

No. 848,120.

PATENTED MAR. 26, 1907.

A. A. MONSON.

AUTOMATIC TRUNKING DEVICE AND SELECTIVE SIGNALING APPARATUS.

APPLICATION FILED NOV. 27, 1906.

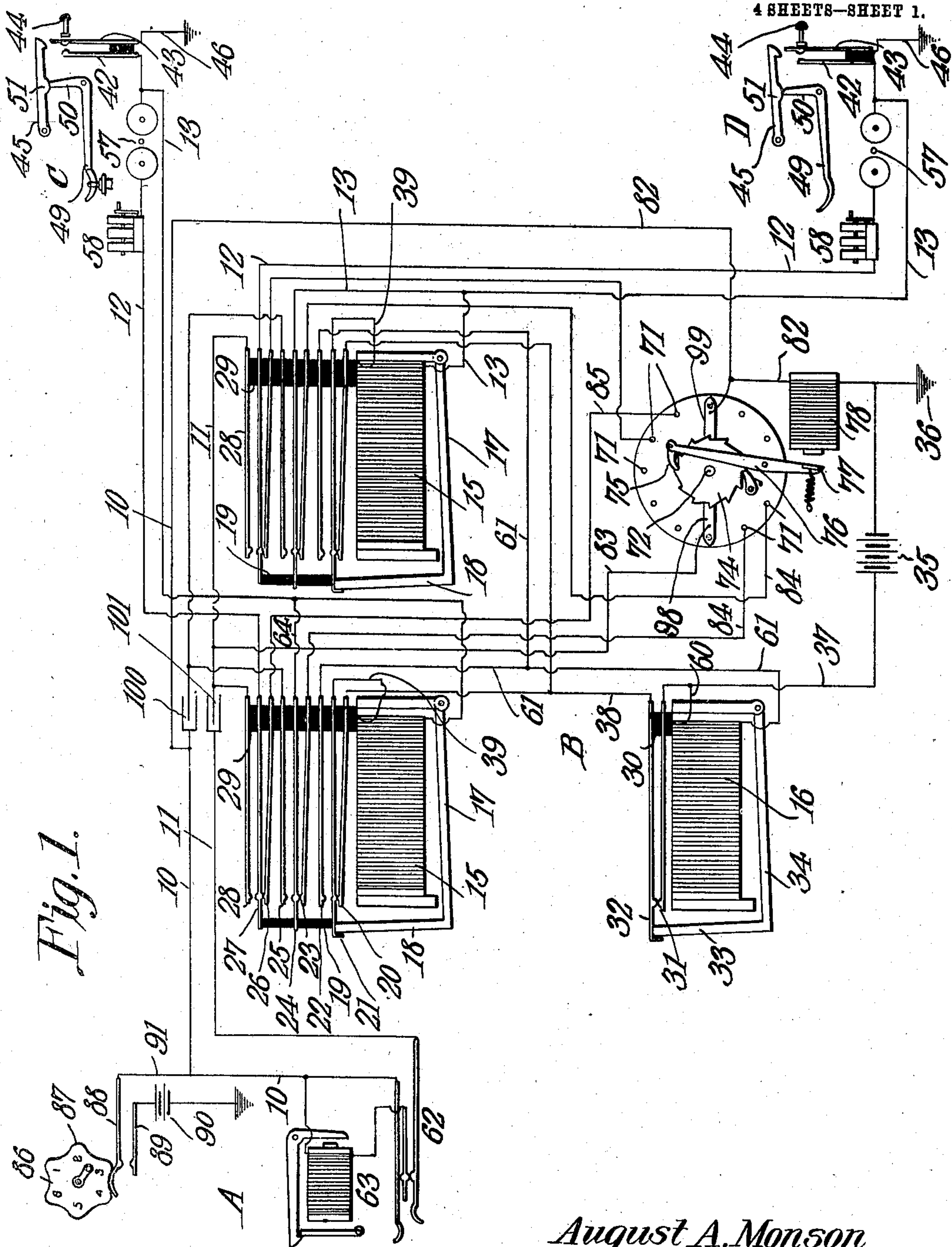


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 3.

