No. 843,746. PATENTED FEB. 12, 1907.

J. L. HALL.

SELECTIVE TRANSMITTING SYSTEM.

APPLICATION FILED DEC. 9, 1901.

4 SHEETS—SHEET 1.

Fig. 1

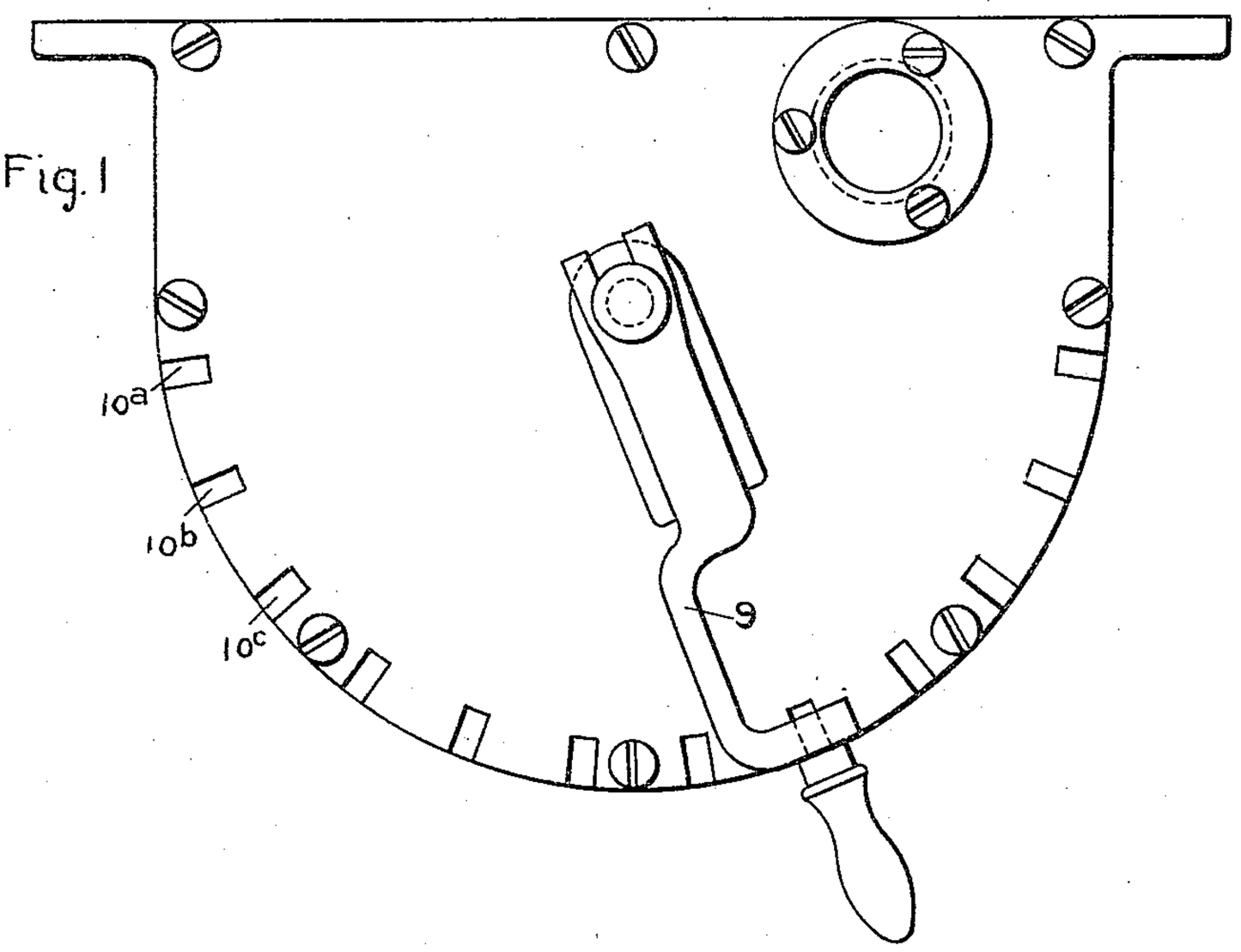
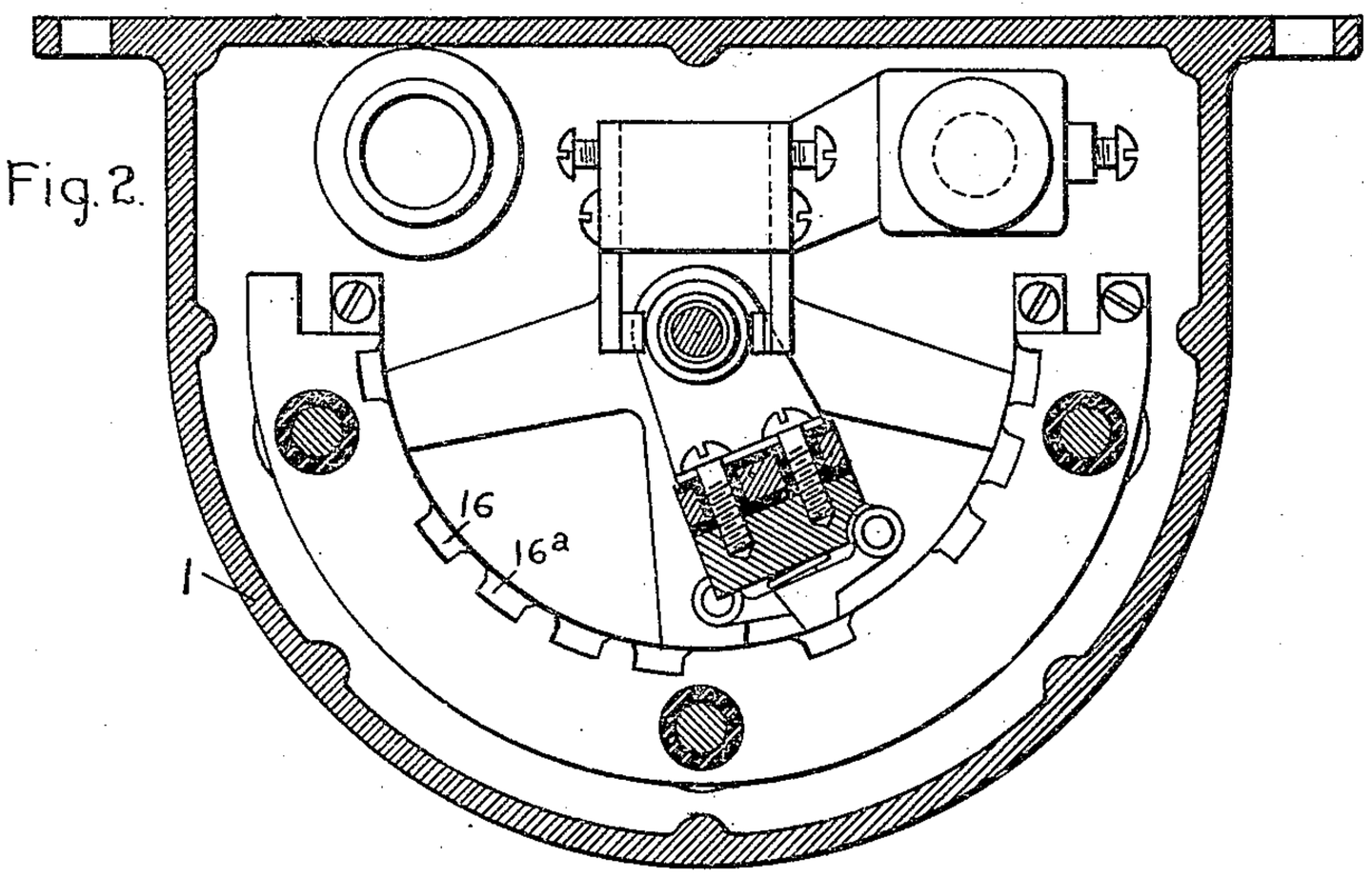


