

(No Model.)

F. J. RUSSELL.
ELECTRICAL INDICATING MECHANISM.

No. 547,035.

Patented Oct. 1, 1895.

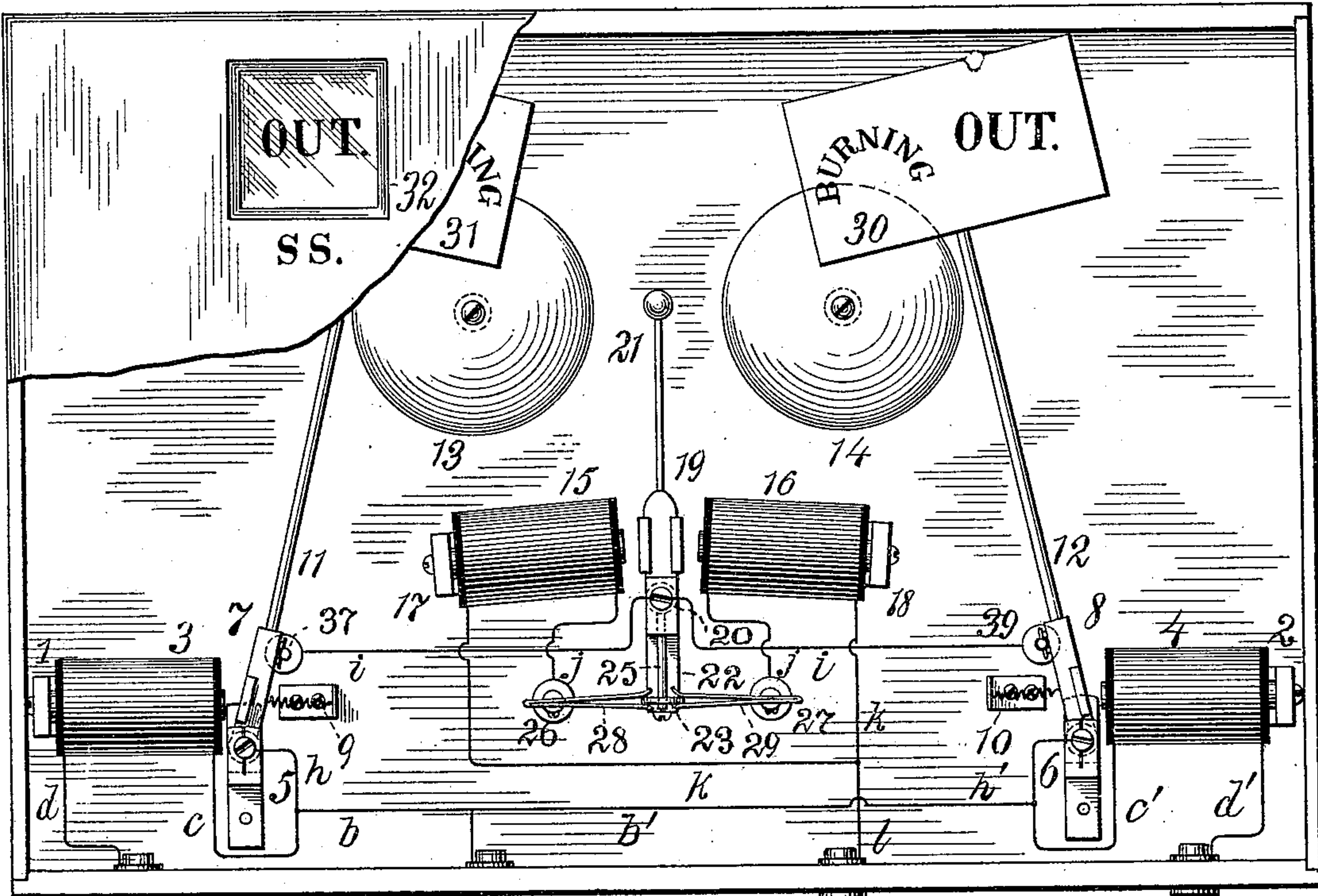


Fig. 1,

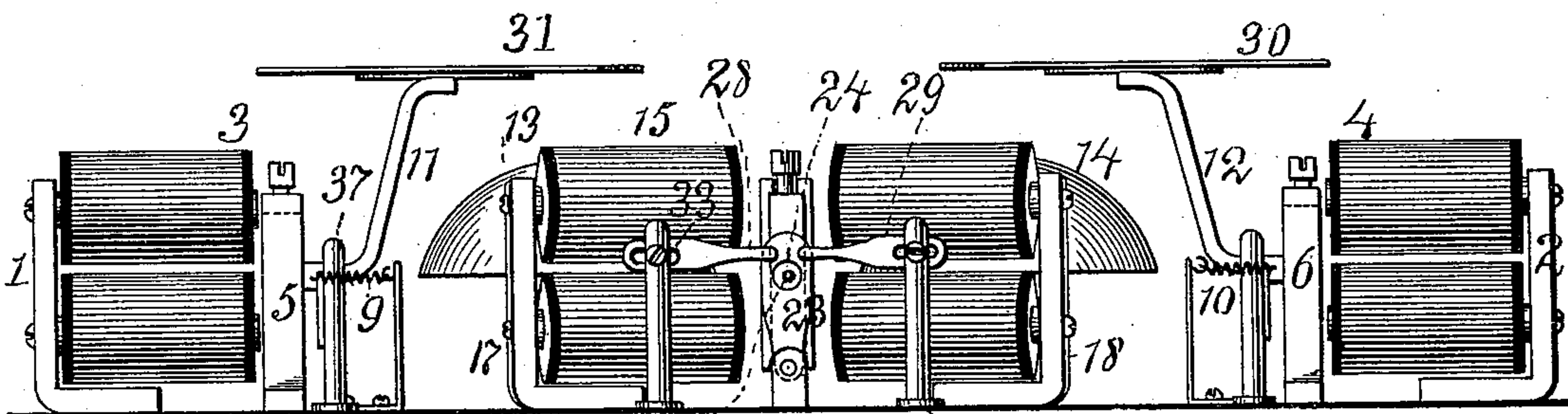
