W. W. MILLER.

APPARATUS FOR TRANSMITTING SIGNALS.

APPLICATION FILED MAY 16, 1916.

1,309,364.

Patented July 8, 1919.

3 SHEETS—SHEET 1.

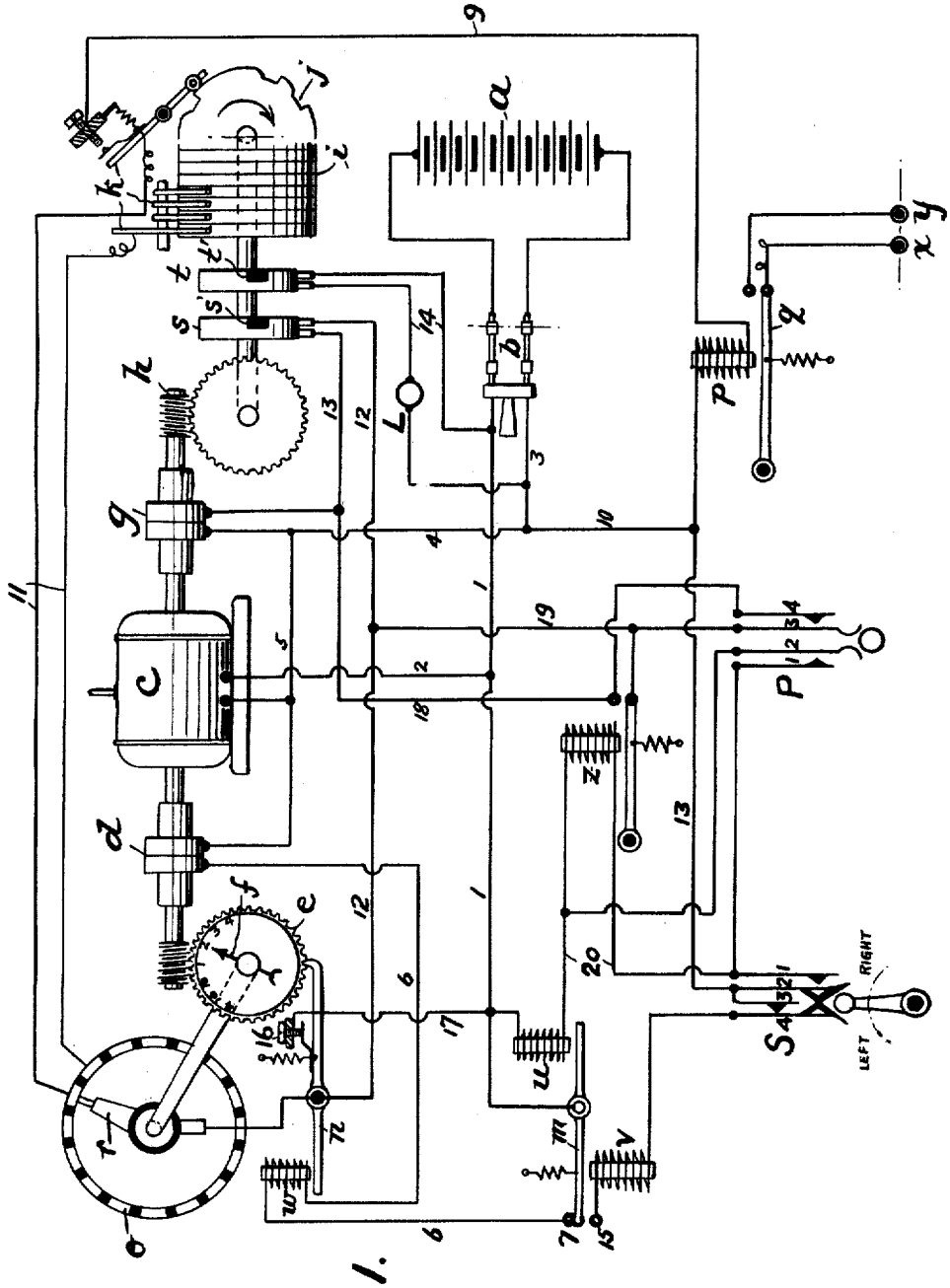


FIG. 1.