Fig. 2.



Witnesses.

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4 SHEETS—SHEET 2.

Fig. 3.

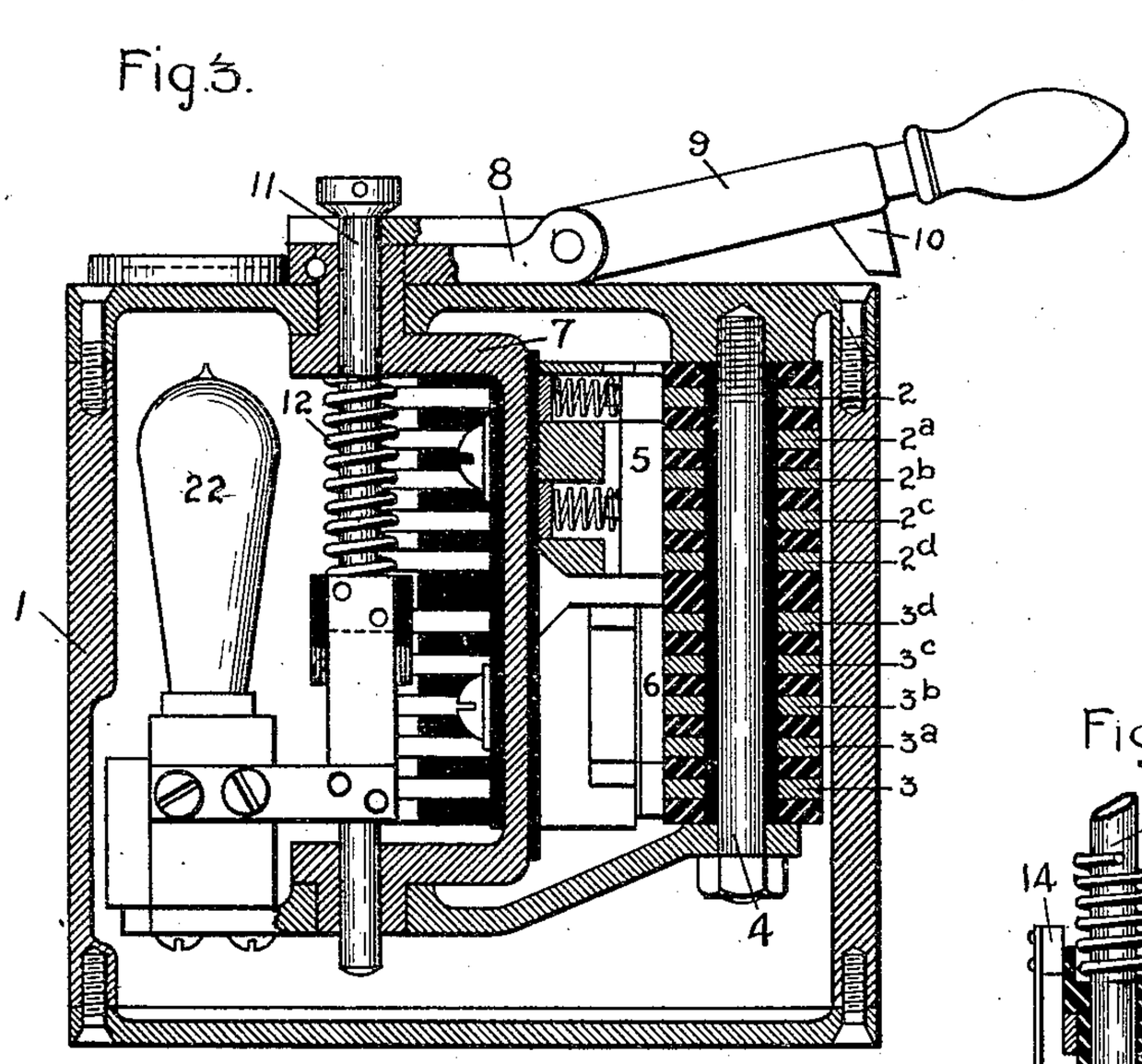


Fig. 4.

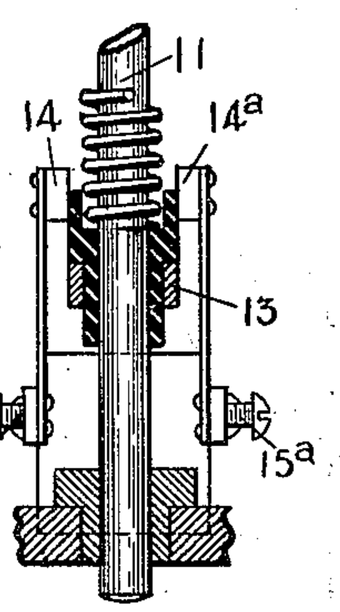
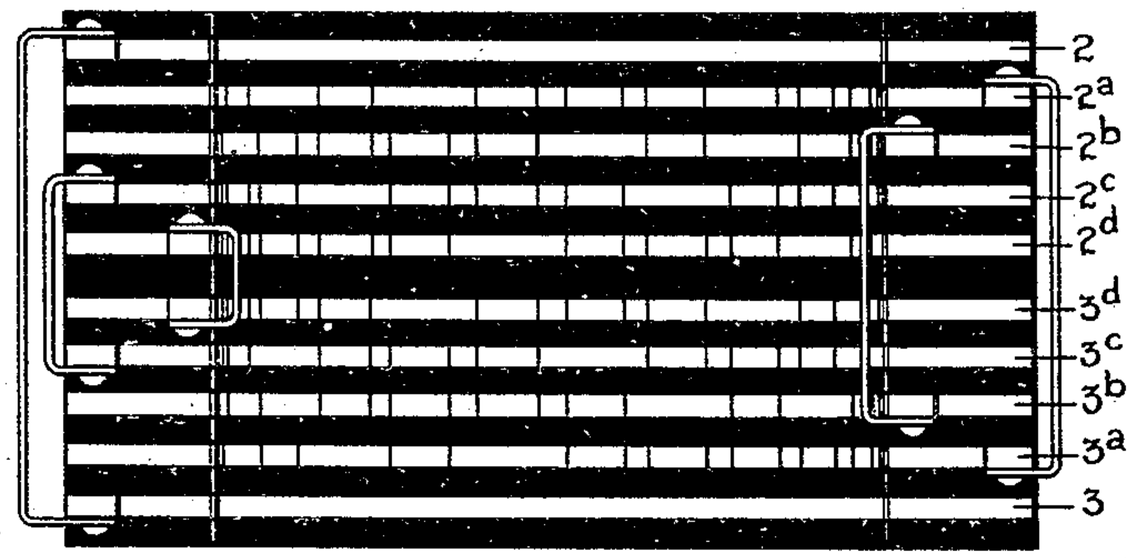


Fig. 5.