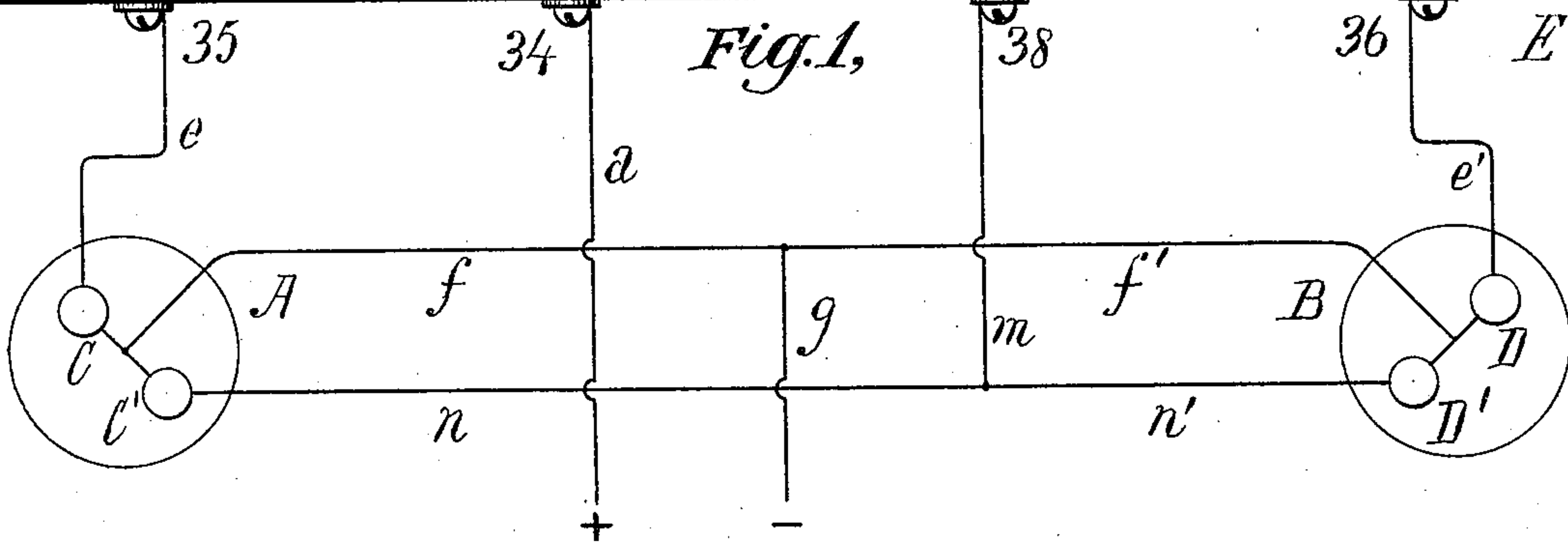


Fig. 2,

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ELECTRICAL INDICATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 547,035, dated October 1, 1895.