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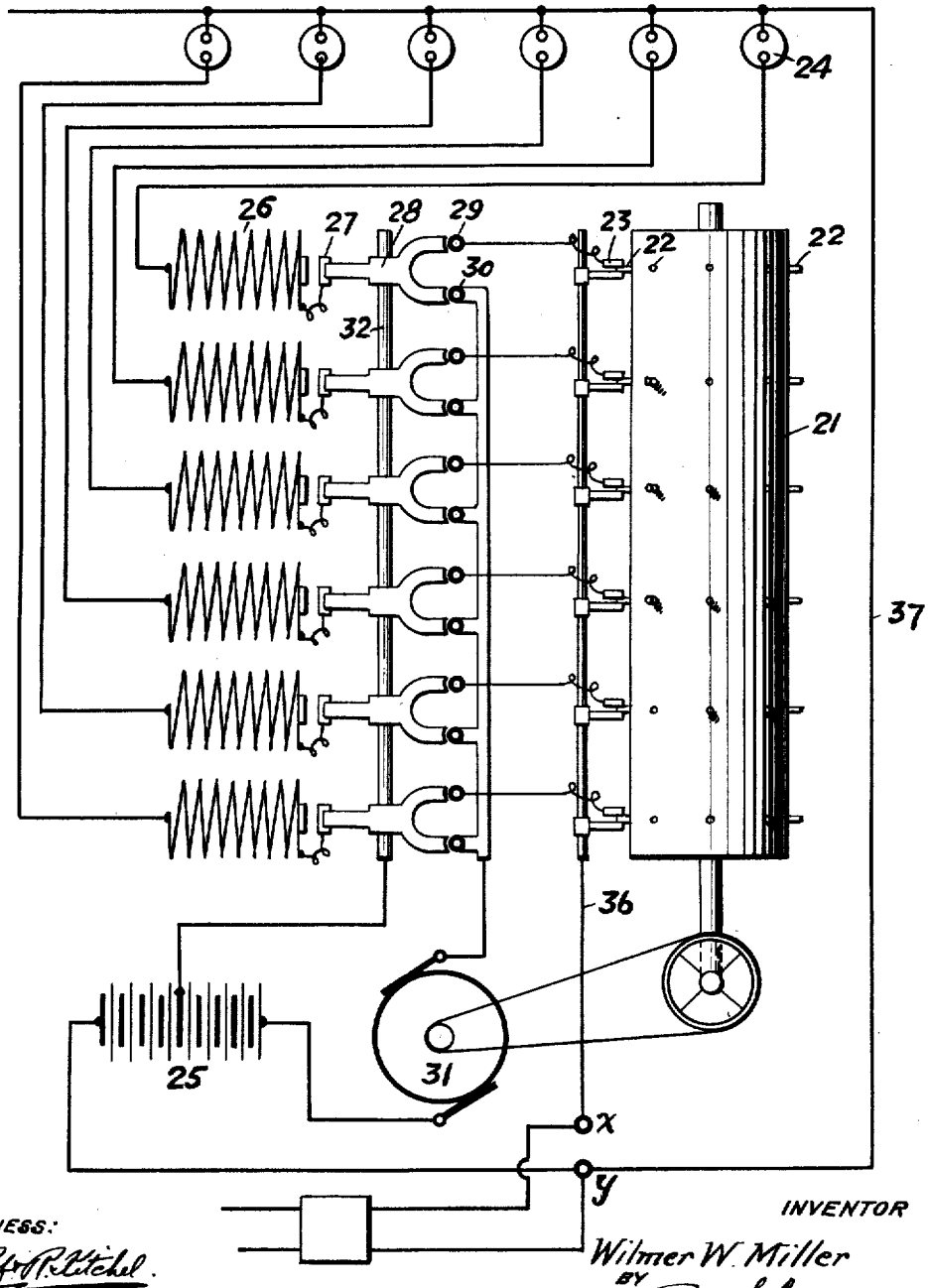
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3 SHEETS SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

