

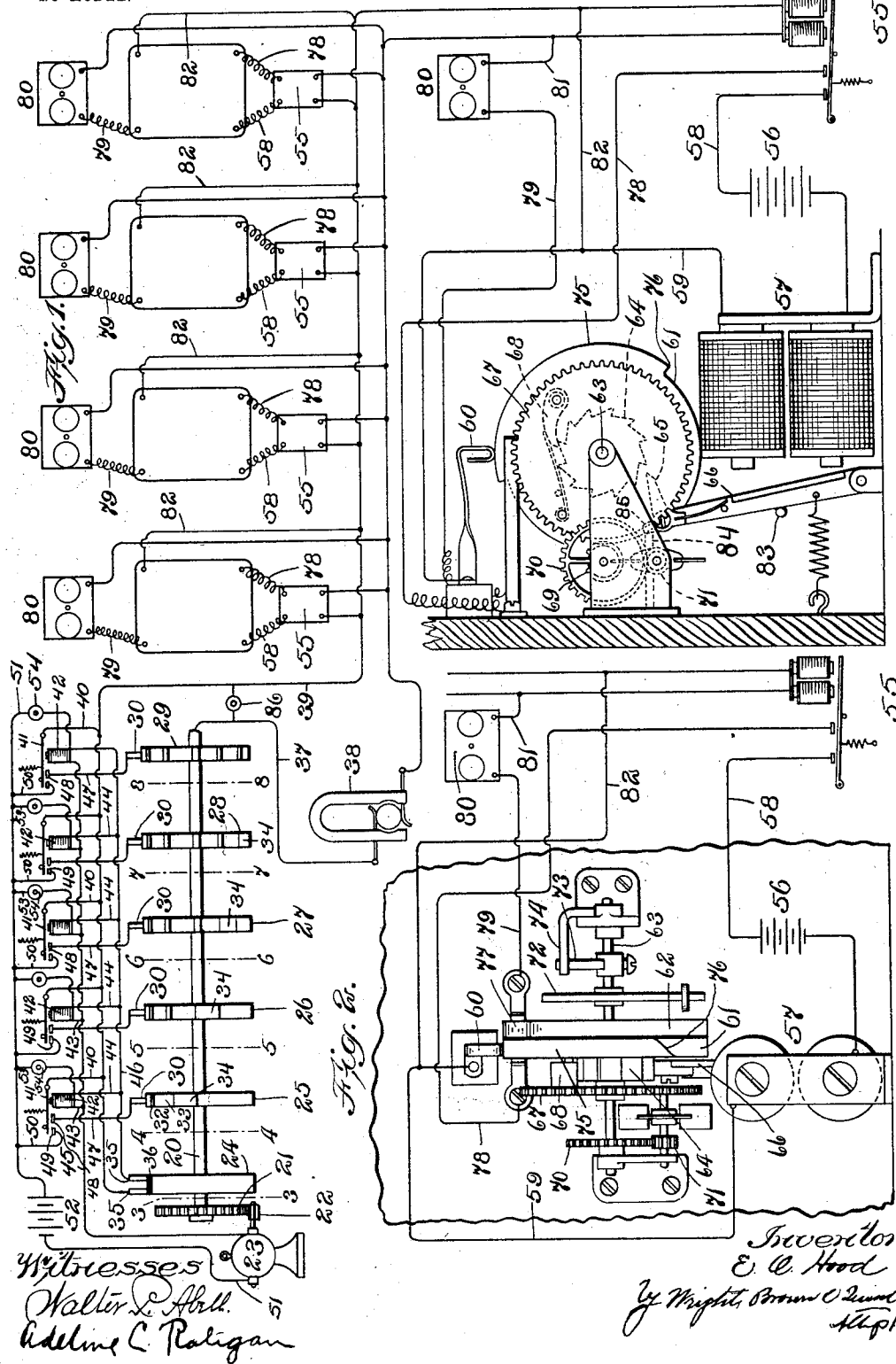
E. O. HOOD.

SIGNALING DEVICE FOR TELEPHONE PARTY LINES.

APPLICATION FILED OCT. 10, 1902.

NO MODEL.