Application filed April 15, 1895. Serial No. 545,680. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. RUSSELL, of the city, county, and State of New York, have invented a new and useful Improvement in Electrical Indicating Mechanism, of which the following is a specification.

The invention consists in an electric indicating and controlling mechanism whereby the pilot of a vessel, for example, may be informed at all times as to the condition of his running-lights, both by visible and by audible indications produced in the pilot-house or other convenient place, and whereby when a lamp happens to go out another lamp is immediately set in glow in place of it.

The invention consists more particularly in the combination of devices pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the apparatus, showing the arrangements of the lights and the circuits in electrical diagram. Fig. 2 is a view of the apparatus from above.

Similar numbers and letters of reference indicate like parts.

The two circles A and B designate any suitable support for the running side lights of a vessel, the starboard light being at the support A and the port light at the support B. In each support A and B there are two electric lights, C and C' being the starboard lights and D and D' being the port lights. All four of these lights, as will now be explained, are connected in circuit with a suitable source of electricity and with the alarm and indicating apparatus, the arrangement, however, being such that the lights C and D only are normally in operation, and these constitute, therefore, the regular running-lights. The lights C' and D' are what may be termed "pre-venter-lights"—that is to say, one or both of them come into glow only when one or both of the regular lights C and D happen to become extinguished. At the same time a shutter bearing an appropriate inscription moves in front of an opening which is visible to the pilot or other person controlling the ship, and a bell likewise sounds, giving the alarm.

The controlling, indicating, and alarm apparatus is all inclosed in a box or case E, which is to be placed on the bridge or in the pilot-

house, or at any other station at which it is desired the necessary intelligence of the condition of the lights shall be received. Mounted on brackets 1 and 2 within the box E are electromagnets 3 and 4. Pivoted on suitable brackets 5 and 6 are the armatures 7 and 8 of these magnets, each armature being provided with a retracting-spring 9 and 10, connected to a fixed abutment in the usual way. The armatures 7 and 8 carry rods 11 and 12, at the upper ends of which are shutters 30 and 31. Upon each shutter are inscribed the words "Burning" and "Out." These shutters are placed behind openings in the cover or wall of the case E. One of these openings is shown at 32. The size of the opening is such that only one of the inscriptions on each shutter can be seen through it. Thus at the opening 32 in the drawings only the inscription "Out" can be seen; but when the rod 11 is moved to the left, then only the inscription "Burning" can be seen. Also within the case E are two gongs 13 and 14. These are caused to sound by the mechanism now to be described. 15 and 16 are two electromagnets supported on fixed brackets 17 and 18. Between the facing poles of the electromagnets 15 and 16 is the armature 19, which is pivoted at 20 to a bracket 22. The armature 19 carries the hammer 21, which is located between the two gongs, and which, when vibrated, acts on both of them. The bracket 22 has a horizontal arm, to which is pivoted a horizontal switch-plate 23, near the extremity of which is a circular opening 24. A vertical rod 25, attached to the armature 19, enters this opening; but the diameter of said rod 25 is considerably smaller than the diameter of said opening, as shown in Fig. 2. Supported upon standards 26 and 27 are double-leaf springs 28 and 29, the ends of which are flared. Between the parts of these leaf-springs enters the plate 23. The springs 28 and 29 are slotted, as shown at 33, and are connected to the standards 26 and 27 by screws, so that said springs may thus be adjusted in a direction of their own length.