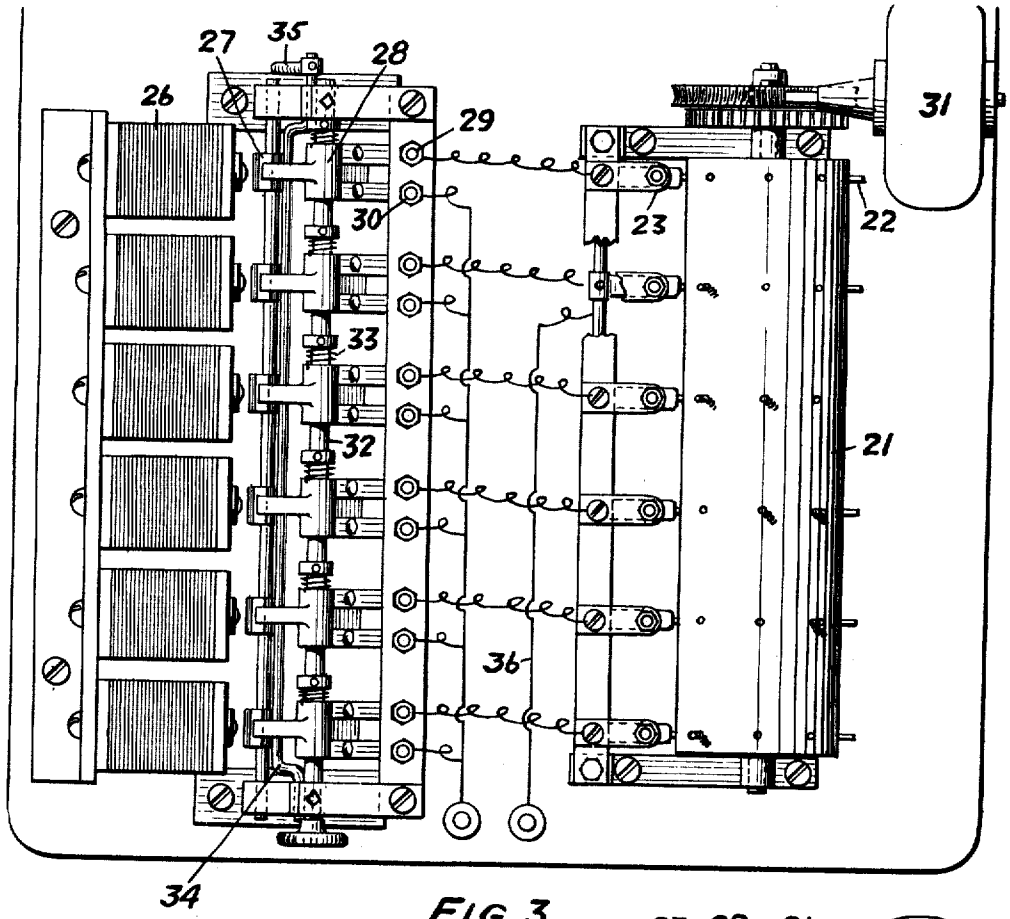


FIG. 3.