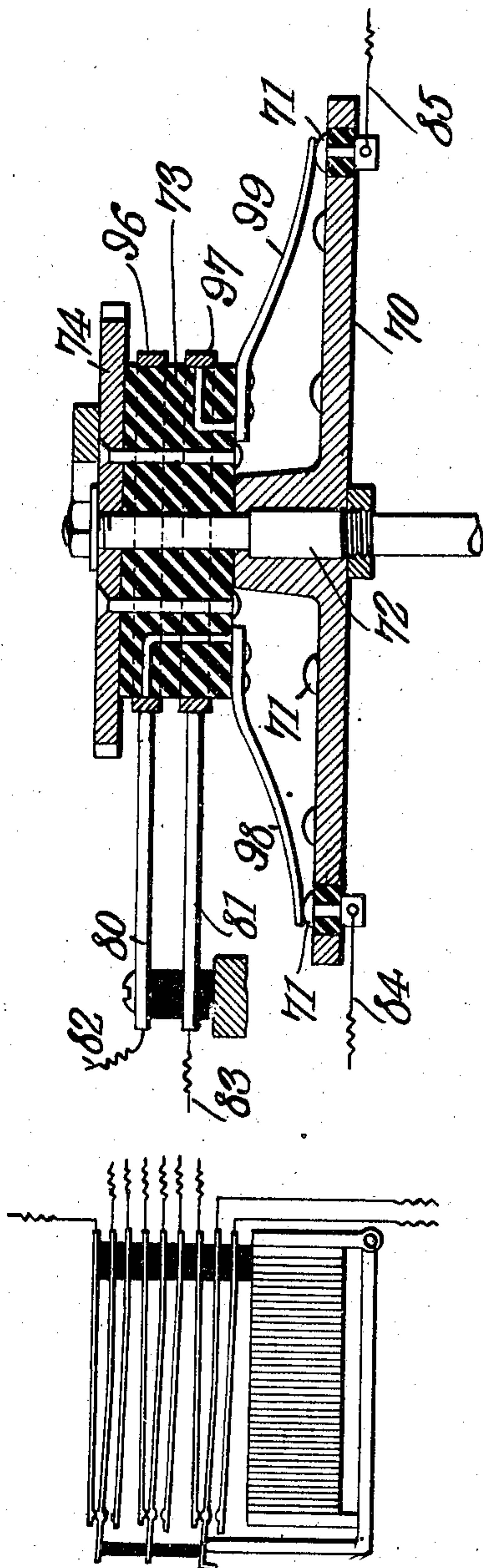


Fig. 2.

