

H. M. ELDRED.
AUTOMATIC ELECTRICAL SIGNALING SYSTEM.
APPLICATION FILED NOV. 11, 1907.

956,057.

Patented Apr. 26, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

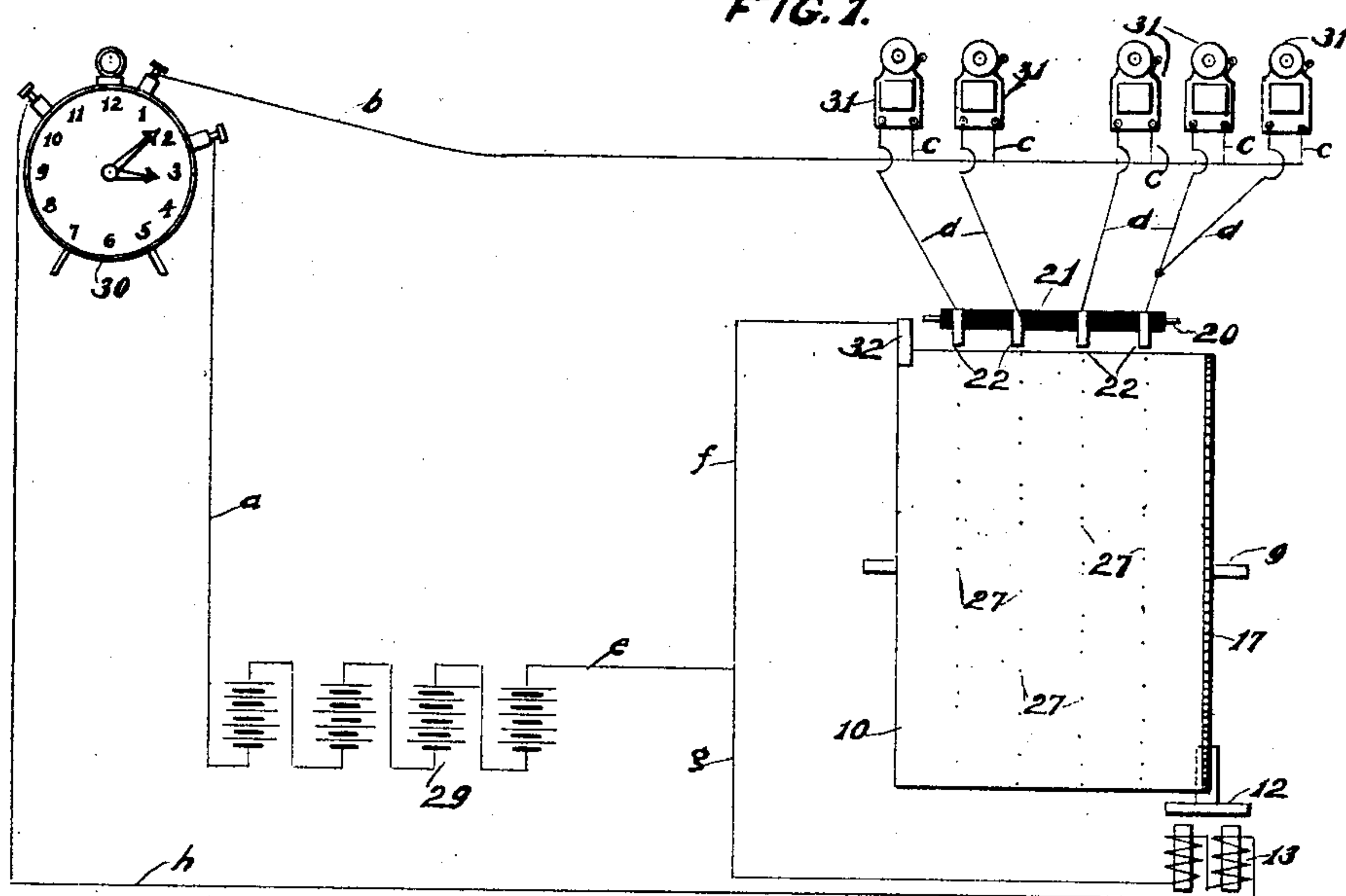
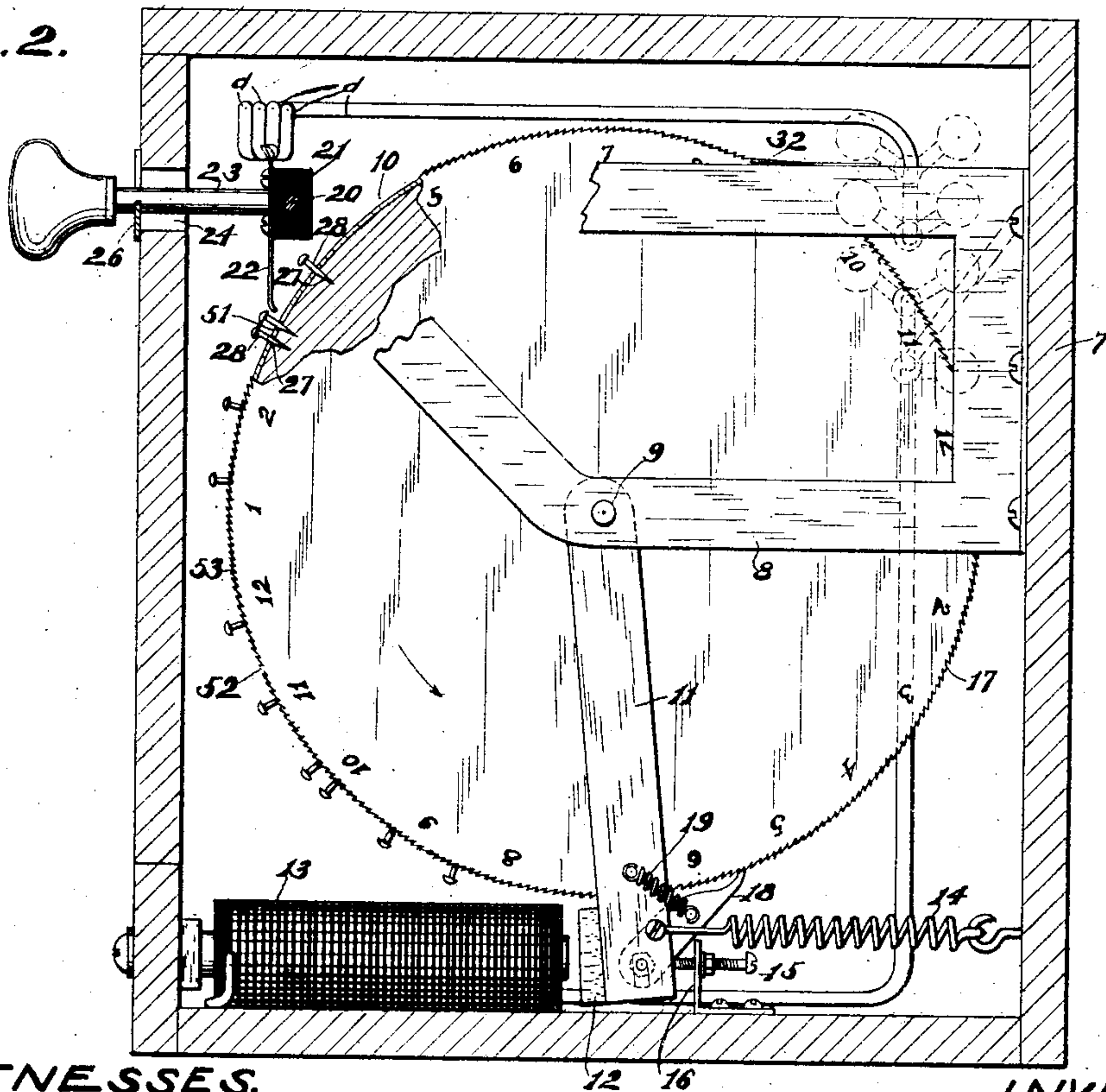