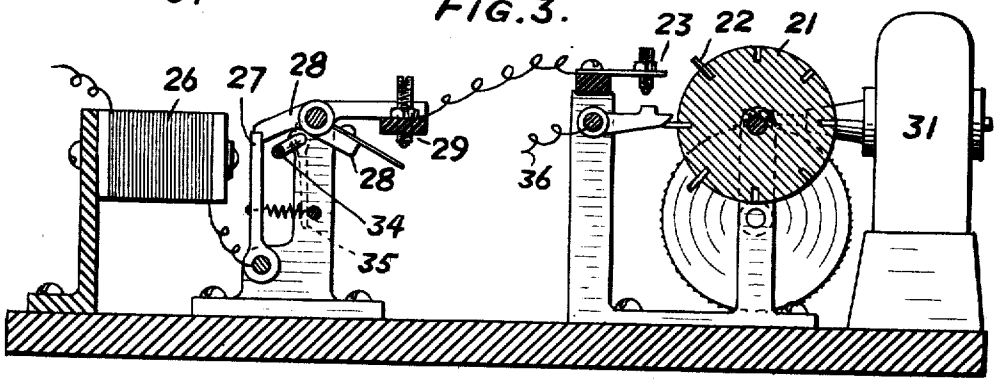


FIG. 4.

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APPARATUS FOR TRANSMITTING SIGNALS.

1,309,364. Specification of Letters Patent. Patented July 8, 1919.

Application filed May 16, 1916. Serial No. 97,781.

To all whom it may concern:

Be it known that I, WILMER W. MILLER, a citizen of the United States, residing at Ardmore, county of Montgomery, and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Transmitting Signals, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of apparatus by which alarms or code signals are caused to be transmitted automatically to a distance from the operator.

With the device of my invention it is possible for an operator, situated at some point of vantage, or at a central station, to cause to be sent out over trunk line wires, or the antenna of a wireless sending set, or other means, a series of code signals which, by a predetermined code, may be readily made to convey intelligible messages or alarms to the parties receiving same.

My invention is designed to provide means whereby the operator may send out such signals instantaneously, by merely pressing a lever, which may be arranged to be done by foot or hand, as is most convenient. The signals may consist of either short or long waves with either short or long intervals between them, conforming to the prearranged code. By the pressing of a switch these signals, if it is so desired, may be made to repeat themselves over and over again, until the desired object has been attained.

It is possible to actuate the apparatus by the operation of alarm traps, such as burglar or fire alarms, as well as by the opening or closing of well known types of switches manually operated, so that numbers or characters, corresponding to those of the particular alarm trap or signaling switch which has been operated, may be transmitted automatically over telephone lines, as to the central telephone exchange, or radiated from the antenna of a wireless sending set.

I will now describe a form of apparatus for carrying out my invention, in connection with the accompanying drawings, in which Figure 1 represents diagrammatically one form of apparatus embodying my invention; Fig. 2 represents diagrammatically a modified and simplified form of my invention, and Figs. 3 and 4 represent respectively a plan and end view of part of the apparatus indicated in Fig. 2.

It is understood that a different system of wiring may be employed, with either open or closed circuits, from that about to be shown and described, without departing from the spirit of my invention, which is defined by the claims at the end hereof.

Referring to Fig. 1 of the drawings, *a* is a battery or other source of electric current supply operating through the double pole switch *b*. A small motor *c* is connected to one pole of the switch by lines 1, 2, and to the other pole by lines 3, 4, 5. The shaft of the motor carries on one end an electrically operated clutch *d*, which transmits motion, through a worm and worm wheel *e*, to an indicator *f*. The other end of the motor shaft carries a similar clutch *g* through which motion is transmitted, by worm gearing *h*, to a drum *i*, by which the signals are given.

The drum *i* is built up of a number of disks mounted together upon its shaft. Each disk has certain notches *j* in its circumference, against which bears a roller on one end of a spring pressed lever *k*. The other end of lever *k* carries one pole of an electric make-and-break. There is a similar contact lever *k*, operating upon each disk of drum *i*. Thus, in the rotation of the drum, as the rollers on the levers drop into the notches *j*, contacts are made at their opposite ends, one of which contacts is made alive, by mechanism about to be described, to make the desired signals.

It is understood that the notches *j* on the various disks composing drum *i*, are variously spaced apart to produce intervals between contacts conforming to a certain code signal for each disk.

Clutches *d* and *g* are connected with one side of the circuit by lines 3, 4, 5. Clutch *d* is connected with the other side of the circuit by line 6, contact 7, lever *m* and line 1. Thus, when the battery is cut in by switch *b*, a circuit is at once formed through clutch *d*, operating said clutch to turn indicator *f*. A stop lever *n* is spring held to hold the indicator stationary, but is withdrawn by the energizing of an electro-magnet *w* placed in line 6.