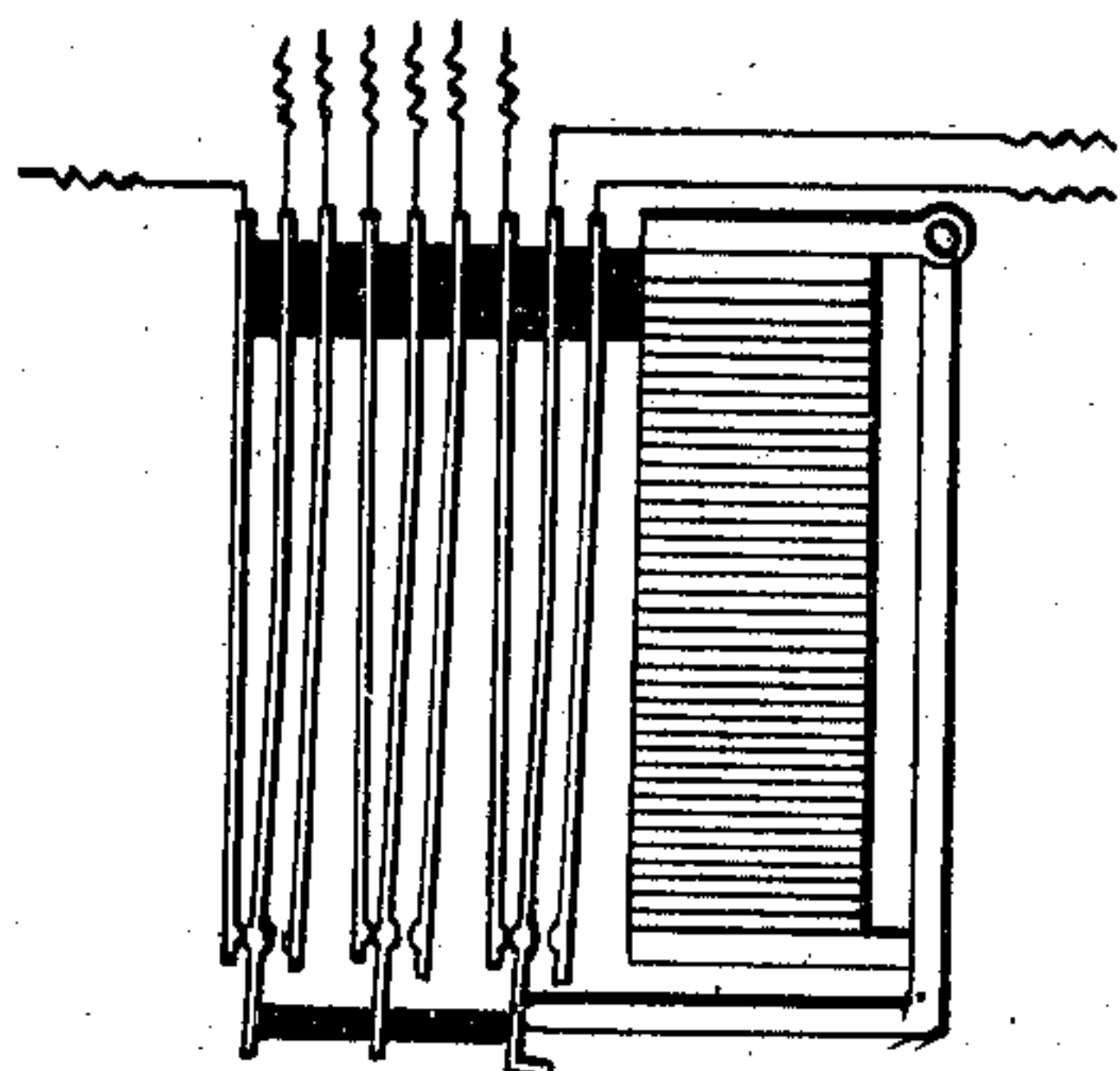
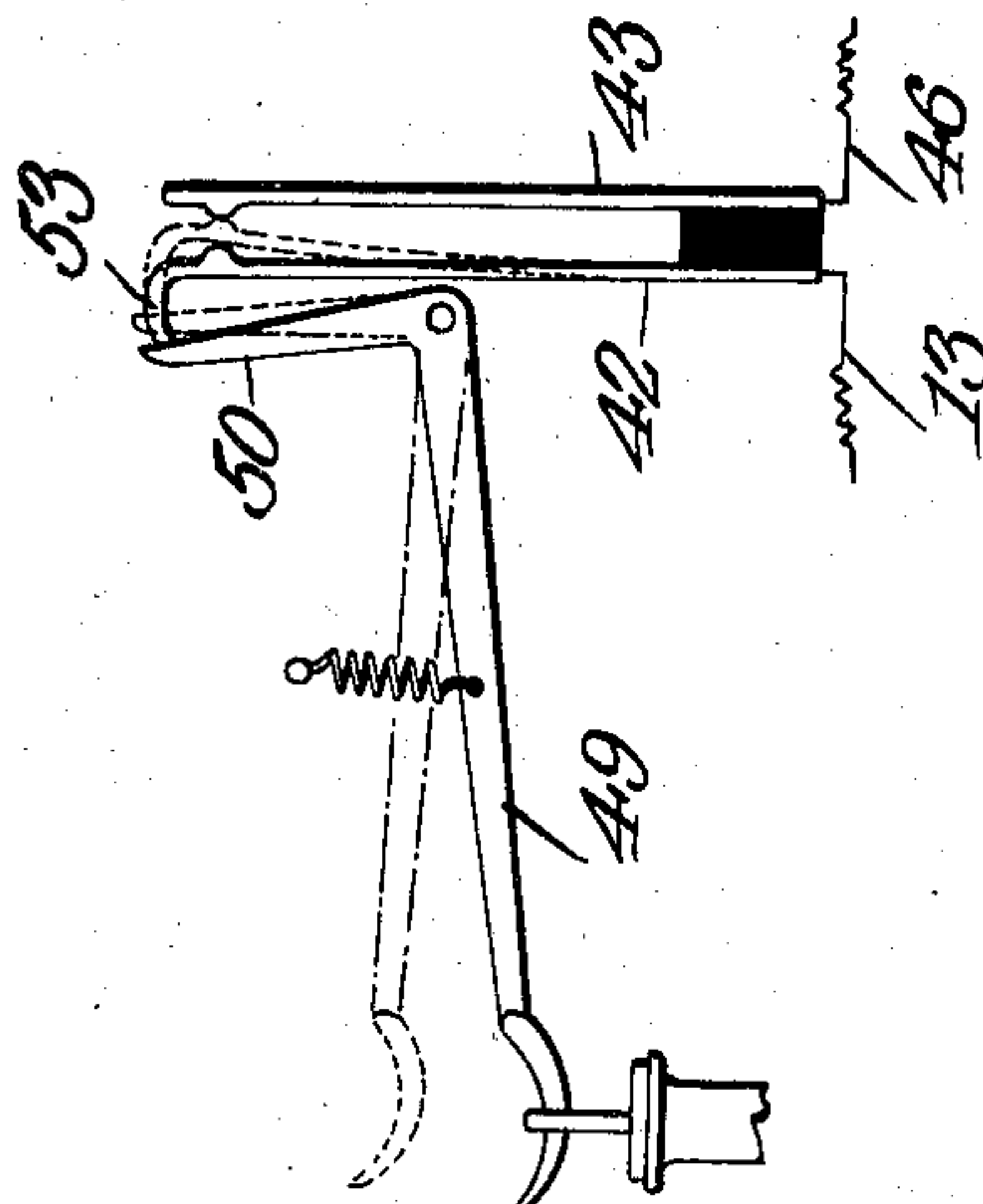


Fig. 4.