FIG. 2.



WITNESSES:

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By Benedict, Morsell & Caldwell
ATTORNEYS.

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2 SHEETS—SHEET 2.

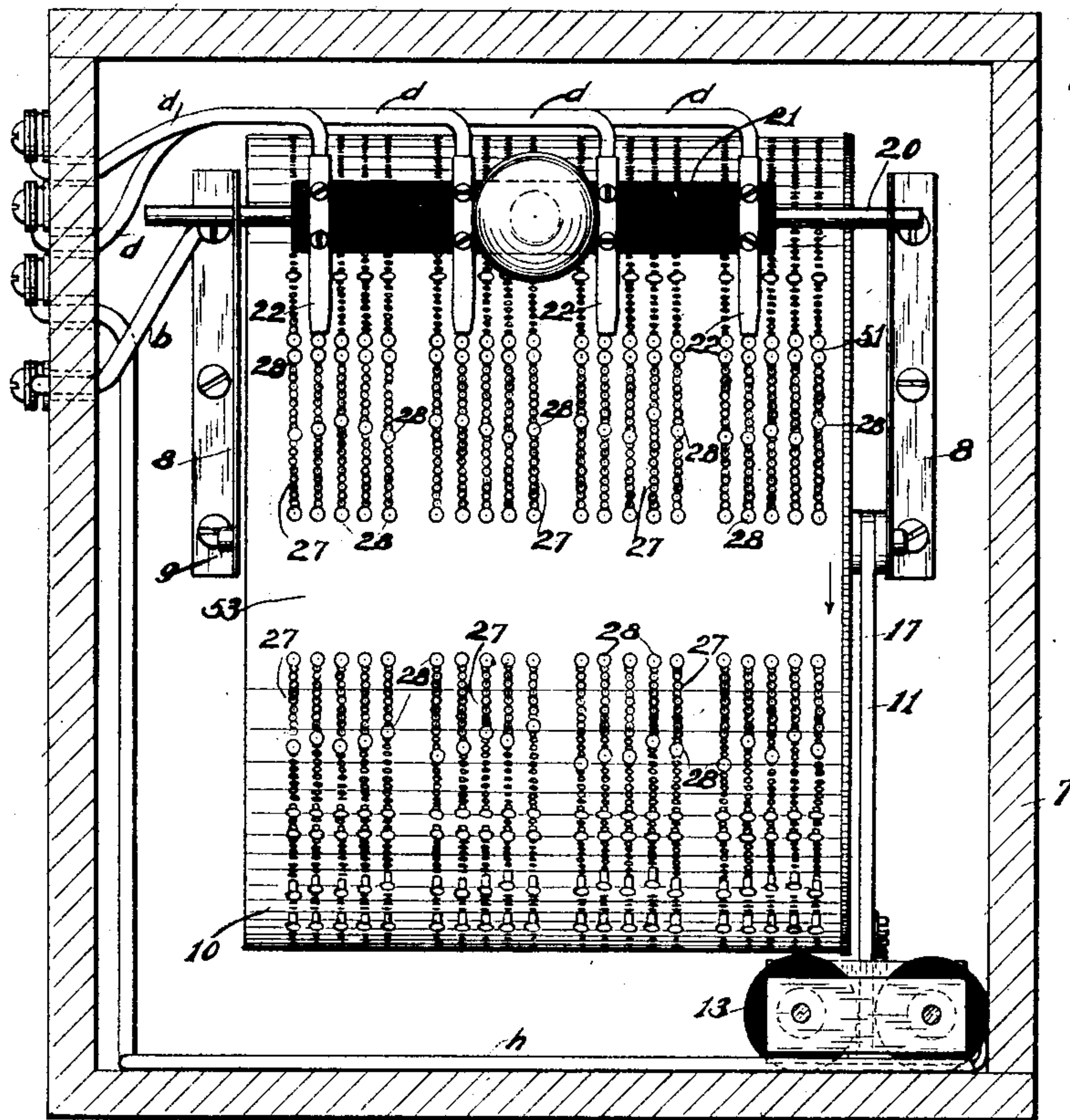


FIG. 3.

FIG. 4.

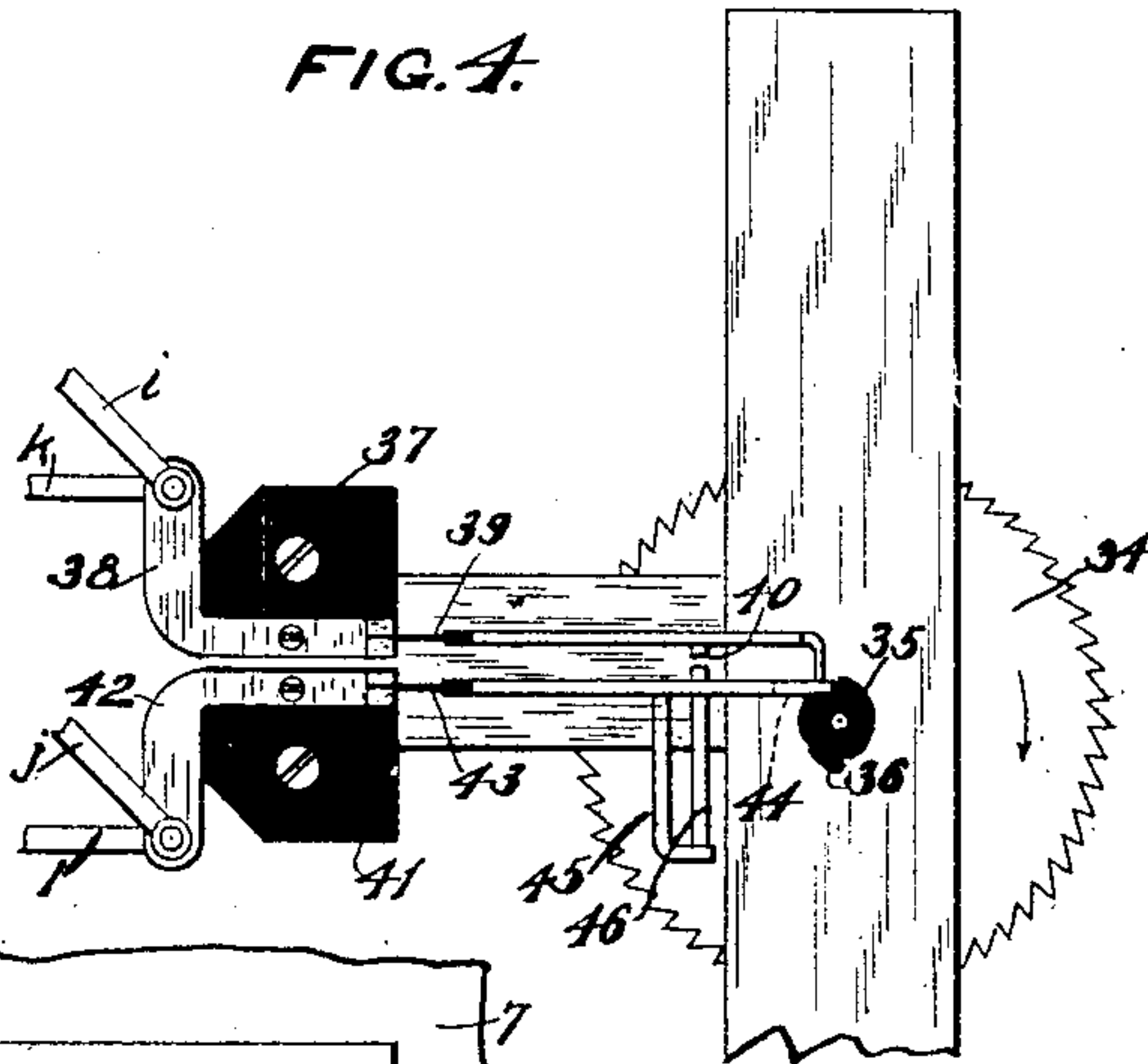


FIG. 5.