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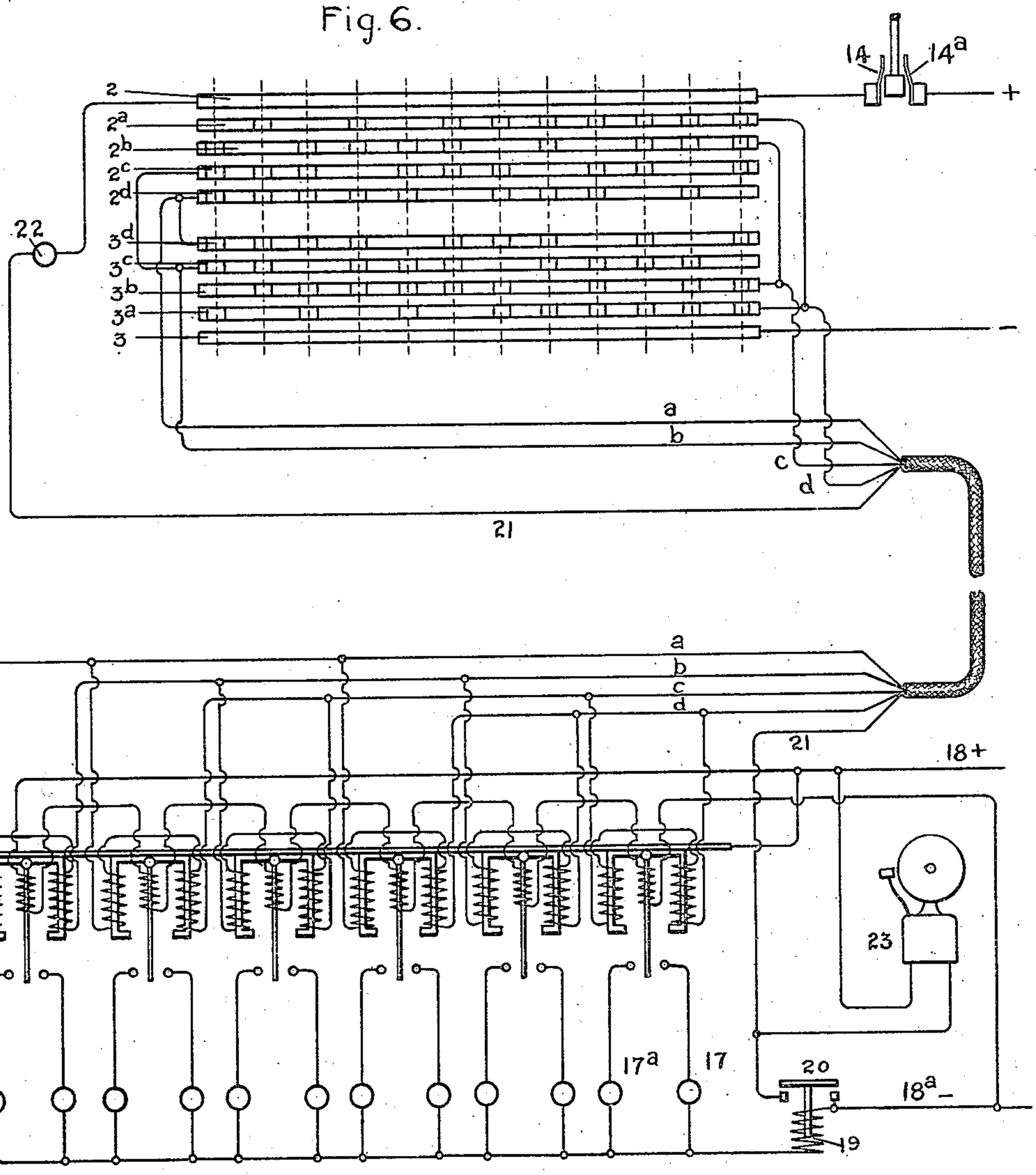
4 SHEETS—SHEET 3.

Fig. 6.



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4 SHEETS—SHEET 4.

Fig 7.