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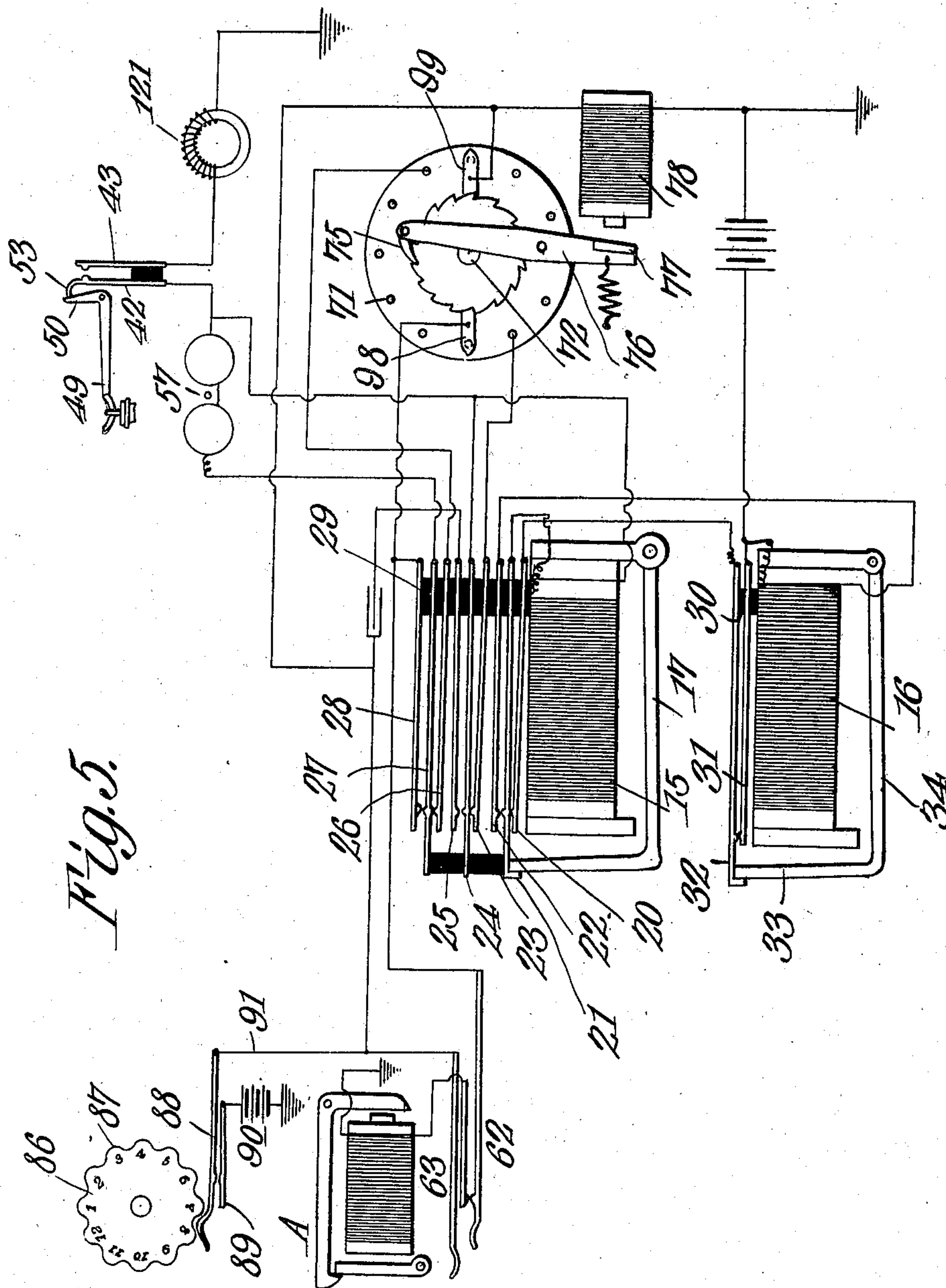
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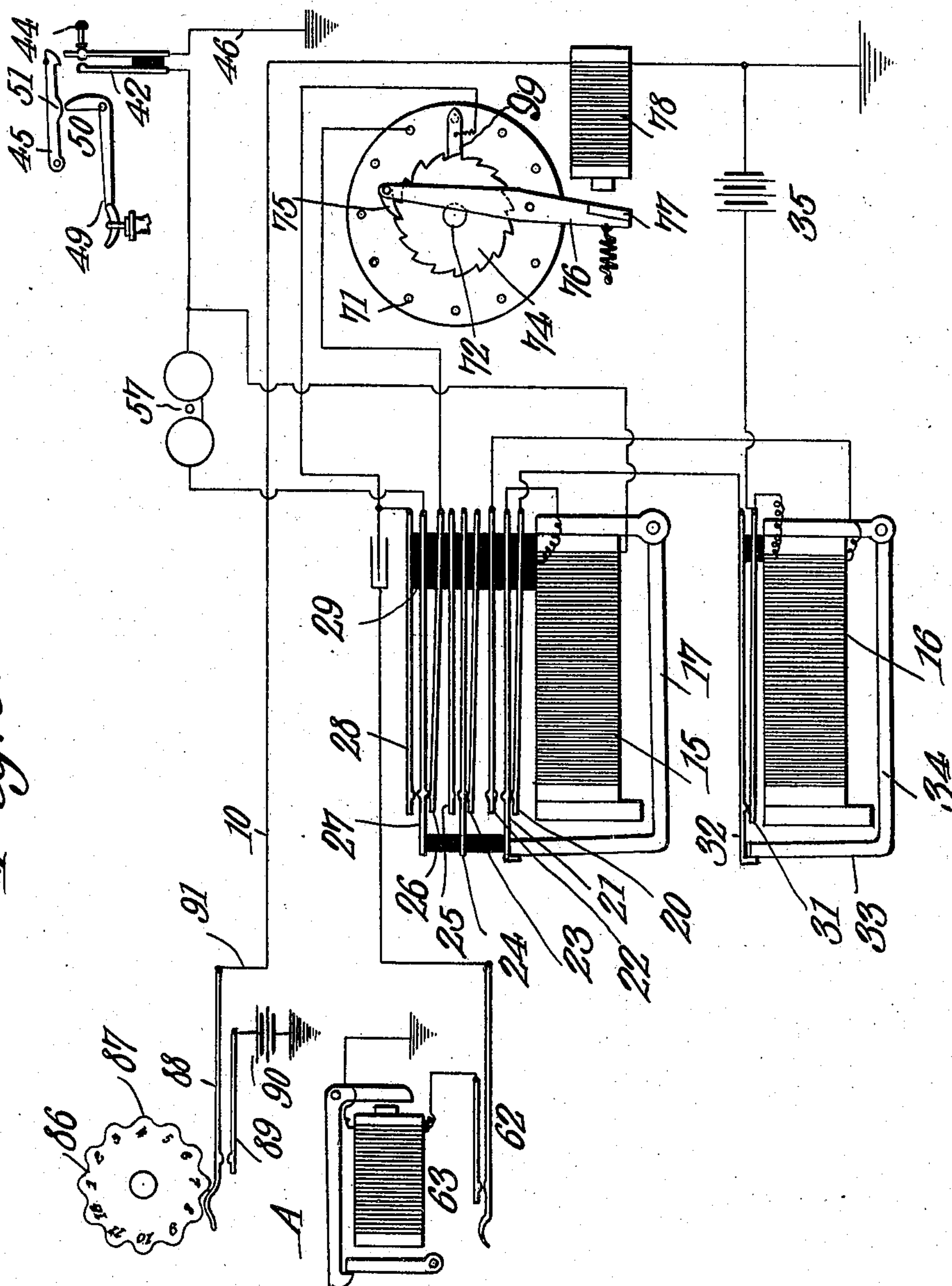
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4 SHEETS—SHEET 4.