When the circuit is closed through clutch *d*, therefore, magnet *w* withdraws stop lever *n* and the indicator is allowed to rotate.

Mounted upon the same shaft with indi-

cator f is an annular commutator ring o, divided into as many separately insulated contacts as there are levers k, and individually and consecutively connected therewith by lines 11. The fixed poles of the make-and-break of levers k are connected with one side of the circuit by lines 9, 10 and 3. Line 9 contains a magnet p, which acts upon a spring lever q to close a contact between wires leading to two binding posts x, y.

These binding posts may be connected with any dispensing system in such a way that every make-and-break by lever k will close and open again a circuit through the lines leading from the binding posts, thereby disseminating the signals as desired. The movable poles of the make and breaks k, as before stated, connect by lines 11, with commutator o, within which a finger r, attached to the shaft of indicator f, turns with it, and makes contact in turn with each contact of commutator o, as indicated to the operator by pointer f. Finger r itself is connected into the circuit by lever n, contact 16 and lines 17 and 1. Thus current can flow through the commutator and make and break k only while clutch g is closed and the drum revolving.

A contact ring s is mounted upon the shaft of drum i. Against the periphery of ring s bear terminal brushes between lines 12, 13. At one point on ring s, a section of insulation s', lies in the path of one of said brushes, causing a break in the circuit at the end of every revolution of the drum. A similar contact ring t, with insulated part t', in angular alinement with s', is also mounted upon the drum shaft, the brushes of which are connected by lines 14 with lines 1 and 3 of the main circuit. A lamp L is placed in line 14, thus giving a visual indication to the operator when the system is operating, as the lamp will be burning as long as the brushes of ring t are not upon the insulator t'.

By pressing the operator's switch S to the right, contact is made between S^2 and S^1, while contact between S^3 and S^4 remains unbroken. This energizes an electromagnet u through lines 13, 10, 3 on one side and lines 20, 1 on the other side. Magnet u throws lever m to break contact 7, which disengages clutch d, and makes contact 15, which energizes a magnet v, holding lever m in its depressed position, when magnet u is demagnetized by the return of switch S to central position.

The apparatus is now in what may be called its "normal condition," with both clutches disengaged, and is ready for the transmission of signals.

Suppose the operator wishes to send a signal whose code number is No. 2. To do so he presses his switch S to the left, which breaks contact between S^4 and S^2, S^3, thereby demagnetizing magnet v. Lever m is pulled back by its spring, making contact at 7, and when switch S is returned to its central position, contact at 15 remains broken. When contact is made at 7, magnet w is energized, which draws lever n out of engagement with the indicator wheel e, breaks a contact 16 (which will be described later) and completes the circuit through clutch d, so that this clutch is engaged and the worm, worm wheel, pointer f and finger r begin to revolve as before explained. When the pointer has reached No. 2 on the dial the operator presses the lever of switch S to the right, closing the circuit through magnet u, as before described, and also through another magnet z located in line 20.

Magnet u at once causes lever m to break contact at 7 and make contact at 15, which holds the lever in this position after switch S has returned to its normal position as before stated. Breaking contact at 7 allows clutch d to disengage, whereby the rotation of the pointer and commutator finger are stopped, and the stop end of lever n holds them pointing to No. 2 on the dial. This movement of lever n also closes contact again at 16, which completes a circuit through clutch g and brush ring s, by way of line 12, 13 on the one side and line 1, 17 on the other. This engages clutch g and starts drum i and rings s and t revolving, which, according to the notches j of the portion of drum i corresponding to No. 2 on the dial, operates the make and break of lever k, which in turn transmits the same through magnet p to binding posts x, y and thence to the line connected therewith.

When lever q is raised by magnet p to close the circuit of x, y, the effect is the same as if the ordinary telegraph sending key were pressed down, and when lever q is released and breaks the circuit, the effect is the same as when the ordinary sending key returns to its normal position.