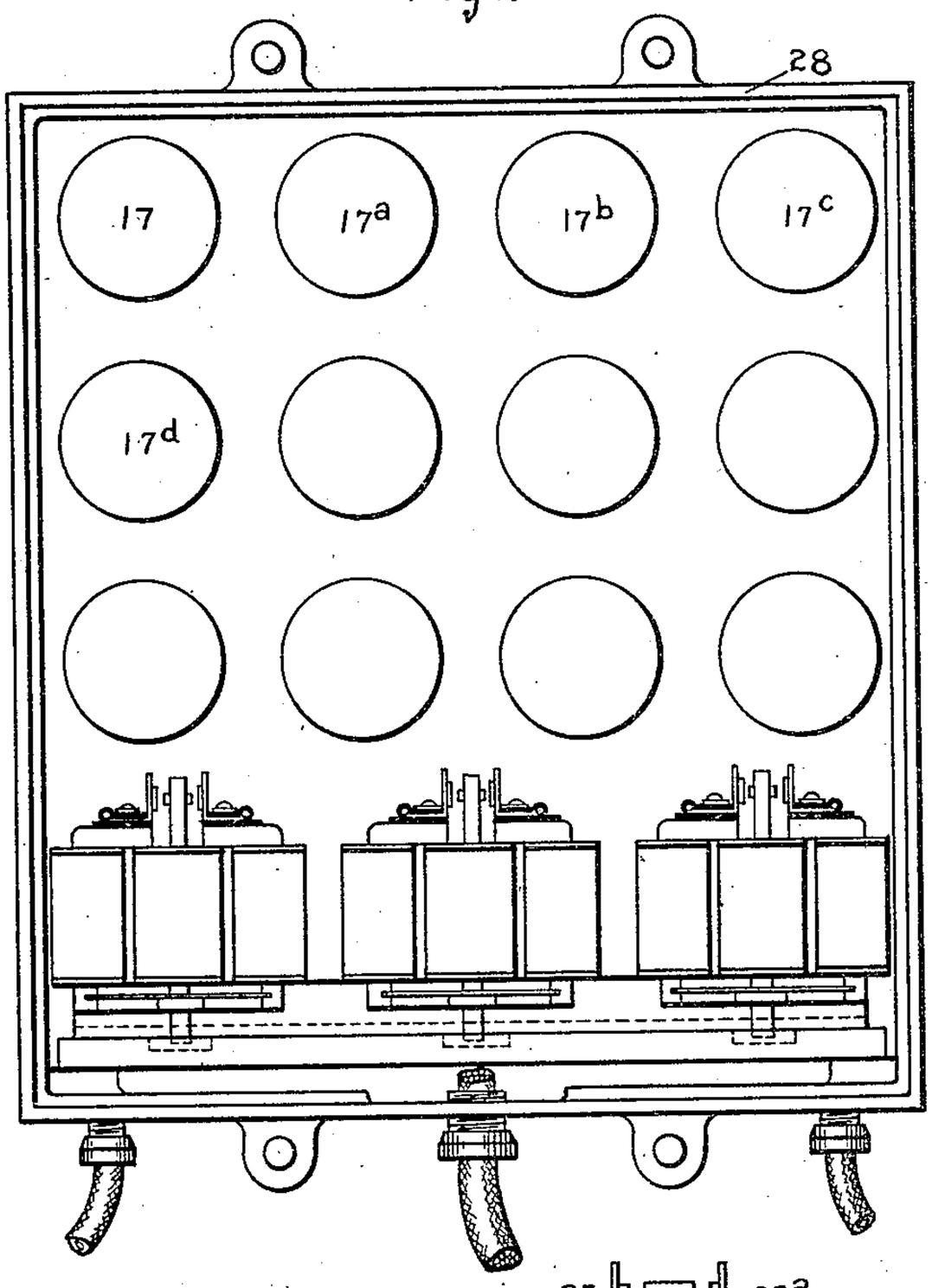


Fig. 8

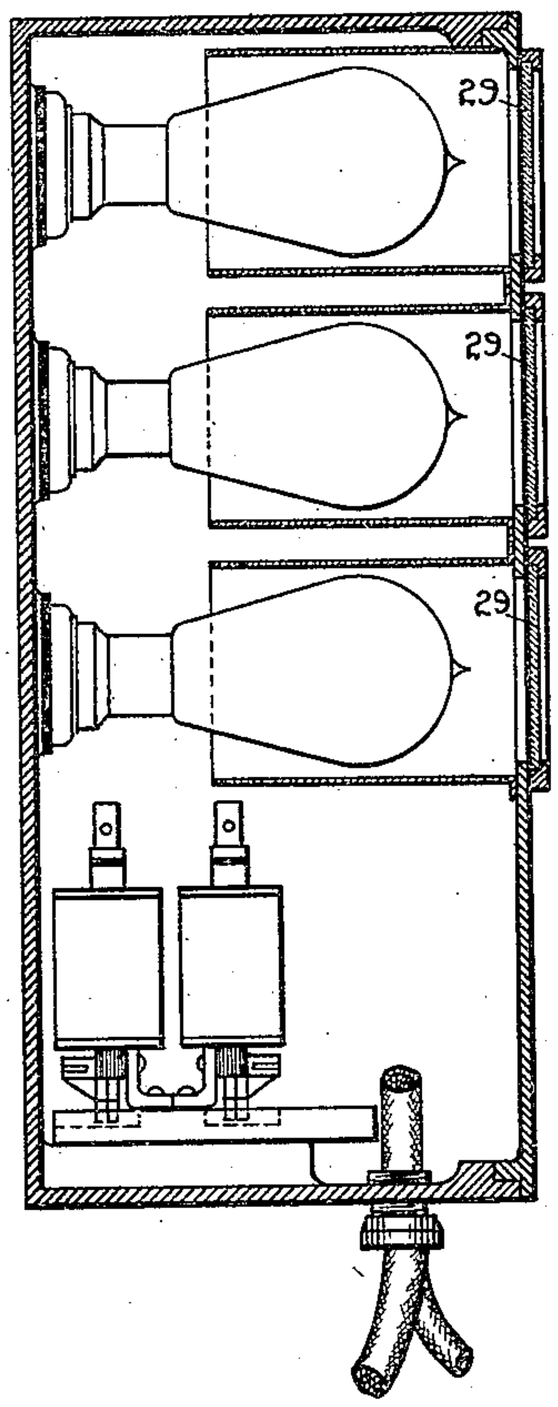
