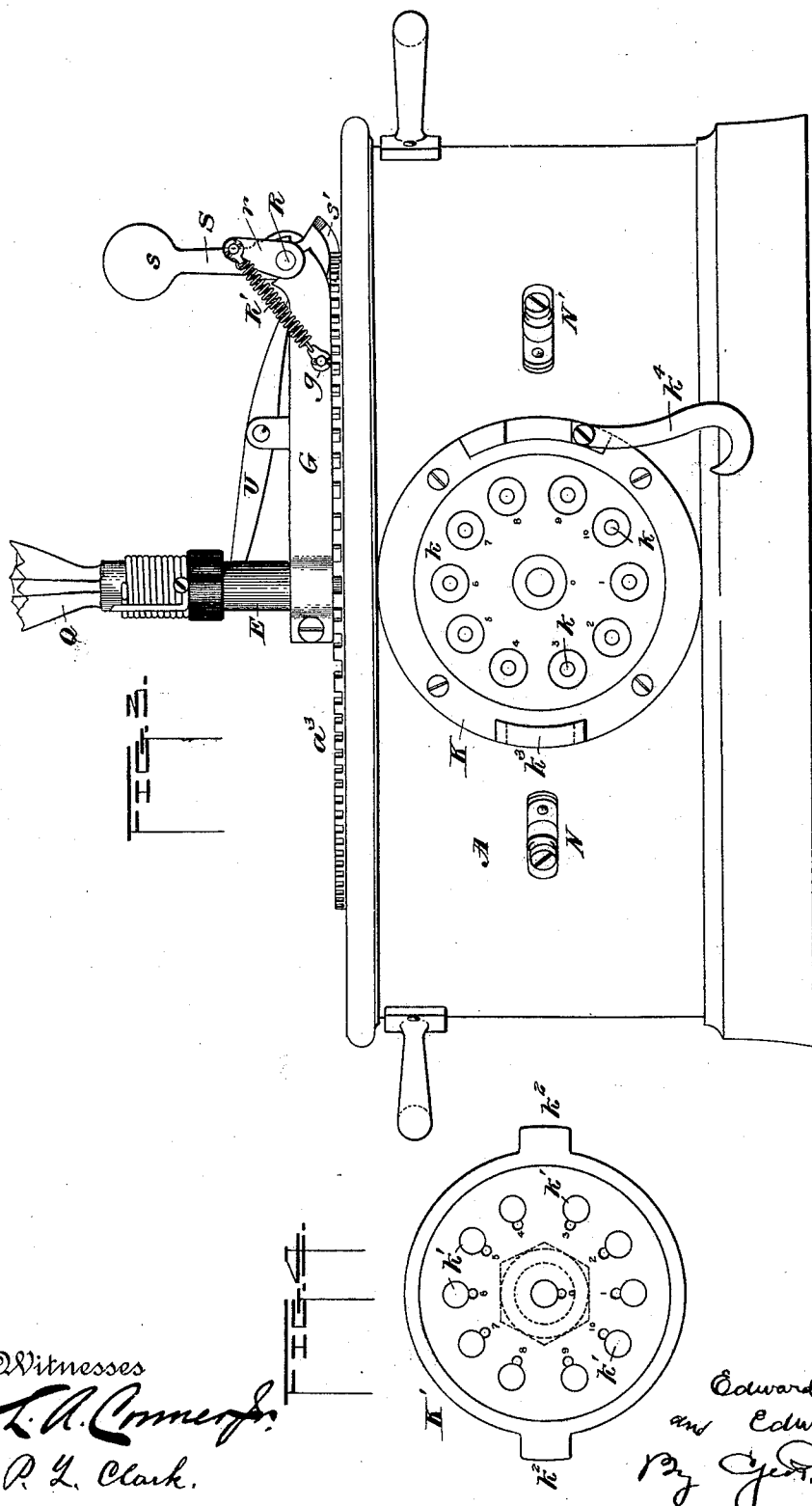
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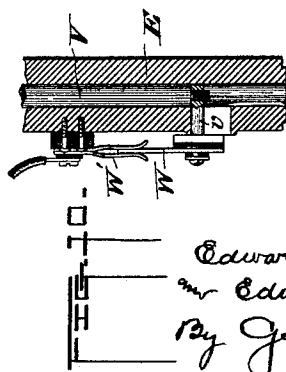