2 SHEETS SHEET 1.



Witnesses
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Inventor:

E. C. Hood

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Attys

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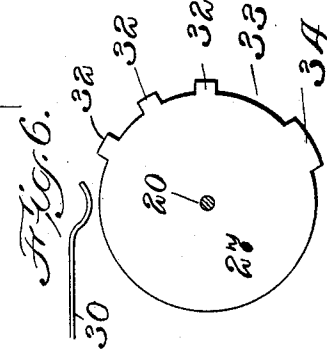
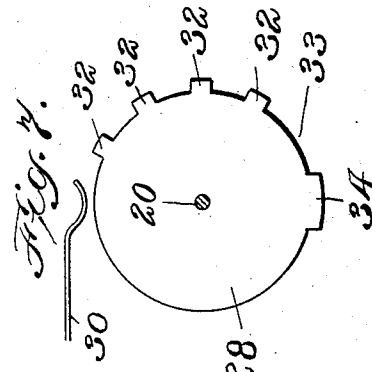
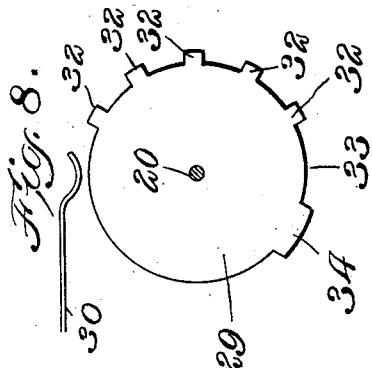
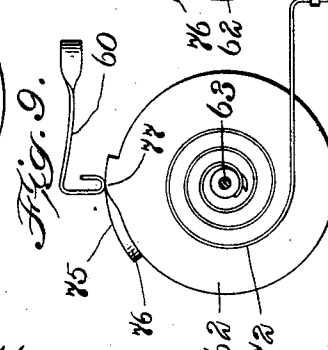
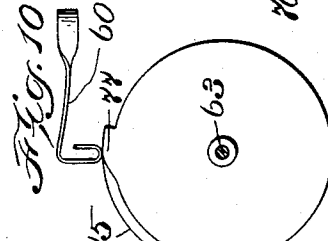
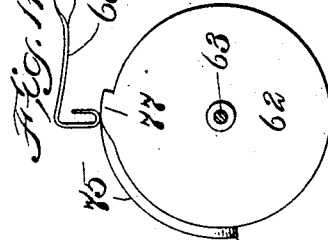
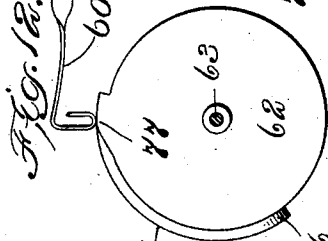
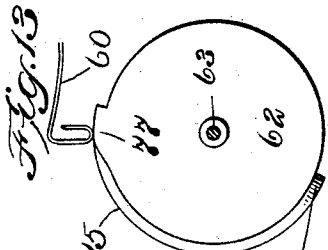
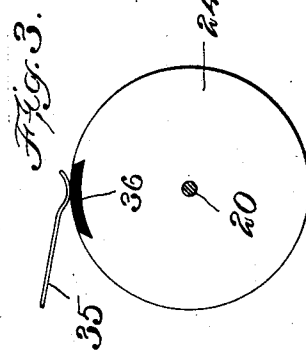
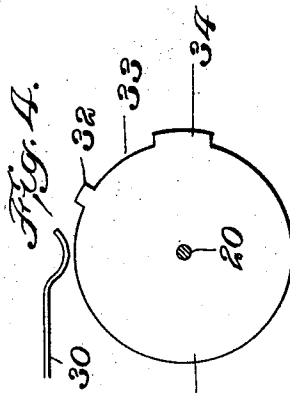
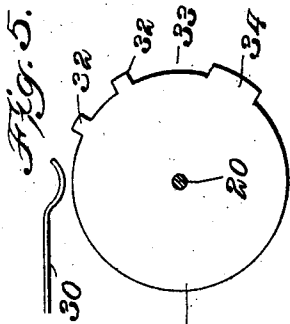
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2 SHEETS—SHEET 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD OAKMAN HOOD, OF HINGHAM, MASSACHUSETTS.