I will now describe the lead of the circuits in the apparatus when the regular running-lights C and D are in operation: from one pole of the source of electricity by wire *a* to binding-post 34, disposed in a wall of the case

E, to wire *b*, branch wire *c*, to and through electromagnet 3, by wire *d* to binding-post 35, by wire *e* to lamp C, by wire *f* to wire *g*, and so to the other pole of said source of electricity. I will call that circuit the "starboard main-light circuit." When the current passes over it, the light C is rendered incandescent, the magnet 3 attracts its armature 7, so bringing the inscription "Burning" on the shutter 31 in front of the opening 32. The port main-light circuit proceeds as follows: from wire *a*, as before, to wire *b'*, to branch *c'*, to electromagnet 4, by wire *d'* to binding-post 36, by wire *e'* to lamp D, and by wire *f'* to wire *g*, and so to the other pole of the source of electricity. When the current passes over this circuit, the electromagnet 4 is energized, attracting its armature 8 and moving the shutter 30, so as to bring the inscription "Burning" thereon in front of the other opening, corresponding to 32. It will be seen, therefore, that the current passes over these two circuits when both running-lights C and D are in proper operation, and the fact of their being in such operation is indicated to the pilot by the words "Burning" appearing before the openings in the case E. Now let it be supposed that the lamp C burns out or becomes otherwise injured, so that the starboard main-lamp circuit is broken at the lamp. This throws into operation what I will call the "starboard bell-circuit," which I will now trace. The current proceeds from wire *a* to wire *b* and then to the branch *h* and so to armature 7. Of course, through the breaking of the starboard main-lamp circuit the magnet 3 has become de-energized, so that the spring 9 now retracts the armature 7. When said armature is retracted, it is brought against a fixed stop or pin 37, thus establishing electrical connection from wire *h* through armature 7 to wire *i*. From wire *i* the circuit proceeds to armature-bracket 22 and thence to plate 23, leaf-springs 28 and 29, and then standards 26 27, thence by the two wires *j* through the electromagnets 15 and 16, thence by the wire *k* to the wire *l*, binding-post 38, wire *m*, wire *n* to lamp C', and thence to the wire *f*, wire *g* and the other pole of the source of electricity. The consequence is as follows: As soon as the electromagnet 3 releases its armature the shutter 31 moves behind the opening 32, so as to expose the inscription "Out," as represented in the drawings. Both of the bell-magnets 15 and 16 are then energized. When there is no current in the apparatus, the armature never normally stands at rest in the middle position, as illustrated in the drawings, but by gravity inclines to one side or the other. If the switch-plate 23 is in its middle position, the armature is permitted so to incline by reason of the rod 25 having play in the larger aperture 24 in said switch-plate. In that case the plate 23 will make contact with both springs 28 and 29 and the current will energize both magnets 15 and 16; but the armature will be most

strongly attracted by that magnet toward which it is inclined, or, in other words, to the pole of which it stands the nearest, and in this way the operation of the vibrator will begin. In practice, however, I find that the armature does not come to rest when the current is shut off with the plate 23 in such a middle position, but that on the contrary the plate is always between the parts of one spring (28 or 29) or the other. Suppose, for illustration, that the armature at the outset inclines by gravity to the right, and that then the switch-plate 23 is between the parts of the spring 28. The width of said switch-plate is such that when it is fully inserted between the parts of spring 28 it is withdrawn from between the parts of spring 29. The current, therefore, under the supposed conditions, will, on establishment, pass only through the magnet 15, which will at once draw the armature 19 to the left; but as the armature moves to the left the rod 25 will move the switch-plate 23 gradually out from between the parts of spring 28 and simultaneously insert said plate between the parts of spring 29, so that by the time the armature has been drawn by magnet 15 a sufficient distance to the left (say to cause the hammer 21 to strike the gong 13) the current has been diverted by the plate 23 into the magnet 16, which now pulls the armature in the opposite direction, (say until the bell-hammer strikes the gong 14,) and thus the armature is set in rapid vibration. It will be observed that the arrangement of the rod 25 in the large opening 24 serves a double purpose, the first being that the armature, as already stated, is permitted to incline a certain distance by gravity, thus insuring the beginning of its vibration by the difference between the pull of the magnets upon it, even when the plate 14 is in its middle position and grasped by both springs 28 29, and the second being that after the armature has completed its stroke with the rod 25 bearing against one edge of the opening 24 in plate 23, on its return movement the rod plays across the said opening freely before it again starts said switch-plate in motion, and thus the armature has a certain acquired momentum before it begins to move the said switch-plate from between the parts of the spring in which it has been inserted, this momentum acting to overcome both the inertia of the plate and the frictional resistance of the parts of the spring bearing upon its faces. The net result is a vibration of the bell-hammer, causing it to strike alternately the gongs 13 and 14, and the accomplishment of this without ever breaking the circuit in which the bell mechanism is located. It will be noticed that the aperture 24 in the plate 23 is larger in diameter than the diameter of the rod 25. The object of this is to enable the armature to start its motion before it in turn causes any movement of the plate 23 between the parts of the springs. In this way the operation of