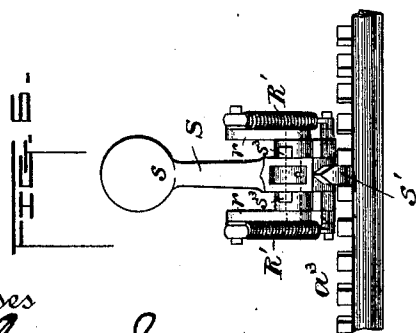
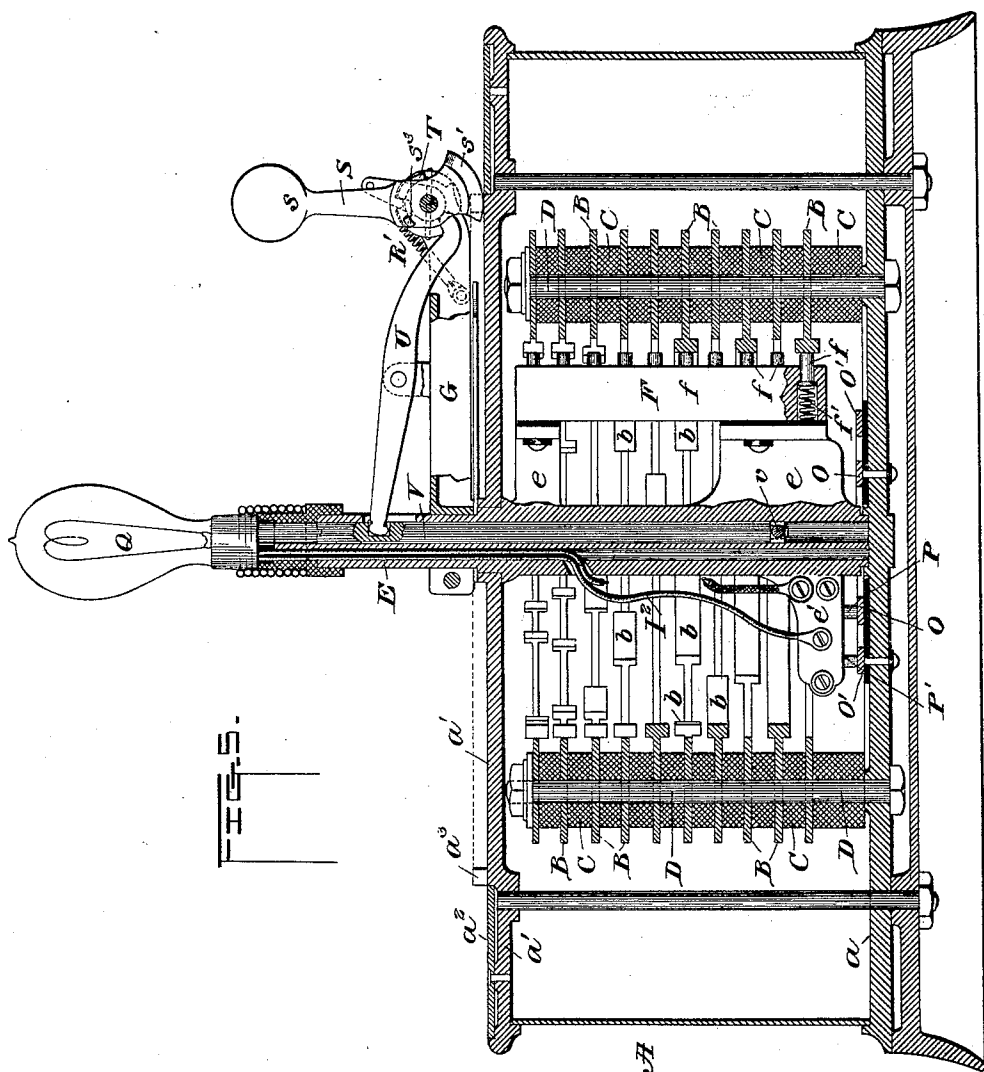
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5 Sheets—Sheet 4.