SIGNALING DEVICE FOR TELEPHONE PARTY-LINES.

SPECIFICATION forming part of Letters Patent No. 747,070, dated December 15, 1903.

Application filed October 10, 1902. Serial No. 126,648. (No model.)

To all whom it may concern:

Be it known that I, EDWARD OAKMAN HOOD, of Hingham, in the county of Plymouth and State of Massachusetts, have invented certain new and useful Improvements in Signaling Devices for Telephone Party-Lines, &c., of which the following is a specification.

This invention has for its object to provide an improved selecting system whereby any one of a number of receiving instruments on a line may be selected and actuated at the will of an operator at a distant station.

An important application of the invention is to party-line telephones, in which connection it affords a means for calling any desired one of the subscribers, to the exclusion of the others. In the illustrative embodiment of my invention hereinafter described, treated as a telephone party-line caller, I employ at the exchange or operator's end a transmitting device consisting of a series of disks mounted upon a common shaft and having contacts arranged in different orders, each disk having a distinctive number of actuating or selecting contacts followed by a gap and the latter followed by a ringing-contact. The common shaft is geared to a motor, and to each disk is assigned a switch which upon being closed energizes the motor, so as to start the disk-shaft in rotation. The circuit is completed through the selected disk during one complete rotation of the shaft, and said disk impresses its distinctive set of impulses upon the line. Arrangements are made whereby the motor-circuit is held closed after its first closing independently of the will of the operator for a complete rotation, after which it is automatically opened and the shaft stopped. At each subscriber's station there is a receiving device comprising two disks placed side by side and rotated step by step in a forward direction in obedience to the impulses sent from the exchange, the said disks being rotated backward when the impulses cease, so as to automatically return to a unison position. In contact with the first disk is a brush which, after a predetermined number of steps differing for the several subscribers' stations and corresponding to the selecting-contacts on the several transmitting-disks at the exchange, is placed in condition to be switched

onto the second receiving-disk by the return of the two receiving-disks to unison position. If the ringing impulse be sent from the exchange while this brush is on the second receiving-disk, the subscriber's bell will be rung. The arrangement of the receiving-disks is such that this brush will reside on the second disk during the ringing impulse only of that subscriber whose transmitting-disk has been selected at the exchange. Therefore, though all the subscribers' receiving-disks are rotated an equal distance, when any one subscriber is called only that subscriber's bell will be rung.

Of the accompanying drawings, Figure 1 represents a diagrammatic view showing a selecting apparatus embodying my invention as adapted to a party-line-telephone call system. Fig. 2 represents an edge view of the mechanism at one of the subscribers' stations. Figs. 3 to 8, inclusive, represent sections on the correspondingly-numbered lines of Fig. 1. Figs. 9 to 13, inclusive, represent side elevations of the receiving-disks at the several subscribers' stations.

The same reference characters indicate the same parts in all the figures.

At the left of Fig. 1 of the drawings is represented the apparatus at the exchange or operator's end of the line and at the right the instruments at the subscribers' stations. 20 is a shaft having a gear 21 connecting it with a pinion 22 on the shaft of an electric motor 23 and bearing a motor-controlling disk 24 and transmitting or actuating disks 25 26 27 28 29, which correspond to the several subscribers on the line and may be increased or decreased in number. Brushes 30 30 coact with contacts on the peripheries of the several transmitting-disks, the disk 25 having, as here shown, one short tooth or contact 32, which acts as a selecting or positioning contact and is followed by a gap 33 of greater length than the contact and a long ringing-contact 34 after the gap. The disks 26 27 28 29 have, respectively, two, three, four, and five selecting-contacts 32, followed in each disk by a gap 33 and ringing-contact 34, similar to those on the first disk.