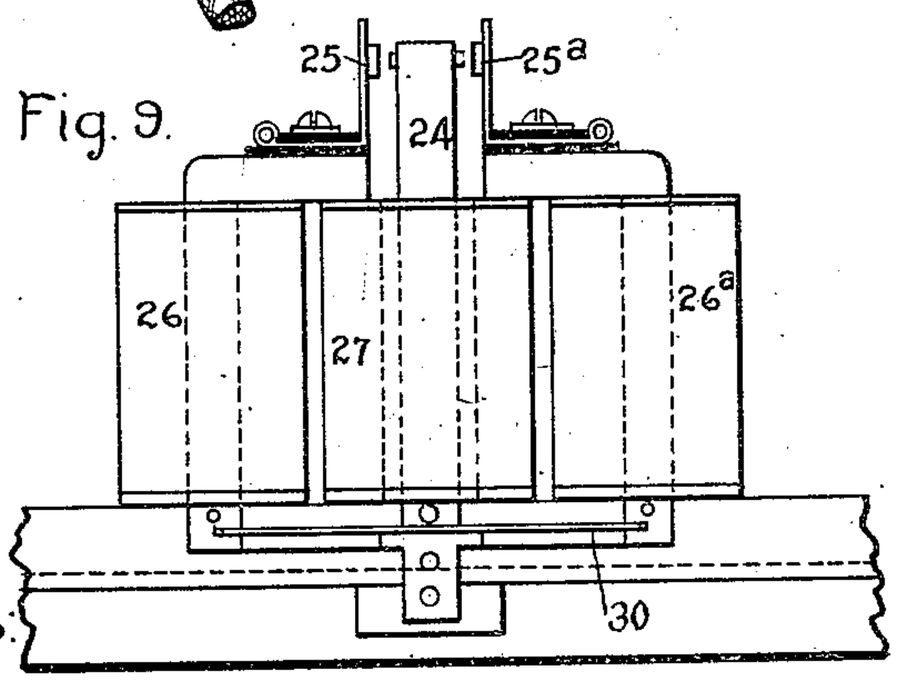


Fig. 9.