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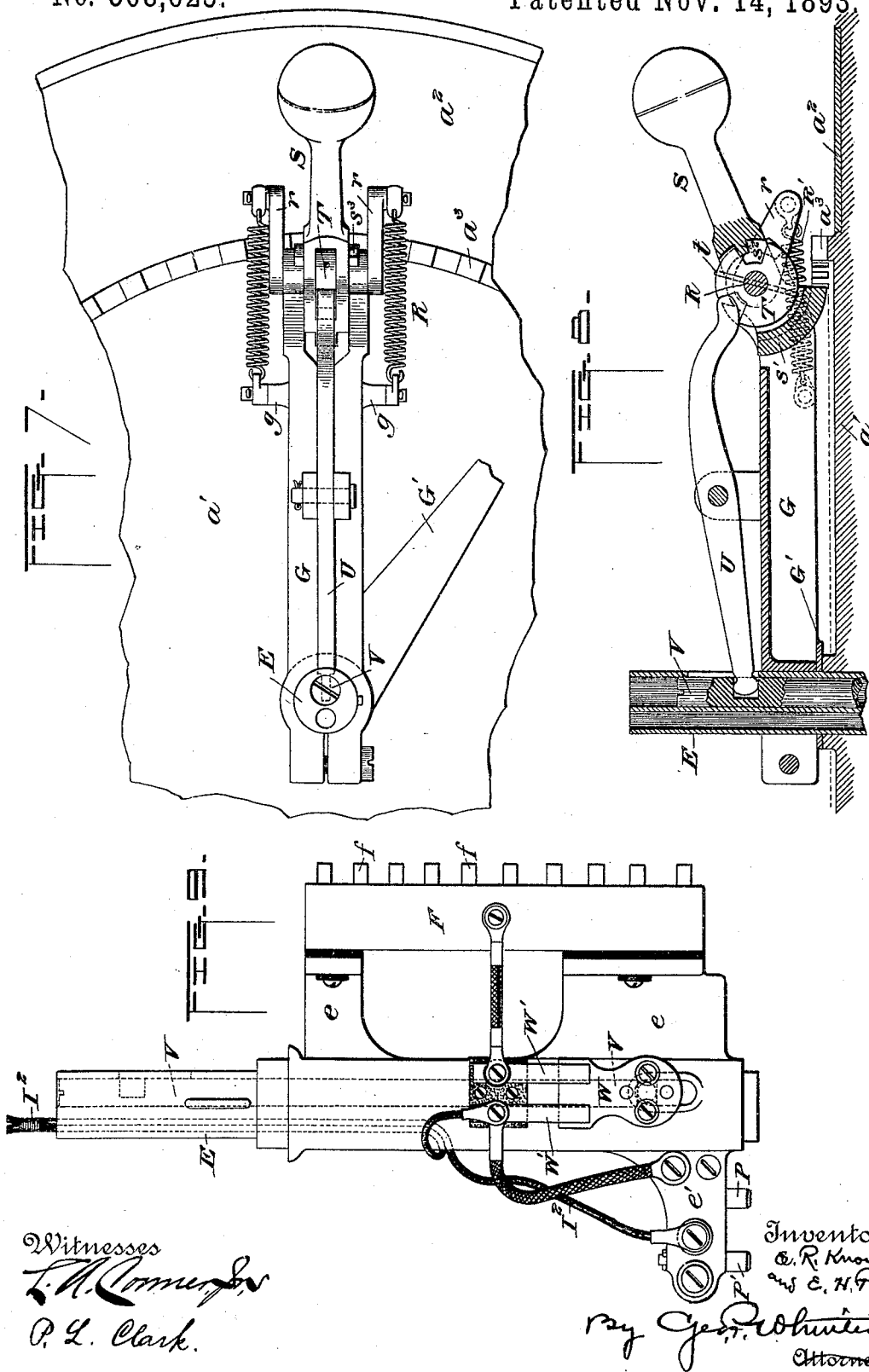
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5 Sheets—Sheet 5.