Two brushes 35 35 coact with the periphery of the disk 24, which is composed of metal, with the exception of a short space filled by

insulating material 36. In the line-wire 37, which connects with the shaft 20, is a magneto-machine 38. The other line-wire 39 connects with one of the brushes 35 and by branches 40 40 to the armatures 41 41 of a series of electromagnets 42 42. The terminals 43 44 of the windings of said magnets are connected, respectively, to a wire 45, leading from the motor 23, and a wire 46, leading from one of the brushes 35. The brushes 30 connect by wires 47 47 with contacts 48 48 under the armatures 41. Under each armature is another contact 49, connecting by a wire 50 with the other wire 51, leading from the motor 23 and containing a battery 52. Wires 53 53 connect the wire 51 with one terminal 44 of the several magnets 42 and contain switches or push-buttons 54 54.

When any one of the switches 54, as the one corresponding to the disk 25, is closed by the operator, a circuit is completed, starting from the battery 52 and passing by way of wire 51, switch 54, wire 53, winding of magnet 42, wire 45 through motor 23 and back to the battery. The motor therefore starts to rotate and moves the metallic portion of disk 24 under the brushes 35. The energizing of the magnet causes it to attract its armature, and the circuit is kept closed through the motor by way of wires 51 and 50, contact 49, armature 41, wire 40, wire 39, brushes 35, and disk 24, wire 46, wire 44, magnet 42, and wire 45. The motor-circuit is maintained until a complete rotation of the shaft 20 has been made, when the insulating-piece 36 comes under the brushes 35 and breaks the circuit of the magnet 42, whose armature leaves the contact 49. It is evident, therefore, that the operator has only to hold the switch 54 closed until the brushes 35 are off the insulation 36.

By the above-described arrangement of transmitting apparatus any one of the transmitting-disks 25 26 27 28 29 can be made to impress its distinctive set of impulses upon the line, the line-current being supplied by the magneto-machine 38.

At each subscriber's station on the party-line an apparatus is provided, as follows: is a relay, through the magnet of which the current from the line 37 39 passes and whose armature opens and closes a local circuit including a battery 56 and an electromagnet 57 in series. 58 denotes the wire passing from one contact of the relay 55 through the battery 56 to magnet 57, and 59 denotes a wire passing from magnet 57 to a brush 60. The latter is capable of being yieldingly displaced in either a horizontal or vertical direction and is adapted to bear against either of two disks 61 62, mounted side by side on a shaft 63 and insulated from each other. Fast to the disks and shaft is a ratchet-wheel 64, adapted to be engaged by a pawl 65, mounted upon the armature-lever 66 of the electromagnet 57, whereby when said magnet receives a series of impulses through the relay

55 the disks 61 62 will be rotated step by step. Loose on the shaft 63 is a gear 67, carrying a pawl 68 in engagement with the ratchet 64 and geared to a train 69 70 71, designed to retard the movements of the gear 67. A volute spring 72, having one end attached to the shaft 63 and the other end to a fixed support, tends to rotate said shaft in opposition to the movement imparted thereto by the magnet 57. Stop-pins 73 74 limit the return movement of the shaft 63 in obedience to the spring 72.

On the periphery of the disk 61 is a raised or radially-extended concentric portion 75, on whose rear end the brush 60 normally rests when the pins 73 74 are in contact and on whose front end is a cam incline 76, adapted to displace the brush 60 in a horizontal direction onto the disk 62. On the periphery of the disk 62, near the rear end of the projection 75, is a projected or radially-extended cam portion 77, having an inclined face adapted to lift the brush 60 to a level with the projection 75. 78 is a wire extending from the disk 61 to the relay 55, and 79 is a wire leading from the disk 62 to an ordinary polarized bell 80. Wires 81 82 lead from the bell 80 and the wire 59 to the line-wires 37 39.

The length of the projection 75 and position of the cam-face 76 differ in the various subscribers' stations and correspond to the number of selecting-contacts 32 on the several transmitting-disks, the arrangement being such that the brush 60 will just escape over the edge of the projection 75 at the cam-face 76 when the last selecting impulse of the corresponding transmitter-disk has occurred. Thus the subscriber's disk 61, corresponding to the transmitter-disk 25, will have a projection 75 of such length that one impulse or stroke of the armature-lever 66, caused by the one contact 32 of disk 25, will carry the brush 60 over the cam edge 76. The disk 61 at the second subscriber's station has a projection 75 of a length corresponding to two strokes of the armature-lever 66 imparted by the two contacts 32 on the transmitter-disk 26. The third subscriber's disk has a projection of length corresponding to three selecting-contacts, and so on.