Fig. 6.



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AUTOMATIC TRUNKING DEVICE AND SELECTIVE SIGNALING APPARATUS.

No. 848,120.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed November 27, 1906. Serial No. 345,316.

To all whom it may concern:

Be it known that I, AUGUST ALVIN MONSON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Automatic Trunking Device and Selective Signaling Apparatus, of which the following is a specification.

This invention relates to telephone systems, and has for its principal object to provide a system by which outlying subscribers may be connected to a central station at very small expense.

When suburban subscribers are to be connected to the central station of a city or town, it is often a matter of considerable expense to run a wire or wires for either common return, grounded, or full-metal circuits, the expense of erection being in many cases prohibitive. One of the ordinary methods of overcoming this difficulty is to provide a party-line system where a number of subscribers are connected on the same line, each having a distinctive call; but this is a matter of considerable annoyance where the calls are sounded at every phone and where the connections are such that any subscriber may overhear the conversation of another. For party-line systems selective devices have been employed; but these as a rule are expensive and require the services of an expert to maintain them in working order. In carrying out the present invention provision is made for connecting two, three, or a dozen or more outlying subscribers' stations to a central point, which may be a distributing-pole, and then connecting this central point to the main central station by a trunk-line.

A further object of the invention is to provide a selective mechanism that is common to a group of subscribers as distinguished from the ordinary selective mechanism, which must be placed at each subscriber's station, thus materially reducing the expense of installation.

A still further object of the invention is to provide a system wherein the "branch central," as it may be termed, constitutes a selecting-station that is partly under the control of the group of subscribers and partly under the control of the central station.

A still further object of the invention is to provide a system wherein the utmost privacy may be insured and all subscribers of the group belonging to the branch central may

be disconnected from the line when any one subscriber connects his station to central.

A still further object of the invention is to provide means whereby a subscriber may connect his station to central and at the same time cut out all other subscribers of the group by simply operating a push-button, switch, or the like or by simply removing the receiver from the hook, it being unnecessary to employ any specially-constructed or complicated mechanism at the subscriber's station for this purpose.