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UNITED STATES PATENT OFFICE.

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SELECTIVE TRANSMITTING SYSTEM.

No. 843,746. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed December 9, 1901. Serial No. 85,133.

To all whom it may concern:

Be it known that I, JOHN L. HALL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Selective Transmitting Systems, of which the following is a specification.

This invention relates to selective transmitting systems, the object being to provide an organization by which a considerable number of separate signals may be transmitted over a small group of wires selectively so as to operate particular signaling instruments at a receiving point or station.

The organization herein described is particularly adapted for use in a system where a single transmitting instrument to send the several signals and a single receiving apparatus at a distant station are employed. Such a system may be used aboard ship, as in an engine-room telegraph, by which different signals may be transmitted from an officer on deck to the engine-room or in transmitting orders from the conning-tower of a war vessel to the several gun-stations.

Parts of the invention are of use for other purposes than transmitting signals, as in operating selective apparatus of any kind through a small number of transmission-wires.

I carry out the invention by providing a group of wires in the form of a cable which connects the transmitting-station to the receiving-station, a transmitting device being employed by which these wires may be connected in groups taken two at a time, so as to form of one wire the outgoing and of the other the return side of an electric circuit in which is included at the receiving-station an electromagnetic signaling device. I prefer to employ a signaling device of the magnetically-polarized type by which the number of combinations possible with a certain number of transmitting-wires is increased, and therefore the equipment is simplified and cheapened.

The transmitting instrument is so arranged that a rotary contact device may connect with a positive and negative supply-wire any desired pair of transmitting-wires in the cable, and the cable may connect at the receiving-station with the different bobbins of the polarized instruments, each one having its operating-coil connected across a different pair of cable-wires. Each receiving-magnet is provided with an armature, which plays between two contacts controlling a local circuit in which are included signaling-lamps arranged behind glazed openings in the receiving-indicator, upon which numbers or other signals may be printed. Thus when a definite signal is delivered by turning the handle of the transmitter to a definite position a particular lamp will be illumined and the number flashed out from the indicator, and the receiving operator may examine a code, and thereby learn the character of the signal, or the signaled information may itself be printed upon the illumined panel.

The several receiving instruments being connected across the wires of the cable in parallel relation afford a network of circuits which permits several receiving instruments to draw current at the same time. The instrument directly across the active wires, however, carries a larger current than any of the others, and in order to prevent more than one instrument responding I give the armatures a sufficient bias by means of a spring to prevent movement except under a definite current strength. For example, in a system of the kind above referred to where four signaling-wires are employed taken in groups of two the springs may be adjusted to resist forty per cent. of the maximum pull of the receiving-magnet, and in such a case only the one connected directly across the signaling-circuit will be operated.

I provide also means for signaling back to the transmitting-station notice that the signal has been transmitted. For this purpose I employ an extra wire inclosed within the same sheath as the signaling group and in which at the transmitting-station is inserted a lamp or other signaling device, which indicates when the lamp at the receiving-station has been lighted, and since the lighting is determined by the movement of the controlling magnet or relay the transmitting officer is advised immediately as to the proper transmission of the signal.

My invention embodies various features, the novelty of which will be hereinafter more fully described in the specification and definitely indicated in the claims, as well in the system as in the type of transmitting and receiving instruments.

In the accompanying drawings, which illus-

trate the invention, Figures 1 and 2 are a top plan and horizontal section of a signal-transmitting instrument embodying my improvements. Fig. 3 is a vertical section of the transmitting instrument. Fig. 4 is a detail of the main circuit-controller. Fig. 5 is a development of the contact devices for controlling the connections with the transmitting-cable. Fig. 6 is a diagram of the signaling system. Figs. 7 and 8 are a front elevation and vertical section of receiving apparatus, and Fig. 9 is a view of one of the polarized receiving-magnets.

Referring first to the transmitter, as depicted in Figs. 1 to 5, 1 represents a metal box in which the parts are inclosed. Within this box is rigidly mounted a group of insulated contact plates or segments 2 2^a 2^b 2^c 2^d 3 3^a 3^b 3^c 3^d. These are arc-shaped segments of metal separated by insulating strips and all insulated from a supporting-bolt 4, secured to the case. Each of these segments is provided at different parts of its arc with recesses or notches, the purpose of which will be hereinafter more fully described. The segments are arranged in two groups, a metallic contact 5 6, carried by a rotary hub 7, being adapted to bridge any pair of contacts of the respective groups. As will be seen, the contact 5 is long enough to bridge any pair of the group 2 of segments and the contact 6 to bridge any pair of the group 3. These contacts are spring-mounted, as indicated, on the rotary hub, and the latter is controlled by an arm 8 on the outside of the box, in which is pivoted an operating-handle 9. The operating-handle carries a finger 10, which prevents its depression except when it is in alinement with some one of a group of notches 10^a 10^b 10^c around the outer edge of the top of the box, as indicated in Fig. 1.