Suppose now that the subscriber corresponding to transmitter-disk 28, whose receiving apparatus is illustrated in Fig. 2, is to be called. The operator at the exchange closes the switch 54, corresponding to this disk, and the ensuing rotation of shaft 20 impresses four short selecting impulses upon the line followed by a pause and then a longer ringing impulse. The effect of the four selecting impulses is to rotate the shaft 63 and disks 61 62 ahead four steps and carry the brush 60 over the cam-face 76 onto the low part of disk 61. During this step-by-step rotation the ratchet 64 passes under the pawl 68, and owing to the retarding-train 67 69 70 71 the backward or return movement of the disks 61 62 during the backward stroke of pawl 65 is

slight. At the termination of the fourth selecting impulse the armature-lever 66 rests against its back-stop 83, and a fixed pin 84, acting against a lug 85 on the pawl 65, holds the nose of said pawl out of the path of the teeth on ratchet 64, thereby permitting the backward rotation of said ratchet. During the passage of the gap 33 in disk 28 under the brush 30 the spring 72 returns the disks 61 62 toward their normal or unison position a sufficient distance to cause the cam-face 76 to displace the brush 60 laterally onto the periphery of disk 62. While said brush has been on disk 61 the line-current has not passed through the bell 80; but as soon as the brush comes onto the disk 62 the line-current can pass through said bell by way of wire 82, brush 60, disk 62, and wires 79 81. With the brush 60 thus positioned the local circuit 58 78, &c., is not energized. The occurrence of the long-ringing impulse, due to contact 34 on disk 28 immediately succeeding the gap 33, causes the bell 80 to ring and the subscriber to be called. It is evident that none of the other subscribers' bells will ring at this moment for the following reasons: The four selecting impulses which have brought the brush 60 of the fourth subscriber's receiving device over the cam-face 76 have also brought receiving-disks 61 62 of each of the other four subscribers four steps ahead. For the subscriber corresponding to transmitting-disk 29 these four steps will find the brush 60 still on the projection 75 of disk 61, for said projection in this subscriber's apparatus is of a length corresponding to five steps, and his disks 61 62 therefore start to return to unison position upon the occurrence of the gap 33 in the fourth subscriber's transmitting-wheel before the fifth subscriber's brush 60 has escaped over the cam edge 76. For the third subscriber, whose transmitting-disk is 27 and whose receiving-disk 61 has a projection 75 of length corresponding to three impulses, the four selecting impulses impressed on the line will have carried the brush 60 on said third subscriber's receiver over the cam edge 76 onto the low part of his disk 61 and one step beyond said cam edge. When this third subscriber's disks 61 62 start to return to unison position, they have therefore to travel back one step and a further distance sufficient for the incline 76 to carry the brush 60 onto the disk 62 before the third subscriber's bell can ring. The length of the gaps 33 in the transmitting-wheels is so determined as to be insufficient to allow this amount of return of any of the subscriber's disks 61 62. The occurrence of the ringing impulse for the fourth subscriber, whose transmitter-disk is 28, therefore finds the brush 60 of the third subscriber, whose transmitting-disk is 27, still on the periphery of the third subscriber's disk 61, and no signal is given at said third subscriber's station. When the ringing impulse occurs on the fourth subscriber's unit, his disks 61 62 are returning toward unison

position, as stated, with the brush 60 on the disk 62. Toward the end of the return movement the cam incline of disk 62 lifts brush 60 to the level of the projection 75, and the horizontal spring of said brush carries it back onto the disk 61, ready for the next call. All the subscribers' disks 61 62, with the exception of the subscriber who is being called, are carried forward a step by the occurrence of the ringing impulse, and their disks 61 62 do not return to unison position until this impulse has ceased. When the fourth subscriber is called, it is evident that neither the first nor second subscribers will be called, for the brushes 60 of their receiving instruments have been carried a greater distance even than that of the third subscriber along the low part of the disk 61 beyond the cam-face 76 by the four selecting impulses. By a similar demonstration to the foregoing, which it is not necessary to give, it will readily appear that when any other subscriber besides the fourth is called his bell will ring, while the bells of the remaining subscribers remain silent.