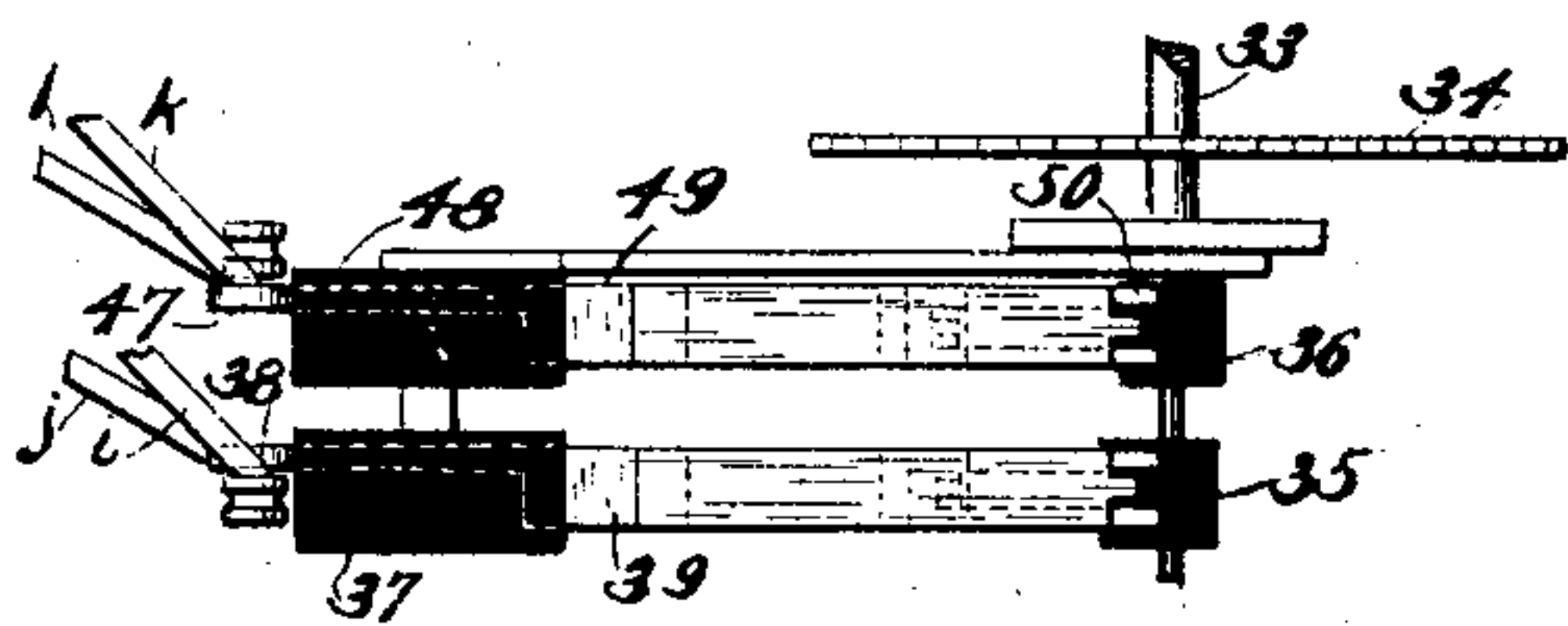
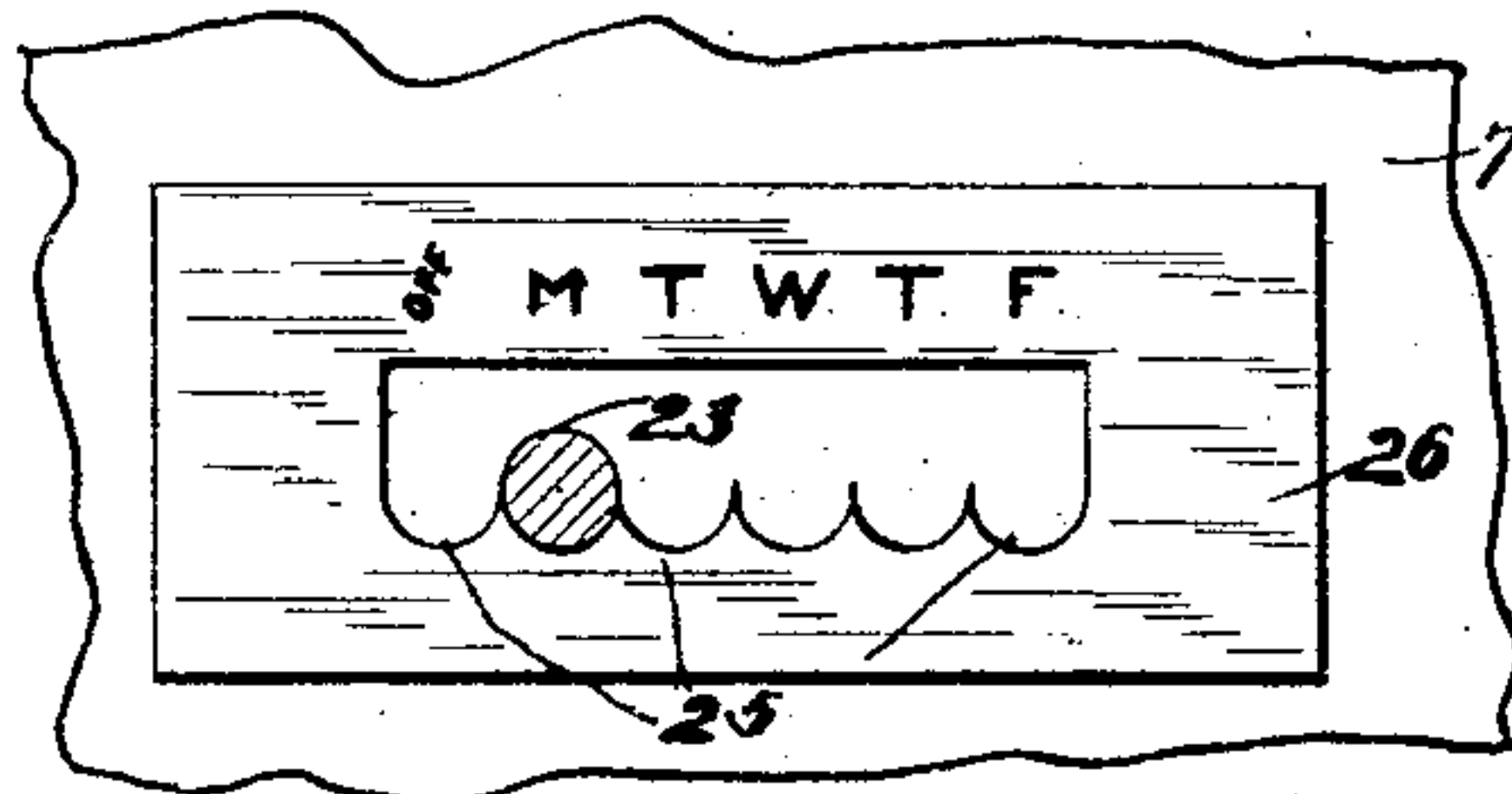


FIG. 6.