A still further object of the invention is to provide a system of this kind in which after a call from any one of a group of subscribers the central operator may connect any one of the group without sounding the call-bells of the others and still maintain all of the remaining lines disconnected.

A still further object of the invention is to provide mechanism which may be used in connection with systems where the energy is supplied at the subscribers' stations or where central-station energy is employed.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a general diagram, illustrating a telephone system arranged in accordance with the invention. Fig. 2 is a detail view of one of the circuit-closing electromagnets of the central station, showing the condition of the parts when the electromagnet is energized. Fig. 3 is a detail view of the selecting device. Fig. 4 is a detail view illustrating a modification of the means for closing the circuit at the subscriber's station when central-station energy is used. Fig. 5 is a diagram of the wiring where central-station energy is used. Fig. 6 is a diagram of a grounded system.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The main central station A is connected to

what may be termed the "branch central" station B by a trunk-line, comprising two wires 10 and 11. This branch central station may be arranged at any convenient point, the apparatus being housed in a suitable casing and placed, for instance, on a distributing-pole located at some convenient point, from which connections may be run to the subscribers' stations, two of which, C and D, are illustrated in Fig. 1, although there may be any number of subscribers connected to this branch central. The apparatus shown in the diagram is limited to a group of six subscribers; but these may of course be increased by altering the capacity of the selective device. Each subscriber's station is connected to the branch central by two wires 12 and 13.

At the branch central there is an electromagnet 15 for each subscriber and a single electromagnet 16 common to all of the subscribers, this second magnet 16 serving when energized by any one subscriber to cut out all remaining subscribers and prevent them from overhearing a conversation.

The electromagnet 15 is provided with a pivotally-mounted armature 17, from the free end of which rises a rod or arm 18, that is arranged to engage and elevate a small block or strip 19, formed of insulating material, when the electromagnet is energized.

Arranged above the magnet is a series of contact-springs 20, 21, 22, 23, 24, 25, 26, 27, and 28, all of which are carried by a block 29 at one end and are insulated from each other at this point. The outer block or strip 19 is firmly connected to the strips 21, 24, and 27 and serves to simultaneously move said contact-strips when the electromagnet is energized.

On the frame of the electromagnet 16 is a block 30 formed of insulating material and carrying two contact-strips 31 and 32, that normally engage each other, the upper strip 32 being movable by a rod or arm 33, that is carried by the armature 34 of the magnet, and when the latter is energized the armature is raised and the strip 32 is forced from engagement with the strip 31, breaking circuit between them.

At the branch central station is a battery 35, one pole of which is shown as grounded at 36, while from the opposite pole extends a wire 37 to contact 31, and when contact 32 is down in engagement with contact 31 the circuit may be traced to wire 38, contact 20, contact 21, wire 39, electromagnet 15, wire 13, to the subscriber's station.

At each subscriber's station is arranged a means for closing this circuit.

In the construction shown in Fig. 1 two spring-contacts 42 and 43 are employed, said contacts being insulated from each other and the contact 43 being under the control of a push-button 44, which may be pressed in-

ward by the subscriber in order to connect it to the contact 42. When so pushed in, the contact 43 is held by a pivotally-mounted catch 45, so as to hold the circuit closed permanently, said circuit being completed from the contact 43, through wire 46, to ground. At the subscriber's station is shown a receiver-hook switch 49, which has an arm 50, arranged to engage a small cam 51 on the lower side of the catch 45 when the receiver is returned to the hook, and when this is done at the completion of a conversation the catch 45 is elevated and the contact 43 is released, so as to break the circuit. This same operation, however, may be accomplished automatically without the employment of a push-button and catch 45, it being simply necessary to employ a cam-like lug 53 on the spring 42 to be engaged by the arm 50 of the receiver-hook when the hook elevates after the removal of the receiver, this operation automatically completing the circuit. When the receiver is replaced on the hook, the arm 50 will leave the cam 53 and the circuit will be automatically broken.

The subscribers' stations are also provided with the usual local circuits, including the receiver and transmitter and a call-bell 57. A small magneto-generator 58 is also shown at each station in Fig. 1, although in some instances this may be omitted where central-station energy is employed.

When a subscriber wishes to call another, he presses button 44 or otherwise engages the two contacts 42 and 43, whereupon a circuit is closed from the battery 35, through wire 37, contact 31, contact 32, wire 38, contact 20, contact 21, electromagnet 15, wire 13, contact 42, contact 43, wire 46, to ground, and thence back to battery. This energizes the electromagnet 15, and the armature 17 is drawn upward, moving the contact 21 into engagement with the contact 22. The resiliency of the contact-spring 20 is such that as the spring 21 moves upward the spring 20 will follow it and will not break contact therewith until 21 has made contact with 22, when it breaks away, and 23 and 26 break away from 24 and 27 as soon as the latter have risen and made contact with 25 and 28, respectively. Thus the circuits will be transferred without any break.