While I have described a novel automatic transmitting device for use with the receiving instruments at the subscribers' stations, I do not wholly restrict myself to such form of transmitting apparatus. It is possible by skilfully preserving the intervals of time for the operator to impress the proper sets of impulses for the several subscribers on the line manually by means of an ordinary switch or push-button 86, connected across the line-wires 37 39. It is also admissible to vary the described structure of the apparatus in many particulars without departing from the spirit of the invention.

I have not described the arrangements for the calling of the exchange by the several subscribers, as the provisions for this may be of any suitable nature and do not form a part of my present invention.

In adapting my apparatus to other uses than as a ringer or caller for telephone party-lines or otherwise it is only necessary to substitute for the several subscribers' bells any instrument, relay, or other translating device adapted to respond in the particular manner or perform the particular office desired, making such other changes, if any, as may be necessary and proper to adapt the system to its required use—such, for instance, as substituting a different source of electromotive force for the magneto-machine 38. The different "stations" or localities of the receiving instruments may of course be adjacent instead of remote.

I claim—

1. In a selecting system, a series of controlling units each comprising an electromagnetic step-by-step actuator, a reciprocating controller advanced thereby and having a free return at a predetermined rate between the advancing impulses of said actuator, and circuit-controlling means automatically oper-

ated by said controller at a predetermined point in its return movement, said point differing for the several controlling units.

2. In a selecting apparatus, a reciprocating controller, electromagnetic means for imparting a step-by-step outward movement thereto, means for causing a return movement of said controller at a predetermined rate, a controlling element, said element and controller being relatively shifted by the controller at a predetermined point in the return movement of the latter, and a circuit controlled by said shifting movement.

3. In a selecting apparatus, a controlling element and a wheel which are relatively rotatable and relatively displaceable axially of the wheel, said wheel having portions of different radii which cooperate with the element and a cam formation between said portions which effects the relative axial displacement of the wheel and element, means for effecting the relative rotation of said wheel and element in outward and return directions, and a translating device controlled by said element.

4. In a selecting apparatus, a controlling element, a rotatable cam-wheel having portions of different radii cooperating with said element, and a cam formation between said portions for axially displacing said element upon the return rotation of the cam-wheel, means for effecting a step-by-step outward movement of said wheel, means for effecting a yielding return movement thereof, and a translating device controlled by said element.

5. In a selecting apparatus, a contact element, a cam-wheel having provisions for displacing said element axially at a given point in its return movement, a contact-surface alongside of said wheel cooperating with said element when thus displaced, means for effecting a step-by-step outward movement of said wheel, means for yieldingly returning

said wheel, and a circuit controlled by contact of said element and contact-surface. 45

6. In a selecting apparatus, a cam-wheel and a contact-surface rotatable together, a contact element displaceable axially from the former to the latter at a given point in the return movement of said parts, means to yieldingly return said wheel and surface, an electromagnetic step-by-step actuator for rotating said parts outwardly against the returning means, and a retarding device automatically connecting with said parts on their return movement. 55

7. In a selecting apparatus, a cam-wheel having portions of different radii and an axially-acting cam portion between the first said portions, a controlling element yieldingly actuated radially and axially toward said portions of different radii, a contact-surface rotatable with said cam-wheel for cooperation with said element when the latter is axially displaced and having a cam incline to restore said element to the portion of said cam-wheel of greater radius, and means for imparting outward and return rotary movements to said cam-wheel and contact-surface. 65

8. In a selecting apparatus, a circuit, a shiftable circuit-controlling member, a signaling-disk and a member-shifting disk mounted to rotate together, the two disks having provisions for shifting said member from each to the other in an axial direction at different points in their return rotation, means for rotating said disks step by step in an outward direction, and means for yieldingly returning the two to unison position. 75

In testimony whereof I have affixed my signature in presence of two witnesses. 80

EDWARD OAKMAN HOOD.

Witnesses:

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ADELINE C. RATIGAN.