The drum i continues to revolve until the right hand brush on ring s comes over the insulated part s', when the circuit through clutch g is broken, causing the clutch to be disengaged and the revolution of drum and rings to cease. In this rotation of the drum the notches j have caused a single complete signal to be transmitted.

It would be impossible to start the drum revolving again, while the brush is on insulation S' were if not that electromagnet Z, above described, is in line 20.

It will be remembered that when operating switch S was pressed toward the right, current was caused to flow through, and energize electro-magnets u and z. Magnet u caused contact to be broken at 7, thereby stopping the pointer and commutator finger on a certain code number. Magnet z attracts its armature, which closes a circuit

through lines 18, 19, which connect with the live circuit in the form of a by-pass for the ring *s*.

Therefore, in stopping the rotation of indicator *f*, switch S should be kept pressed to the right, keeping magnet Z magnetized, until the drum has turned far enough to have the insulation *s'* pass from under the brush, when motion will continue, as described, for a full revolution, lamp L burning and signifying the fact to the operator. When the lamp lights, switch S may be released.

It is often desirable to have the signals sent out repeatedly, which is accomplished by means of a plug switch P, placed in convenient relation to the operator. By closing this switch at any time prior to signaling or during the rotation of the drum, contacts P', P^2 short circuit magnet *z*, and contacts P^3, P^4 take the place thereof, or rather make permanent connection between lines 18 and 19 and thereby by-pass ring *s*, and a circuit will be continued through clutch *g*, keeping the drum revolving and sending out repeated signals so long as the switches remain as described.

It will be understood that in using the terms "drum" and "disk" I do not mean to be confined to a revoluble element of drum shape or one composed of mechanically separate or separable disks or parts, but mean to include any revoluble member sections of which coöperate with the respective make and break devices.

In the modified and simplified form of my invention shown in Figs. 2, 3 and 4, the revoluble member is shown as a drum 21, carrying opposite each pair of poles an annular series of pegs which as the drum revolves closes the contacts between the poles.

A certain other outside connection is made that determines which pair of poles become active, and the pegs operating on those poles are so placed as to produce electric signals according to some predetermined code. As shown the pegs 22 make connection at the pole 23 which lie across the circuit of the line *x*, *y*.

Suppose the signal or alarm to be started by the closing of one of the station switches 24, which may represent the opening of a door, window, or shutters connected therewith. A circuit is at once set up through the battery 25 and the solenoid 26 corresponding to switch 24.

The energizing of the solenoid trips the catch 27, which allows lever 28 to turn and make the double connection with poles 29 and 30, whereupon a circuit from the battery 25 is established through shaft 32, lever 28, contact 30 and through the motor back to the battery.

Thus the motor is started, which turns drum 21, the pegs 22 of which, acting on the poles 23, send a series of electric impulses through the circuit leading from terminals *x* and *y* shown at the bottom of Fig. 2 and in which is interposed any signaling device (not shown). That is, the circuit is established, starting from terminal *x*, through line 36, contact 23, contacts 29 and 30, to motor 31, and through battery 25 to terminal *y* and thence, through the signal circuit back to terminal *x*. By this apparatus, whichever switch 24 is sprung, a corresponding set of impulses is sent over the line giving a specific signal or alarm as desired.

This continues until the lever 28 which has been tripped is reset. These levers are pivoted upon a common axis 32, and the latched ends are sprung downwardly by coiled springs 33. A bent rod 34 underlies these ends and may be swung up by means of handle 35 to reset any one of the levers 28 which has been sprung as above described.

Thus one pole of each of the pairs 23 is connected with a corresponding pole 29 in line with a definite one of the switches 24. The other pole of each of the pairs 23 is connected with a common return 36 leading to one side of the sending line *x*—*y*. All of the stationary switches 24 are connected by a common return 37 with the other side of the sending line *x*—*y*.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In an automatic signal transmitting apparatus, the combination with an electric motor, of a clutch actuatable thereby, an indicator operable from the clutch, electrically controlled means to control the operation of the clutch by the motor, a series of circuits, means coöperating with the indicator to energize one of said circuits dependent upon the point of arrest of the indicator, and means operable upon the arrest of the indicator to intermittently open and close, in a predetermined manner, the said circuit so energized.