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AUTOMATIC ELECTRICAL SIGNALING SYSTEM.

956,057.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed November 11, 1907. Serial No. 401,614.

To all whom it may concern:

Be it known that I, HOWARD M. ELDRED, residing in Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Automatic Electrical Signaling Systems, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in automatic electrical signaling systems.

The primary object of the invention is to provide a construction adapted for indicating automatically the times at which different events shall commence and terminate, thereby automatically apportioning the periods or divisions of time to be devoted for different objects or purposes.

The system is particularly adapted for use in schools for indicating the period of time to be devoted by different teachers in different grades or classes to different studies. The invention, however, may be used to good advantage in other relations, as for instance, in connection with railways etc.

With the above primary object, and other incidental objects in view, the invention consists of the devices and parts, and the combinations, or the equivalents thereof, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a diagrammatic view of the system; Fig. 2 is a side elevation of the operating mechanism, the casing being in section, and a portion of the drum broken away; Fig. 3 is a view at right angles to Fig. 2, the casing being in section; Fig. 4 is a side elevation of the make and break mechanism which is arranged within the clock mechanism; Fig. 5 is a plan view of Fig. 4; and Fig. 6 is a view of a fragment of one of the sides of the casing.

The operating mechanism is preferably inclosed in a casing 7. Projecting from one side of the casing, and within the casing, are brackets 8, 8, the lower arms of said brackets forming bearings for a shaft 9. Mounted on this shaft is a drum 10. Pivotaly mounted on one end of the shaft is an armature arm 11, the armature 12 at the lower end of said arm adapted to coöperate with an electro-magnet 13, and to be drawn against the poles of the magnet, when said magnet is energized. The armature arm is

normally held back so that its armature is out of contact with the poles of the magnet by means of a coiled spring 14, one end of said spring being secured to the arm, and the opposite end thereof to the casing. The extent to which the armature arm can be drawn back is limited by means of an adjusting screw 15 which is turned through an arm 16.

One end plate of the drum is provided circumferentially with ratchet teeth 17 which are adapted to be engaged by a dog or pawl 18 pivoted to the armature arm. The free end of this dog or pawl is held in engagement against one of the teeth by means of a coiled spring 19, one end of said spring engaging the dog, and the opposite end thereof engaging the armature arm.

Slidably supported in the upper arms of the brackets 8 is a rod 20, said rod carrying an insulated block or plate 21. Secured to this block, and having their opposite ends extending above and below the block, are spring contact arms or brushes 22. The block also has extending outwardly therefrom a handle 23, said handle projecting to the exterior through a slot 24 in one of the sides of the casing, and advisably provided on its outer end with a knob for convenience in operating it. The bottom of the slot through which the handle passes is provided with a series of recesses 25. These recesses, however, are preferably formed in the lower bordering edge of a slotted plate 26, which is set over the slot 24 of the casing. There are six of these recesses although there may be more if desired, and the handle is adapted to be adjusted so as to seat itself in any one of the recesses. The recess at one end may be styled an "off" recess, that is to say, when the handle is resting in this recess the rod 20 is at such adjustment that all of the brushes are out of line to complete the electrical circuit as the drum revolves, and as it will be hereinafter more fully pointed out. The five remaining recesses are successively for the first five days of a week, constituting the school days, and as a matter of convenience these recesses may be designated on the outside of the casing, respectively, M T W T and F.

Circumferentially around the periphery of the drum are lines of perforations 27 divided into groups of five lines each, each line of a group representing a day. In other words, in each group the first circum-

ferential line to the left is the Monday line, the next succeeding line the Tuesday line, the next succeeding line the Wednesday line, the next succeeding line the Thursday line, and the last line the Friday line. Contact pins 28 are adapted to be placed in a number of the openings of the different lines according to a pre-arranged scheme or system, as will be hereinafter fully explained.

The numeral 29 indicates an electrical battery from which extends a wire *a* leading to a binding post projecting from clock mechanism 30. Another wire or conductor *b* extends from a second binding post of the clock mechanism, and this wire has a series of short branch wires *c, c, c, c, c*, extending therefrom and leading to different bells or gong mechanisms 31. Other wires *d, d, d, d, d*, lead from the bell mechanisms to the respective brushes 22. Another wire *e* leads from the battery, and has a branch wire *f* leading therefrom and connecting to a brush 32, which brush is always in contact with the drum 10. A second branch wire *g* leads from wire *e* and connects with the electro-magnet and a return wire *h* leads from the electro-magnet to a third binding post of the clock mechanism 30.