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No. 508,625.

Patented Nov. 14, 1893.



UNITED STATES PATENT OFFICE.

EDWARD R. KNOWLES, OF MIDDLETOWN, CONNECTICUT, AND EDWIN H. PARK, OF MILLBURY, MASSACHUSETTS, ASSIGNORS TO THE SCHUYLER ELECTRIC COMPANY, OF CONNECTICUT.

SWITCH-BOX FOR CONTROLLING ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 508,625, dated November 14, 1893.

Application filed March 31, 1893. Serial No. 468,489. (No model.)

To all whom it may concern:

Be it known that we, EDWARD R. KNOWLES, residing at Middletown, in the county of Middlesex and State of Connecticut, and EDWIN H. PARK, residing at Millbury, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Switch-Boxes for Controlling Electric Circuits, of which the following is a specification.

Our invention relates to electricity, and its object is, primarily, to enable a ship's officer or other person to close an electric circuit through one or more of a number of electric signaling devices, such as electric lamps. The invention is applicable, however, to other uses than signaling, being useful where any number of translating devices are to be controlled singly or in groups.

The invention consists in a movable contact or contacts co-acting with a plurality of fixed contacts having at intervals notches or other non-conducting spaces. Each fixed contact is in circuit with a translating device, and the movable contact is connected electrically with one pole of a generator, the other pole of which is connected with a common return conductor for all the translating devices. By properly arranging the conducting surfaces on the fixed contacts, any one or more of the translating devices can be cut in, and thus different groups of them will be energized as the movable contact is brought to different points in its path.

The invention also consists in many details of construction, as hereinafter set forth and particularly pointed out in the claims.

In the drawings,—Figure 1 is a top plan view of an apparatus embodying our invention. Fig. 2 is a similar view with the top plate removed. Fig. 3 is a side elevation. Fig. 4 shows the inside of the lid of the cable box. Fig. 5 is a vertical section. Fig. 6 is an end view of the latch. Fig. 7 is a plan view of the latch on a larger scale. Fig. 8 is a sectional elevation of the same. Fig. 9 is an elevation of the circuit closer. Fig. 10 is a sectional elevation of the same; and Fig. 11 is a diagram of circuits for four translating devices.

The case A is a metal box of any suitable size and construction, preferably cylindrical, and about sixteen inches in diameter. Within the case is a vertical tier of metallic bars B, insulated from each other and from the bottom *a* of the case by blocks or rings of insulation C, and from the walls of the case by a suitable air-space, as shown. The bars are preferably annular, and both they and the insulation are firmly clamped together by bolts D, which pass into or through the bottom of the case. In the inner edge of each ring are cut notches having teeth or contact faces *b* here and there. This edge of the ring is preferably flanged, as shown, so as to afford broad surfaces for the teeth *b*, which are irregularly but very carefully laid out in order to obtain the proper combinations, as will appear more clearly hereinafter.

The movable contact is so arranged with reference to the fixed contacts as to be capable of being shifted from one vertical tier of conducting surfaces *b* to another. When the fixed contacts are annular, we use a spindle E, journaled centrally in bearings in the bottom and top plates *a*, *a'* of the case A, and having on one side one or more arms *e* to which is secured an insulated block F which carries the movable contact. This may be constructed in any suitable manner, such as a single brush of copper long enough to contact with all the rings. We prefer, however, to provide a separate brush for each ring, as shown, consisting preferably of a pin *f* projecting from a socket in the outer edge of the block F, and having a spring *f'* behind it to keep it pressed yieldingly against the teeth *b* of its co-acting ring B. A head on the inner end of the pin, or any equivalent device, keeps it from being forced entirely out of its socket. The spindle is provided with a handle G, sweeping over the top plate *a'*, and carrying a pointer G' to indicate on a scale H the proper position to which to bring the movable contact in order to close the desired circuits. The scale is concentric with the spindle, and may be laid off upon the top plate *a'*, or upon a plate *a''* attached thereto. The divisions of the scale correspond with the number of permutations or combinations to be made with