2. In an automatic signal transmitting apparatus, the combination with an electric motor, of two clutches actuatable thereby, an indicator operable from one clutch, electrically controlled means to control the operation of both clutches by the motor, a series of circuits, means coöperating with the indicator to energize one of said circuits dependent upon the point of arrest of the indicator, and means operable from the second clutch to intermittently open and close the circuit so energized.

3. In an automatic signal transmitting apparatus, the combination with an electric motor, of two clutches actuatable thereby, an indicator operable from one clutch, electrically controlled means to control at will

the operation of the first clutch by the motor a series of circuits, means coöperating with the indicator to energize one of said circuits dependent upon the point of arrest of the indicator, means operable upon the arrest of the indicator to effect the operation of the second clutch by the motor, and means operable from the second clutch to intermittently open and close the circuit so energized.

4. In an automatic signal transmitting apparatus, the combination with a series of revoluble elements, of a corresponding series of devices adapted to coöperate with the respective elements during their revolution and be actuated thereby, electric circuits corresponding to the respective elements and devices and which are adapted, when energized, to be opened and closed intermittently in a manner dependent upon the actuation of their respective devices by the respective elements, a movable indicator, means to move said indicator to a predetermined point, and means coöperating with the indicator to energize one of the circuits dependent upon the point to which said indicator is moved.

5. In an automatic signal transmitting apparatus, the combination with a series of revoluble elements, of a corresponding series of devices adapted to coöperate with the respective elements during their revolution and be actuated thereby, electric circuits corresponding to the respective elements and devices and which are adapted, when energized, to be opened and closed intermittently in a manner dependent upon the actuation of their respective devices by the respective elements, means, including a switch and electric circuits, to selectively connect any of the first named circuits with the source of supply, to effect the rotation of the revoluble elements and to stop the rotation of the same, and means, including another switch and electric circuit, to render said stop means inoperative, thereby effecting an indefinite repetition of the signal transmitting impulses.

6. In an automatic signal transmitting apparatus, the combination with a series of revoluble elements of a corresponding series of devices adapted to coöperate with the respective elements during their revolution and be actuated thereby, electric circuits corresponding to the respective elements and devices and which are adapted, when energized, to be opened and closed intermittently in a manner dependent upon the actuation of their respective devices by the respective elements, a rotatable indicator, an electric motor, clutches operable by the motor adapted to operate respectively the indicator and the revoluble elements, means, including a switch and an electric circuit, to render the first clutch operative to turn the indicator to a predetermined point, and means, including electric circuits, to render the second clutch operative and to energize that one of the first named circuits corresponding to the point of arrest of the indicator.

7. In an automatic signal transmitting apparatus, the combination with a series of revoluble elements, of a corresponding series of devices adapted to coöperate with the respective elements during their revolution and be actuated thereby, electric circuits corresponding to the respective elements and devices and which are adapted, when energized, to be opened and closed intermittently in a manner dependent upon the actuation of their respective devices by the respective elements, a rotatable indicator, an electric motor, clutches operable by the motor adapted to operate respectively the indicator and the revoluble elements, means, including a switch and an electric circuit, to render the first clutch operative to turn the indicator to a predetermined point, means, including electric circuits, to render the second clutch operative and to energize one of the first named circuits corresponding to the point of arrest of the indicator, switch mechanism, one element of which rotates with said revoluble elements, interposed in the circuit controlling the second clutch, and adapted, in its rotation, to render the second clutch inoperative, and means, including a switch and electrical connections, to complete the circuit of the second clutch around said switch mechanism.

In testimony of which invention, I have hereunto set my hand, at Philada., Penna., on this 12th day of May, 1916.

WILMER W. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."