Certain details of the construction of the interior of the clock mechanism 30 are illustrated in Figs. 4 and 5 of the drawings. Referring to this mechanism, the numeral 33 indicates the shaft of the escapement wheel 34 of the clock mechanism. On this shaft are mounted two insulated cams 35 and 36, said cams being so arranged on the shaft that the shoulder of one cam will be at a diametrically opposite point to the point of location of the shoulder of the other cam. Secured to the under side of an insulated block 37 is an electrical conductor arm 38 to which is connected a spring contact arm 39, the free end of said arm being bent downwardly. On the under side of this arm is a short contact 40. Secured to the upper side of another insulated block 41 is an electrical conductor arm 42, to which is connected another spring arm 43 located immediately below arm 39. The free end of arm 43, however, is not bent downwardly, but extends a slight distance in advance of the downwardly bent end of arm 39 and bears on the edge of the cam 35, its extremity being bifurcated, as indicated by the numeral 44, so as to permit the bent end of arm 39 to also rest on the edge of the cam by passing between the furcate parts. Rigid to and depending from the under side of arm 43 is an L-shaped arm 45. Rigid to and projecting upwardly from the horizontal portion of this L-shaped arm is an extension 46, the upper end thereof passing freely through an opening in arm 43, and its extremity being bifurcated (the bifurcation not shown however) and in line to receive between the

furcate parts thereof the contact 40. In view of the fact that the upper arm 39 which has its free end bent downwardly is slightly shorter than the lower arm 43, it is evident that in the travel of the cam 35, the shoulder thereof will first leave the arm 39, and hence permit said arm to drop and its bent end to pass between the furcate members of arm 43, with the result that, for a short space of time, arm 39 will be bearing on a low portion of the cam edge, while arm 43 will still be bearing on the raised portion; or, in other words, said arm 43 has not at this time dropped off the shoulder of the cam. In consequence of the lower position of arm 39 and the raised position of arm 43 the two contacts 40 and 46 are brought together. A short wire *i* leads from the binding post of the clock mechanism with which wire *b* connects, and another short wire *j* leads from the binding post with which wire *a* connects. When, therefore, the two contacts 40 and 46 are in engagement as just explained, the circuit within which the bells are included is completed as follows: from the brush 22 or brushes 22 which may happen to be in contact with a pin or pins 28, to wires *d* and to the bells, thence from the bells through the short wires *c* to wire *b*, and to the binding post of said wire *b*, thence by wire *i* to the arms 38 and 39, thence through contacts 40 and 46 and along arm 45 to arm 43, thence to arm 42, and by way of wire *j* to the binding post with which wire *a* connects, thence by way of wire *a* to the battery 29, thence by wires *e* and *f* to brush 32. When the circuit is thus completed the bell or bells in circuit are of course sounded.

The circuit for controlling the electro-magnet 13 is made and broken in exactly the same manner. That is to say, there is another arm 47 corresponding to arm 38 and secured beneath an insulating block 48, and having a spring contact arm 49 secured thereto, corresponding to arm 39. Also a lower arm corresponding to arm 42, and having a spring contact arm 50 secured thereto, corresponding to arm 43. The two spring arms 49 and 50 are constructed exactly similar to the arms 39 and 43, the arm 49 having a contact similar to 40 (not shown) and the arm 50 having a contact similar to 45—46 (not shown), and they are adapted to coöperate with the cam 36.

From the binding post to which wire *h* connects extends a short wire *K*, and from the binding post to which wire *a* connects, extends a short wire *L*, the former leading to the arm 47, and the latter to the arm corresponding to arm 42. When, therefore, the contacts of arms 49 and 50 corresponding to contacts 40 and 45—46 are in engagement, the electrical circuit is completed as follows: from wire *L* to the binding post to which wire *h* connects, thence by wire *h* to the elec-

tro-magnet, thence through the poles of the magnet and along wire *g*, thence along wire *e* to the battery, thence by wire *a* to the binding post of the clock mechanism with which said wire *a* connects, thence through wire *l* to the make and break.

In systems now in use in schools, it is customary for one scholar to be designated, for a period of time, to take charge of the ringing of the bells in the different rooms in order to announce when a certain study is to commence and when to end, as well as for ringing the bells to indicate the time for recess to begin and to end. The bells under this ordinary system are controlled by push buttons usually located at some convenient place in close proximity to the principal's room. The scholar delegated for this duty is of course provided with a schedule of the studies for the different rooms or classes, and the time to be devoted to each, and the different push buttons are in electrical circuit with the bells in the different rooms. In this way, the bells can be sounded at the times designated for the commencement and ending of the different studies. This system, however, is open to objections particularly the objection to the necessity for the assignment of some scholar for this special duty. It will be obvious that the present invention obviates entirely the particular objection just pointed out, in view of the fact that the entire system is automatic in operation.

In explanation of the working of the system, it is to be stated that the spaces or intervals between the teeth 17 indicate intervals of time of five minutes each, that is to say, the make and break mechanism of the clock which controls the electro-magnet is so regulated that the electrical circuit is completed to the electro-magnet at such intervals of time that the electro-magnet is energized, the armature drawn over to said magnet, and the pawl 18 operated so as to turn the drum from one tooth to another at each interval of five minutes. As the drum is thus intermittently revolved it is obvious that portions of the periphery thereof are intermittently brought beneath the brushes 22.