the translating devices, and in each division is a word, letter or symbol to designate the particular translating device or devices thrown into action when the pointer stands opposite that division; together with a predetermined meaning for such combination, if desired.

In the drawings, ten contact rings are shown, and they are supposed to be connected with ten electric lamps, arranged in a row, and colored alternately red and white. The divisions of this scale in Fig. 1 each contain five spots, red lights being represented by the black spots. Provision is made for showing from one to five lights of either color, and every possible combination of red and white in groups of five. These combinations may mean letters of the alphabet, points of the compass, numbers, words of frequent occurrence, and the like. The scale shown in Fig. 1 is especially adapted for nautical signaling. Each ring B has connected with it an insulated conductor I, which runs to a contact plate *k* in a cable box K on one side of the case A. The lid K' of this box carries a corresponding number of contacts *k'* which rest against the plates *k* when the lid is on. Suitable fastening devices, such as the lugs *k*², and the eye *k*³ and latch *k*⁴, hold the lid in place. Connected with each contact *k* is an insulated conductor, the group of conductors being gathered into a cable L and led to the lamps or other translating devices, M. The cable also contains a common return conductor which is connected with one of the binding posts N', to which is also connected one of the supply mains *x* from the generator. The other supply main *y* is connected to the binding post N' whence a conductor leads to a contact ring O, concentric with the spindle and suitably insulated. On the spindle is an arm *e'* carrying an insulated block P in which is a spring contact pin *p* bearing always on the ring O. The pin *p* is electrically connected with the block F, through a circuit-closer on the spindle (hereinafter described). The arm *e'* carries another insulated spring contact pin *p'*, resting upon another contact ring O' concentric with the spindle, and electrically connected by the conductor I' with the binding post N'. A conductor I² connects the pins *p*, *p'*, thus forming a derived circuit, in which is placed a lamp Q, which may be conveniently mounted on the top of the spindle E, and serves to indicate the condition of the main circuit, as well as to prevent injurious sparking at the circuit closer. It is very desirable in an apparatus of this kind, to close the contacts *b*, *f*, before the circuit is closed, in order to prevent false signals, and injury to the contacts. It is also desirable that the locking of the handle and the closing of the circuits be done by the same handle. We have therefore provided the handle G with a locking latch which is arranged to close the circuit-closer after the handle is locked, and to open said closer before the handle is unlocked. The devices

we prefer to employ to accomplish these objects will now be described. The outer end of the handle G is forked, and through the arms of the fork passes a shaft R carrying at each end a rock-arm *r*, to which is attached a spring R', the other end of which is fastened to the handle G, or to studs *g* projecting therefrom. Between the arms of the fork is hinged, on the shaft R, a latch S, having a handle *s* and a curved rib *s'*. On the upper surface of the top plate *a'* is a circle of teeth or annular rack *a*³, the spaces between which will just admit the ribs *s'* when the latch is lifted to a vertical position. The outer end of the rib is beveled on both sides, to facilitate its entrance between the teeth *a*³, in which position the handle G is locked. When the latch is turned down, the rib is thrown back out of engagement with the teeth, leaving the handle G free to swing in either direction.