The inner end of the handle is threaded by a rod 11, normally pressed down by a spring 12, maintaining out of contact a metallic ring 13 and pair of contact-brushes 14 14^a. The metallic ring is secured to an insulated collar mounted on the rod 11, as indicated in Fig. 4. When the handle 9 is depressed, the rod 11 is lifted against the tension of the spring 12 and brings into engagement the contact-ring and the brushes, thereby bridging a circuit between the binding-posts 15 15^a, connected in the main circuit. By means of this construction it is impossible to close the main circuit except when the handle is in alinement with one of the notches 10^a 10^b, &c., since in no other position can the main circuit-closer be lifted. Each contact-segment, as above indicated, is provided with a group of notches, as will be seen in Fig. 2 at 16 16^a, &c. Each of these notches is sufficiently wide to clear one of the contact bridges or brushes 5 6 when the latter passes over it.

Figs. 5 and 6 show a development of the controller-segments, an examination of which will render clear the relation of the parts. The vertical dotted lines in Fig. 6 illustrate the different signaling positions of the bridging contacts which occur when the handle is opposite some one of the notches 10^a 10^b, &c. When in such a position, it may be depressed, closing the main circuit at the circuit-closer 14 14^a hereinbefore described. This puts the potential of the supply-circuit, (indicated by the signs plus and minus,) which may be the lighting-circuit of the vessel when the system is employed in such a place, upon the segment 2, and the movable bridging contact cross-connects this with some other segment of the group 2. For example, if the handle is turned so that the bridging contacts 5 6 are in the position indicated by the extreme left-hand vertical line they will cross-connect segment 2 with segment 2^a, all the other segments 2^b 2^c 2^d of the upper group being dead, since, as will be evident from the figure, the bridging contact 5 rests over the notches of these bars, and therefore forms no contact with them. On the other hand, if the lever 9 had been shifted to a position to bring the bridging contacts to the position of the second dotted line in Fig. 6 then the segment 2^a would be out of contact with the brush, but segment 2^b would be rendered alive by cross connection through the brush with segment 2. Thus by different positions of the handle the plus wire may be successively thrown upon any of the four segments 2^a 2^b 2^c 2^d and the minus wire upon any one of the four segments 3^a 3^b 3^c 3^d, and since there are four signal-wires in the cable any one of six combinations may be made—for example, 1 2, 1 3, 1 4, 2 3, 2 4, 3 4. By means of the polarized instruments this range of combinations may be multiplied by two, since obviously there may be six combinations by which the armature may be shifted toward the right and six by which it may be shifted toward the left. There are therefore twelve positions for the bridging contacts 5 6, which are indicated by the vertical dotted lines in the upper part of Fig. 6. Assuming, for example, that the operating-handle of the transmitter is shifted to the first position and is pressed, segments 2 2^a are connected and 3 3^b, thereby throwing potential on wires *c* and *d*. As will be evident from the lower part of Fig. 6, the bobbins of the different receiving-magnets are connected across the wires of the cable, so as to couple them in the order above recited. There is therefore only one instrument which directly cross-connects wires *c* and *d*—namely, the instrument at the extreme right—and this instrument getting a larger flow of current than any of the others shifts its armature and closes the circuit on a signaling-lamp 17 or 17^a, &c. The armature of each receiving-magnet is preferably polarized by an excit-

ing-coil, as indicated in Fig. 6, and the several coils may be placed in series relation to a local supply-circuit 18 18ª. The several lamps 17 17ª, &c., are placed in open branches of this circuit governed by the several armatures of the receiving-magnets, as will be evident from the diagram.

When any lamp-circuit is closed by its receiving-magnet, a coil 19, included in said circuit, operates a contact 20 and closes a path to a return-wire 21, inclosed within the cable and returning to the transmitting-station, in series with which is an indicator, as a lamp 22, in the transmitter. The return-wire 21 at the transmitting end is connected through the signal-lamp 22 and contacts 14 and 14ª to the positive terminal of the source of current and at the receiving end is connected through the contact 20 to the negative terminal of the source of current. The contact 20 also controls an alarm bell or indicator 23 at the receiving-station. The polarized magnets of the receiving instrument are indicated in Figs. 7, 8, and 9. Each of these consists of a magnetic circuit formed of soft iron, in the air-gap of which is adapted to rock a pivoted armature 24 between two contact-points 25 25ª. The fixed cores are polarized by spools 26 26ª, connected in series relation between the cable-wires *a b c d* in the order hereinbefore referred to—that is to say, between 1 and 2, 1 and 3, 1 and 4, 2 and 3, 2 and 4, 3 and 4, respectively—and the armature is polarized by a coil 27, having an opening sufficiently large to permit the armature to play between the contact-points 25 25ª. To return the armatures to the normal position when the magnets are deënergized and to hold them in this position, I mount strips of spring metal 30, Fig. 9, rigidly on the armatures near their lower ends and at right angles thereto. The ends of these strips 30 protrude into slots formed in the fixed cores of the magnets 26 26ª. These relays or polarized magnets are mounted in a box or casing 28, containing the receiving-lamps, which are controlled by the relays. The front of the casing is provided with glazed openings, as indicated in Fig. 8 at 29, upon which may be painted or otherwise marked any desired information to be conveyed to the receiving-operator. Thus in transmitting the signal before the circuit can be closed and any part of the system rendered alive the handle 9 must be depressed, which can only take place when it stands in proper position to send a signal. The particular signal set depends on the arc over which it is shifted and the pair of wires in the cable which are connected in circuit.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A selective transmission system comprising a plurality of wires between the transmitting and receiving apparatus, polarized receiving apparatus comprising a plurality of magnets respectively connected across different pairs of wires, a source of electric energy, and transmitting apparatus for throwing said source with either polarity across different pairs of wires a pair at a time.