the device is made more certain, because the armature is given a certain amount of initial momentum before it begins to move the plate 23. In my aforesaid application for Letters
 5 Patent, Serial No. 545,679, now pending, I have described this bell mechanism separately and apart from any other combination, and in that application have specifically claimed it. Continuing now the statement of the re-
 10 sults following the extinguishment of lamp C, not only are the gongs 13 and 14 sounded by the mechanism so far described, but the pre-
 15 venter-lamp C' is, by reason of such current through it, at once set into glow, so that, to sum up all the results, the pilot is shown
 20 visually at the opening 32 the inscription "Out." He receives warning also by the ringing of the gongs, and instantly, also, the pre-
 25 venter-lamp C' is rendered incandescent and so remains until the regular lamp C is put back in proper condition for operation. Not only, therefore, does the pilot receive a visible and audible alarm, but any danger which might attend the extinguishment of the lamp
 C is entirely prevented by the immediate lighting of the preventer-lamp C', located beside it.

The circuits in connection with the lamps D and D', which accomplish the same results
 30 with respect to these lamps, I will now trace: from wire *a* to wire *b'*, to branch *h'*, armature 8, stop 39, wire *i'*, armature 19, bracket 22, springs 28 and 29, wires *j*, magnets 15 and 16, wire *k*, wire *l*, binding-post 38, wire *m*, wire
 35 *m' n'*, lamp D', wire *f'*, and wire *g*.

By the term "indicating device" herein used I mean any apparatus which on being actuated produces effects which can be perceived either audibly or visibly, by means of
 40 which effects the observer is warned that something has or has not taken place. Thus a shutter having inscriptions moving in front of an orifice is an indicating device; so is an arm moving to and fro in one direction or
 45 another, or, in addition, moving over any kind of scale.

The invention is applicable to a variety of different purposes. It may be employed to insure the operation of any electrical appara-
 50 tus wherein a rupture of the circuit is likely to be attended with injurious results. Thus

it may be used to give warning of the failure of railroad signal mechanism to act and to replace at once the inoperative contrivance by another and operative one. It will also
 55 indicate at a distant station that the lamps in a subway or tunnel are not working and substitute others for them; or in theater illumination it may be employed in event of a sudden rupture of a main feeding-circuit
 60 and extinction of the lamps therein, which might leave the house or stage suddenly in darkness, to substitute instantly the lamps of a second or preventer circuit.

I claim—

1. In an electric indicating and controlling mechanism, and in combination with a vessel, locomotive, railroad car, or other movable means of transportation, an electric circuit having two branches, and in one branch an
 70 electro-magnet and an electric lamp, and, in another branch, a circuit closer controlled by said magnet, an indicating device mechanically actuated by said circuit closer, a second electric lamp and an electric bell; the said
 75 lamps being disposed in proximity and the said indicating device, circuit closer and bell being located at a station distant from said lamps.

2. The combination of the electric lamps C
 80 and D and electro-magnets 3 and 4 each in main circuit, contact points or stops 37 and 39 and an electric bell in branch circuit, and retractible armatures 7 and 8 making contact with said stops 37 and 39 when retracted, sub-
 85 stantially as described.

3. The combination with a vessel or other means of transportation of the electric lamps C and D and electro-magnets 3 and 4 in main
 90 circuit, contact points or stops 37 and 39, an electric bell and electric lamps C' and D' disposed respectively in proximity to said lamps C and D in branch circuit, retractible armatures 7 and 8, actuating indicating devices, as 30, 31, and making contact with said stops
 95 37 and 39 when retracted, substantially as described.

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Witnesses:

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