In Figs. 2 and 3 of the drawings, the drum is shown as having revolved to such position that the brush 22 for a line of perforations has just passed the last or second pin of a pair of pins which are arranged close together. The number of teeth between these two pins is such that the space 51 between said pins represents an interval of time of fifteen minutes, or the short recess period. Of course when the brush 22 relating to each line passed on to the first pin of these two pins the electric circuit hereinbefore described which controls the bells was completed, and the bells in the different rooms sounded, and information thereby given that the time for

the commencement of the fifteen minutes recess had arrived. When the second pin of the pair, however, made its contact with the brush, the bells were again sounded indicating that the recess was at an end. Exactly the same principle is involved in regard to the different lessons. For instance, the space which is indicated in the drawings by the numeral 52 it will be assumed represents the time to be devoted to history. By reference to the drawing it will be seen that around the circular edge of the end of the drum which is provided with the ratchet teeth 17 there are a series of numbers running from 1 to 12, followed by another series running from 1 to 12, and these numbers represent the twenty-four hours in the day, and necessarily correspond to the clock arrangement. Under the schedule laid out to be followed the history class is, say, to commence at 11 o'clock. Consequently one of the pins 28 is inserted in an opening aligned with the numeral 11. If, now, the history lesson is to continue for forty-five minutes the next pin is placed in an opening in alignment with the ninth tooth from the first pin, the nine teeth of course indicating an interval of forty-five minutes. Therefore, when the pin for the numeral 11, in the revolution of the drum, is brought into contact with the brush 22, the bell is sounded. The drum thereafter continues to revolve at intervals of five minutes, and when forty-five minutes have elapsed the second pin is brought into contact with the brush 22, and the alarm again sounded, to indicate that it is time for the history lesson to terminate.

There is a blank space on the drum, indicated by the numeral 53, which is unprovided with the lines of perforations. This space is of such width as to take one hour and a half for the brushes 22 to clear it in the revolution of the drum, and the said space is intended to control the ringing of the bells for indicating the commencement and ending of the long recess. The pins 28 are set at the beginning and end of this space so as to cause the bells to be rung for the commencement of the recess at fifteen minutes to twelve o'clock, and to be again rung for the ending of the recess at fifteen minutes past one o'clock.

It is not desirable that the bells should be rung immediately upon the bringing of the pins 28 into contact with the brushes 22. This is for the reason that the drum is revolved very quickly the distance of one tooth, and if the electrical circuit controlling the bells were completed immediately upon the contact being established between a brush 22 and the pin, it would cause the bell to ring but a fraction of a second, that is to say, if the brush should engage the pin and immediately leave it, or brush by it quickly, the ringing would only be for

the instant, or possibly there might not be any ringing at all. It is therefore desirable, and I prefer that the mechanism should be so arranged, that the brush remain on the pin during a five minute interval, and at the same time that the circuit controlling the bells should not be completed during all the period that the brush is in contact with the pin, as in such case the bell would be continuously rung for five minutes. It is therefore necessary under this preferred arrangement that the brush should not only remain on the pin for the period of five minutes, but also that the ringing should be but for a portion of said five minutes. Under my arrangement, therefore, the bell controlling circuit is not completed during a large portion of the time the brush is on the pin, and this result is secured by the particular arrangement of the cams 35 and 36 on the escapement shaft 33, which arrangement is such that the electrical circuit controlling the intermittent movement of the drum is completed, say at the expiration of each five minute interval, and in which time the pin is first brought into contact with the brush 22, and the electrical circuit controlling the bells is completed when the brush has been on the pin about two and one-half minutes.

It may be possible that under the system laid out for the studies in the different rooms that two rooms may have their studies commence and terminate at exactly the same time. I, therefore, show the wire *d* of one of the bell mechanisms (the bell mechanism at the extreme right of Fig. 1) connected to the wire *d* of the next adjacent bell mechanism, the result being that the sounding of the alarm in the two rooms in which the said two bell mechanisms are located is simultaneous.

While I prefer to have the brushes 22 secured to and extending from a laterally movable rod such as 23, yet I do not wish to be understood as limiting myself specifically thereto, inasmuch as in some applications of the invention permanent or fixed brushes will answer the requirements, as, for example, in some instances of school use or railroad use the daily programs or lessons are the same, and consequently there would be no need under such circumstances for the shifting of the brushes. Under this arrangement there should be one line of perforations for each school room, and one fixed brush for said line of perforations.

What I claim as my invention is:

1. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of the group representing certain successive periods of time, pins adapted to be inserted

in said perforations, means for causing said drum to rotate intermittently, the intermittent or step by step movement bearing at stated or predetermined intervals apart, an adjustable device provided with a brush adapted, under different adjustments of the device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, a bell or signaling mechanism, an electrical circuit in which the bell mechanism, the drum, and the brush are included, and a make and break device within the circuit adapted, by contact of the pins with the brush through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanism to be operated.

2. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of the group representing certain successive periods of time, pins adapted to be inserted in said perforations, means for causing said drum to revolve intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, an adjustable device provided with a brush adapted, under different adjustments of the device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, means for holding the adjustable device releasably in an adjusted position, a bell or signaling mechanism, an electrical circuit in which the signaling mechanism, the drum, and the brush are included, and a make and break device within the circuit adapted, by contact of the pins with the brushes through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanism to be operated.

3. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of a group representing certain successive periods of time, pins adapted to be inserted in said perforations, means for causing said drum to revolve intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, a movable device adapted to be moved over the surface of the drum and provided with a brush adapted, under different adjustments of the movable device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, an operating handle projecting from the movable de-

vice, a member provided with a series of recesses with any of which the handle is adapted to engage upon the different adjustments of the movable device, a bell or signaling mechanism, an electrical circuit in which the signaling mechanism, the drum and the brush are included, and a make and break device within the circuit adapted, by contact of the pins with the brushes through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanism to be operated.

4. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in groups, the perforations of each line and also the lines of perforations of each group representing certain successive periods of time, pins adapted to be inserted in said perforations, means for causing said drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, an adjustable device provided with a plurality of brushes corresponding in number to the number of groups of perforations, said brushes adapted, under different adjustments of the device, to be alined with corresponding lines of the different groups, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of the lines of the groups, bell or signaling mechanisms, an electrical circuit in which the signaling mechanisms, the drum, and the brushes are included, and a make and break device within the circuit adapted, by contact of the pins with the brushes through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanisms to operate.

5. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of a group representing certain successive periods of time, pins adapted to be inserted in said perforations, operating means for causing the drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, an adjustable device provided with a brush adapted, under different adjustments of the device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, an electrical circuit for operating the drum operating means, a make and break mechanism within said circuit adapted to complete and break the circuit at stated intervals and thereby intermittently rotate the drum at stated intervals, a bell or signaling mechanism, an electrical

circuit in which the signaling mechanism, the drum, and the brush are included, and a make and break device within the circuit adapted by contact of the pins with the brushes through the rotation of the drum to complete the circuit and cause the bell or signaling mechanism to be operated.

6. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of the group representing certain successive periods of time, pins adapted to be inserted in said perforations, operating means for causing the drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, an adjustable device provided with a brush adapted, under different adjustments of the device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, an electrical circuit for operating electrically the drum-operating means, a clock-controlled make and break mechanism within said circuit adapted at certain intervals of time to complete and break the circuit and thereby intermittently rotate the drum at stated intervals, a bell or signaling mechanism, an electrical circuit in which the signaling mechanism, the drum, and the brush are included, and a clock-controlled make and break device also within said circuit adapted when closed and also by contact of the pins with the brush through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanism to be operated.

7. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations disposed in a group, the perforations of each line and also the lines of perforations of the group representing certain successive periods of time, pins adapted to be inserted in said perforations, drum-operating mechanism for causing the drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, and adjustable device provided with a brush adapted, under different adjustments of the device, to be alined with any of the lines of perforations, and, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of a line, an electrical circuit for operating electrically the drum operating means, a make and break device within said circuit adapted at certain intervals of time to complete and break the circuit and thereby intermittently rotate the drum at stated intervals, a bell or signaling mechanism, an electrical circuit in which the signaling mechanism-

ism, the drum, and the brush are included, and a make and break also within said circuit adapted when closed and also by contact of the pins with the brush through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanism to be operated, the respective make and break mechanisms in the circuit of the drum operating mechanism, and in the circuit of the bell and signaling mechanism being so timed that the bell circuit is not completed until after the circuit for the drum-operating mechanism has been completed and after the pin has been in contact with the brush for a predetermined space of time.

8. In an electrical signaling system, the combination of a drum, said drum provided therearound with a line of perforations, pins adapted to be inserted in said perforations, means for causing said drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, an adjustable contact or brush adapted as the drum is intermittently rotated to make contact with the pins inserted in different of the openings of the line of perforations, a bell or signaling mechanism, an electrical circuit in which the bell mechanism, the drum and the brush are included, and a make and break device within the circuit, adapted by contact of the pins with the brush through the rotation of the drum to complete the circuit and cause the bell or signaling mechanism to be operated.

9. In an electrical signaling system, the combination of a drum, said drum provided therearound with lines of perforations, pins adapted to be inserted in said perforations, means for causing said drum to rotate intermittently, the intermittent or step by step movement being at stated or predetermined intervals apart, brushes or contacts adapted, as the drum is intermittently rotated, to make contact with the pins inserted in different of the openings of the lines of perforations and adjustable to different lines of openings, bell or signaling mechanisms, an electrical circuit in which the bell mechanisms, the drum, and the brushes are included, and a make and break device within the circuit, adapted by contact with the brushes through the rotation of the drum, to complete the circuit and cause the bell or signaling mechanisms to be operated.

10. An electrical signaling system, comprising a drum provided with circumferential lines of perforations disposed in a group, the perforations of each line and also the lines of perforations representing certain successive periods of time, an adjustable device provided with a plurality of brushes

corresponding in number to the groups of lines of perforations of the drum and constructed to be adjusted to bring the brushes into alinement with corresponding lines of perforations of each group, pins inserted in some of said perforations to contact with said brushes, means for intermittently rotating the drum, the intervals of rest between the intermittent movements of the drum coinciding with the periods during which the pins when inserted in the perforations are in contact with the brushes, a signaling mechanism, an electric circuit in which the signaling mechanism, the drum, the drum rotating means and the brushes are included, and a clock controlled make and break device within said circuit constructed and adapted to complete the circuit to operate the signaling mechanism after a pin has been moved into contact with one of the brushes and to break said circuit before said pin has moved out of contact with said brush.

11. An electrical signaling system, comprising a drum provided with circumferential lines of openings disposed in groups, the openings of each line and also the lines of openings representing certain successive periods of time, an adjustable device provided with a plurality of brushes corresponding in number to the lines of openings of each group of the drum and constructed to be adjusted to position the brushes in alinement with lines of openings of a group, pins inserted in some of said openings of each group to contact with said brushes, means for intermittently rotating the drum, the intervals of rest between the intermittent movements of the drum coinciding with the periods during which some of the pins inserted in the openings are in contact with the brushes, a signaling mechanism, an electric circuit in which the signaling mechanism, the drum, the drum rotating means and the brushes are included, and a clock controlled make and break device also included in said circuit and adapted and constructed to complete the circuit to operate the signaling mechanism when a pin has been moved into contact with one of the brushes, the clock controlled make and break device completing the circuit for a period of time less than the time the pins are in contact with the brushes.

In testimony whereof, I affix my signature, in presence of two witnesses.

HOWARD M. ELDRED.

Witnesses:

A. L. MORSELL,

ANNA F. SCHMIDTBAUER.