2. A selective transmission system comprising a plurality of wires between the transmitting and receiving apparatus, transmitting apparatus for coupling the wires in different pairs and connecting a pair at a time to the terminals of a source of voltage with either polarity, a plurality of polarized receivers connected respectively across the different pairs of wires, and indicators controlled by the several polarized receivers.

3. A selective transmission system comprising a plurality of transmission-wires extending from the transmitting to the receiving apparatus, a source of electric energy, transmitting apparatus for selecting said wires a pair at a time and connecting them to the terminals of said source with either polarity, electromagnetically-actuated receivers connected respectively across the different pairs of wires, indicators controlled by the armatures of the receivers in opposite directions of movement, and means for biasing the armatures against movement in either direction.

4. A selective transmission system comprising a plurality of wires between the transmitting and receiving apparatus, a source of electric energy, transmitting apparatus for imposing said source on different pairs of wires taken a pair at a time, the several wires occurring in more than one pair respectively, a plurality of receiving-electromagnets respectively connected across the several pairs, and electric lamps selectively controlled by said receiving-magnets.

5. A selective signal-transmission system comprising a plurality of wires between the transmitting and receiving apparatus, a source of electric energy, transmitting apparatus for imposing said source on different pairs of wires taken a pair at a time, the several wires occurring in more than one pair, a plurality of receiving-magnets connected respectively to the different pairs of wires, a return signal-circuit actuated by each receiver, and an indicator in said circuit at the transmitting-station.

6. A selective signal system comprising a transmitter, a receiver, a plurality of wires between them, a source of difference of potential, means in the transmitter for selecting the wires a pair at a time and connecting them to said source with either polarity, and a plurality of polarized magnets in the receiver connected respectively across the different pairs of wires.

7. A selective signal system comprising a transmitter, a receiver, a plurality of wires between them, and a manually-operated

switch in the transmitter to which the several wires and the mains from a source of electric supply are connected and which is arranged in its different positions for selecting any pair of the wires and connecting them a pair at a time to said mains with either polarity.

8. A selective signal system comprising a transmitter, a receiver, a plurality of wires between them, mains from a source of electric supply, means in the transmitter for selecting any pair of the wires and connecting them a pair at a time to the mains with either polarity, polarized relays in the receiver connected respectively between the several pairs of wires, a circuit closed by a relay when operated, and an indicating device in said circuit.

9. A selective signal system comprising a transmitter, a receiver, a plurality of wires between them, a source of difference of potential, means in the transmitter for selecting any pair of the wires and connecting them with said source with either polarity, a switch in the circuit of said source closed only when said selecting means is in operative position, and means in the receiver affected by said connection to give an indication.

10. A selective signal system comprising a transmitter, a receiver, and a plurality of wires between them, said transmitter having a plurality of conducting-segments, positive and negative mains from a source of electric energy, each wire of the system being connected to two of said segments and each of said mains being connected to a segment, a contact device coöperating with the segments, an operating-handle therefor, and break-points in the several segments distributed so that any pair of wires may be selected and connected to the supply-mains with either polarity.

11. A selective signal system comprising a transmitter, a receiver, and a plurality of wires between them, said transmitter having two sets of conducting-segments, the several wires of the system being connected to a segment of each set, a contact for each set, leads from a source of electric supply connected to said contacts, break-points in the several segments distributed to connect different wires with said leads in different angular positions, and an operating-handle for shifting the contacts to cut different groups of wires into circuit.

12. A selective signal system comprising a transmitter having a pivoted operating-arm, a receiver, a plurality of wires between them-a source of difference of potential, means in the transmitter controlled by said operating-arm for selecting any pair of the wires and connecting them with said source with either polarity, a switch in the circuit of said source closed only when said operating-arm is in operative position, means in the receiver affected by said connections to give an indication and to close a circuit, and indicating means at the transmitter actuated when said circuit is closed.

13. A selective signal system comprising a transmitter, a receiver, and a plurality of wires between them, said transmitter having a plurality of conducting-segments, positive and negative mains from a source of electric energy, each wire of the system being connected to two of said segments and each of said mains being connected to a segment, a contact device coöperating with the segments, an operating-handle therefor, breakpoints in the several segments distributed so that any pair of wires may be selected and connected to the supply-mains with either polarity, means in the receiver actuated when such connection is made to give an indication and to close a circuit, and indicating means at the transmitter actuated when said circuit is closed.

14. A selective signal system comprising a transmitter, a receiver, and a plurality of wires between them, said transmitter having a plurality of conducting-segments, positive and negative mains from a source of electric energy, each wire of the system being connected to two of said segments and each of said mains being connected to a segment, a contact device coöperating with the segments, an operating-handle therefor, breakpoints in the several segments distributed so that any pair of wires may be selected and connected to the supply-mains with either polarity, a switch in the supply-circuit, and means preventing closure of said switch except when the operating-handle is in an operative position.

15. A selective signal system comprising a transmitter, a receiver, a plurality of wires between them, said transmitter having two sets of conducting-segments, the several wires of the system being connected to a segment of each set, a contact for each set, leads from a source of electric supply connected to said contacts, break-points in the several segments distributed to connect different wires with said leads in different angular positions, an operating-handle for shifting the contacts to cut different groups of wires into circuit, a switch in the supply-circuit, and means preventing closure of said switch except when the operating-handle is in an operative position.

In witness whereof I have hereunto set my hand this 6th day of December, 1901.

JOHN L. HALL.

Witnesses:

BENJAMIN B. HULL,

MARGARET E. WOOLLEY.