It will be noted that a branch 60 of the wire 37 runs to the winding of the electromagnet 16, and from the electromagnet extends a wire 61 to the contact 22, so that as soon as the circuit is transferred to contact 22 the course of the current will be from battery, through wire 37, wire 60, electromagnet 16, wire 61, contact 22, contact 21, wire 39, winding 15, wire 13, to the subscriber's station and ground. As soon as the electromagnet 16 is energized its armature 34 is attracted, and being elevated the contact 32 will be moved out of engagement with the

contact 31, and the circuit at this point will be broken for all subscribers. It is to be noted that this single electromagnet 16 is common to all of the subscribers, and when once a circuit is broken between 31 and 32 by the closing of the circuit at any subscriber's station no other subscriber in that particular group can make a call to central nor can he listen to any conversation being carried on over the line. It is important in this connection to note that when the contact 20 moves up following the contact 21 there is merely a transfer of the circuit without breakage; otherwise the electromagnet 15 will be deenergized.

When the electromagnet 15 was energized and block 19 was moved up, the contact 24 moved from contact 23 into engagement with contact 25 and the contact 27 moved from engagement with contact 26 into engagement with the contact 28. The result of this is that a circuit is closed through the trunk-lines 10 and 11, which circuit may be traced from the subscriber's station through wire 12, contact 27, contact 28, wire 11 to the switchboard-jack 62, to calling drop-magnet 63, back over wire 10 to contact 25, contact 24, wire 64, and wire 13 to the subscriber's station. The central-station operator will then plug in in the usual manner and ascertain the number of the station with which the subscriber desires to be connected, and if the station to be called is at any point outside the group in which the calling subscriber is located the connection is made in the ordinary manner. Should the station to be called be located in the same group with the calling subscriber, it becomes necessary to make the connection in another manner.

At the branch central station is a selector, including a plate or disk 70, carrying an annular series of contacts 71, there being as many pairs of contacts as there are subscribers in the group, six pairs being shown in the present instance, and those of each pair being disposed diametrically opposite each other. At the center of the plate or disk is a short shaft 72, on which is mounted a disk 73, formed of insulating material, and a ratchet-wheel 74, the latter being provided with teeth of a number corresponding to the number of contacts, and these teeth being engaged by a pawl 75, that is carried by a lever 76. This lever has an armature 77, that is arranged within the field of force of an electromagnet 78, and each time the electromagnet is energized the pawl will be operated to advance the ratchet-wheel to the extent of a single tooth. On the periphery of the drum 73 are two spaced contact-rings 96 and 97, which are connected, as shown in Fig. 3, to metallic contact tongues or brushes 98 and 99, these tongues or brushes being arranged to engage the contact-buttons 71. The contact-rings 96 and 97 are engaged by

brushes 80 and 81, and these are connected to the trunk-line wires 10 and 11 by branch wires 82 83, respectively. Leading from each pair of buttons are wires 84 85, which are connected to the contact-springs 23 and 26, respectively, there being one electromagnet 15 and one set of contact-springs and one pair of contact-buttons for each subscriber, as previously described.

At the central station is a revoluble disk 86, having peripheral tongues 87, arranged to engage and depress a contact-spring 88, the latter being movable into engagement with a contact-spring 89. The contact-spring 89 is connected to one pole of a battery 90, the opposite pole being grounded, while the contact-spring 88 is connected, by a wire 91, to the trunk-line 10. In some cases wire 91 is extended independently to electromagnet 78, and wire 82 joining it to trunk is omitted. From the trunk-line at the branch central station leads a wire 82 to the selector-electromagnet 78, and from thence to ground.

If the central operator wishes to call a subscriber in the group, either at the request of another subscriber in that group or some outside station, she turns the disk 86 for a distance corresponding to the number of the subscriber to be called, thus making and breaking contact between the springs 88 and 89, and each time the selector-disk is turned to the extent of a single tooth and the contact-springs 98 and 99 firmly rest on the contact-buttons 71, belonging to the subscriber to be called. Assuming that the springs 98 and 99 make contact with the terminals of the conductors 84 and 85, the calling or signal circuit may be traced from the central station over wire 10, wire 82, contact 80, ring 96, brush 99, one of the buttons 71, wire 84, contact 23, contact 24, wire 64, wire 13 to subscriber's station, back through wire 12, contact 27, contact 26, wire 85, the opposite button 71, brush 98, ring 97, contact-brush 81, wire 83 to trunk-wire 11, and back to the central station, it being remembered that the electromagnet 15 of the subscriber to be called has not been energized, and the contacts 27 and 26 and 24 and 23 are therefore in engagement with each other. The operator connects the called and calling stations and rings of the trunk, thus notifying both parties that the connection has been made. When finished, the subscribers ring off in the usual way, it being merely necessary to replace the receiver on the hook to effect the breaking of the contacts 42 and 43. This deenergizes the electromagnets 15 and 16, and the operator then turns the selector-disk 86 the rest of the way around, leaving the line in condition for another call.