The hub of the latch is slotted out, to receive a tumbler T fastened to the shaft R by a pin *t*. In the periphery of the tumbler are two notches, with one of which a lug *s*² on the latch S engages, and in which it has a certain amount of lost motion, as clearly shown in Fig. 8. It will be readily seen that when the latch is moved it turns with it the tumbler, and consequently the shaft and rock arms, until the latter stand in line with the shaft and the studs *g*, when upon a further movement of the latch, the rock-arms pass the center and the springs instantly complete their movement, by reason of the play between the notch in the tumbler and the lug *s*². The latch itself is limited in its movements, by stops *s*³ which come in contact with shoulders on the fork of the handle G; or in any other suitable manner. The object of giving the tumbler T a sudden throw at the end of its movement in either direction is, to effect a sudden closing and breaking of the circuit, the circuit-closer being operated by the tumbler. A lever U is fulcrumed on the handle G, one end of it engaging with the second of the two notches in the tumbler. The other end of the lever passes through a slot in the spindle into a longitudinal hole therein, in which is fitted a rod V, at the lower end of which is a lateral arm *v* projecting through a slot in the spindle and carrying a block of insulation to which is fastened a metallic blade W, adapted when raised to enter two spring-jacks W' supported on a piece of insulation attached to the spindle. One of these spring jacks is electrically connected with the contact pin *p*, and the other with the block F, so that in connection with the blade W they form a circuit-closer for the signaling circuits.

It will be seen that the construction is such that the circuit cannot be closed before the rib *s*² engages with the teeth *a*³ and locks the handle; nor can the rib be disengaged before the circuit is broken.

The operation of the device has been inci-

dentally described above, but it may be briefly stated as follows: The latch is turned down, thereby first opening the circuit closer, and then unlocking the handle, which is moved until the pointer stands opposite the desired signal. In this position the spring contact pins *f* rest against the teeth *b* of such of the rings *B* as are in circuit with the lamps which, when lighted, will form the combination corresponding with the desired signal. The latch is then raised, thereby first locking the handle and then closing the circuit-closer; whereupon, the lamps glow. This operation is repeated for each signal, and the device is so easily manipulated that the signals can be rapidly given.

The apparatus is compact and solid, has no loose parts to get out of adjustment, and can be made with packed joints to resist dampness at sea. While it is preferred to make the fixed contacts annular, as shown, yet it is evident that they need not necessarily be confined to that particular form.

Having thus described our invention, what we claim is—

1. A switch box comprising a tier of stationary conductors, each having a different arrangement of electrically continuous contact surfaces, a plurality of translating devices, each in constant connection with its respective conductor, and a movable contact transverse to said conductors and adapted to move lengthwise thereof, and to make contact with a different group of contact surfaces at each of a number of given positions of said movable contact, said contact being in circuit with all of said translating devices, substantially as described.

2. A switch-box comprising a plurality of metal bars, each having a different arrangement of notches in its edge, and a movable contact transverse to all of said bars, substantially as described.

3. The combination with a plurality of insulated metal bars, each having a different arrangement of contact surfaces along one edge, of a movable contact transverse to said bars, and translating devices, each in circuit with one of said bars and with the movable contact, substantially as described.

4. The combination with a tier of fixed contacts, each having a different arrangement of electrically continuous contact surfaces, a plurality of translating devices, each in constant connection with its respective conductor, a movable contact, lying constantly transverse to said fixed contacts, and adapted to slide lengthwise thereof from one combination of surfaces to another, and an indicating device to show which group of contacts is in circuit for any given position of the movable contact, substantially as described.

5. The combination with a plurality of fixed contact bars having contact surfaces arranged in different combinations, of translating devices in circuit therewith, a movable contact co-acting with the fixed contacts and adapted

to close with one or more of the same in differing combinations, a scale graduated to correspond with the separate groups of fixed contact surfaces, and a pointer attached to the movable contact, substantially as described.

6. The combination with a plurality of superposed insulated contact bars having contact surfaces arranged in different combinations, of translating devices in circuit therewith, a contact common to all said translating devices arranged transverse to said surfaces and movable lengthwise thereof, a circuit controller in circuit with said movable contact, and a handle for moving said contact and operating the circuit controller, substantially as described.