By the employment of the central-calling device the central station can at any time select and privately call any of the subscribers in another group, and after being

called the subscriber should press his button in order to cut out the selecting device and operate the electromagnets 15 and 16 for the purpose of cutting out the balance of the group, thus insuring the utmost privacy. Meantime the central operator may restore the disk 86 to zero in order to save time in case there should be a subsequent call for another subscriber in the group.

10 In Fig. 5 is illustrated the arrangement of the wiring where central-station energy is used, and in this case the push-button 44 and catch 45 are omitted, as previously described, the circuit being closed automatically where
15 the receiver is removed from the hook. When the circuit is closed at the contacts 42 43, the current will flow through the magnets 15 16, as before, thus energizing them, and thereby causing the closure of the contacts 21 22, 24
20 25, and 27 28. Another circuit will then be established from the battery through coil 16 to coil 15, through contacts 21 22, thence through the bells 57 to contacts 27 28, thence to conductor 11, thence through jack 62 to
25 call drop-magnet 63, to ground and back to the battery, impedance 121 between the contacts 42 43, and to ground at the local station, diverting the current to central after the initial energization of the magnets 15 16.
30 This arrangement would also furnish current to the called station for talking purpose after it has been selected by the operation of the selecting mechanism.

For a grounded circuit one side of the drop
35 would be severed and grounded, as shown in Fig. 6, and in this case the top of the spring of the jack would be omitted. The upper condenser 100 is omitted and the connection between the wire 82 and the selector-spring
40 99 is also omitted, while only a single selecting-spring is used. In this case it is not necessary to employ the intermediate contacts 23 24 25, and their wiring connections are therefore omitted, although the structure of
45 the contact-block and the electromagnet remain the same.

I claim—

1. In telephony, a central station, a branch central station having a trunk-line connection therewith, a group of subscribers' stations connected to the branch central station, an electromagnet at the branch central station for each of the subscribers and under the sole control of the subscriber, contacts
50 under the control of said electromagnets for closing connection between the trunk-line and the subscriber's station when the electromagnet is energized, and an additional electromagnet connected in multiple with
55 the entire group of subscribers' stations, and contacts under the control of the additional magnet and through which all connections must be primarily made, the energizing of the additional electromagnet by any sub-

scriber cutting out all of the remaining subscribers of the group.

2. In telephony, a main central station, a branch central station connected thereto by a trunk-line, a series of circuit-closing electromagnets arranged at the branch central station, a group of subscribers' stations, each of which is individually connected to one of said electromagnets, a circuit-breaking electromagnet arranged at the branch central station and connected in multiple to an entire
70 group of subscribers' stations, and contacts under the control of the electromagnets for closing connection between the trunk-line and any subscriber, and automatically breaking the circuits of the remaining subscribers
80 of the group.

3. In trunk-line telephone systems, a group of subscribers' stations connected to a branch central station which forms one terminal of the trunk-line, electromagnetically-
85 actuated contacts arranged at the branch central station and connected one to each of the subscribers' stations for closing a circuit between the trunk-line and the calling subscriber, and an electromagnetically-
90 controlled circuit-breaking mechanism connected in multiple to the group of subscribers and operable by any subscriber making a call for cutting off communication between all of the other subscribers and the trunk-line.

4. In trunk-line telephone systems, a branch central station forming one terminal of the trunk-line, a series of electromagnets arranged at the branch central station, contacts arranged adjacent to each magnet and
100 under the control of its armature, the terminals of the trunk-line being connected to two of the contacts of each set, a group of subscribers' stations connected each to one of the electromagnets and also to contacts
105 under the control of the electromagnet to which it is connected, whereby energizing of the subscriber's line and electromagnet connects the subscribers' station to the trunk-line, and a circuit-breaking electromagnet
110 having contacts under the control of said armature, the contacts being connected in multiple with the entire group of subscribers' stations, whereby on the energizing of the circuit-breaking electromagnet by any sub-
115 scriber, the connections of the remaining subscribers of the group will be broken.

5. In telephony, a main central station, a branch central station, a trunk-line connecting them, an electromagnetically-operated
120 selector-disk arranged at the branch central station and controllable from the main central station, a group of subscribers' stations connected to the branch central station and under the control of a selecting device, a circuit-closing electromagnet arranged at the
125 branch central station for each subscriber's station, contacts under the control of said

electromagnet for closing circuit between the
subscriber's station and the trunk-line, and a
circuit-breaking electromagnet arranged at
the branch central station and common to
5 all of the subscribers' stations for cutting out
all of the group of subscribers except the one
making a call.

In testimony that I claim the foregoing as
my own I have hereto affixed my signature in
the presence of two witnesses.

AUGUST ALVIN MONSON.

Witnesses:

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IDA L. FALK.