7. The combination with a plurality of fixed parallel contact bars, of a movable contact adapted to close with one or more of the same in differing combinations at different points in its movement, translating devices in parallel circuit with said fixed and movable contacts, a circuit controller in circuit with the movable contact, and a device on the movable contact for operating said controller, substantially as described.

8. The combination with a plurality of fixed parallel contact bars, of translating devices each in circuit with a contact bar, a movable contact in circuit with all of said translating devices and adapted to close the circuit through one or more of the same in differing combinations at different points in its movement, a circuit controller for said circuit, and a locking latch on the movable contact adapted to operate the circuit controller, substantially as described.

9. The combination with a plurality of fixed contacts, of a plurality of translating devices in circuit therewith, a movable contact, a circuit controller, and a locking latch on said movable contact connected with the circuit-controller and adapted to lock the movable contact before it closes the circuit and to open the circuit before it unlocks, substantially as described.

10. The combination with a plurality of fixed contacts, of a plurality of translating devices in circuit therewith, a movable contact, a circuit controller, and a locking latch on the movable contact, connected with the circuit controller by a lost motion device, substantially as described.

11. In a switch box, a tier of insulated annular contact bars each having an arrangement of contact surfaces differing from the rest, a spindle concentric with said bars, and a contact on said spindle lying transverse to all the bars, substantially as described.

12. In a switch-box, a tier of fixed contact-rings having different arrangements of contact surfaces, a spindle concentric therewith, and an insulated block on said spindle carrying a contact pin for each ring, substantially as described.

13. In a switch-box, a tier of fixed contact rings, having different arrangements of con-

tact surfaces, a spindle concentric therewith, an insulated block on said spindle, and spring contact pins seated in sockets in said block, substantially as described.

5 14. The combination with a tier of contact rings, of a movable contact rotating concentrically therein, an annular contact concentric therewith, and a contact pin bearing on said annular contact and electrically connected with said movable contact, substantially as described.

10 15. The combination with a tier of contact rings, of a spindle mounted concentrically therein, a movable contact mounted on the spindle, and a circuit controller carried on said spindle and electrically connected with the movable contact, substantially as described.

15 16. In a switch-box, the combination with the tier of contact rings and the spindle, of the annular contacts O, O', concentric with the spindle, the arm carrying the two contact pins *p, p'* bearing on the contacts O, O', and the lamp Q in circuit with the pins *p, p'*, substantially as described.

20 17. In a switch-box, the combination with a suitable base, of a tier of contact rings B, insulation C interposed between said rings, bolts D clamping said rings and insulation to the base, and an inner contact concentric with the contact rings, substantially as described.

25 18. In a switch-box, the combination with the spindle and its handle, of a latch hinged to said handle and having a rib, and an annular rack, between whose teeth the rib is adapted to enter, substantially as described.

19. In a switch-box, the combination with

the spindle, of a circuit controller mounted thereon, a handle on the spindle, a rock-shaft journaled in the handle, and connected with the circuit-controller, and a latch having a loose connection with the rock-shaft, substantially as described.

20. In a switch-box, the combination with the spindle and its handle, of a rock-shaft journaled in the handle, a spring adapted to pull the rock-shaft off the center in either direction, a lever engaging with said rock-shaft, and a circuit-controller operated by said lever, substantially as described.

21. In a switch-box, the combination with the spindle and its handle, of the rock-shaft R carrying the arms *r* and the notched tumbler T, the spring R', the latch S having a lug *s*³ engaging with a notch in the tumbler, the lever U also engaging with a notch in the tumbler, and a circuit-controller operated by said lever, substantially as described.

22. In a switch-box, the combination with the spindle having a longitudinal hole, of the rod V in said hole, the insulated blade W carried by said rod, the spring-jacks W', and means for reciprocating said rod, substantially as described.

In testimony whereof we hereunto set our hands in the presence of two witnesses.

EDWARD R. KNOWLES.

EDWIN H. PARK.

Witnesses for Edward R. Knowles:

G. A. MCKAY,

J. A. KENISTON.

Witnesses for Edwin H. Park:

N. H. PARK,

E. H. VAUGHAN.