

No. 785,103.

PATENTED MAR. 21, 1905.

J. P. JACKSON.
TELEPHONE SELECTING MECHANISM.

APPLICATION FILED JUNE 30, 1903.

4 SHEETS—SHEET 1.

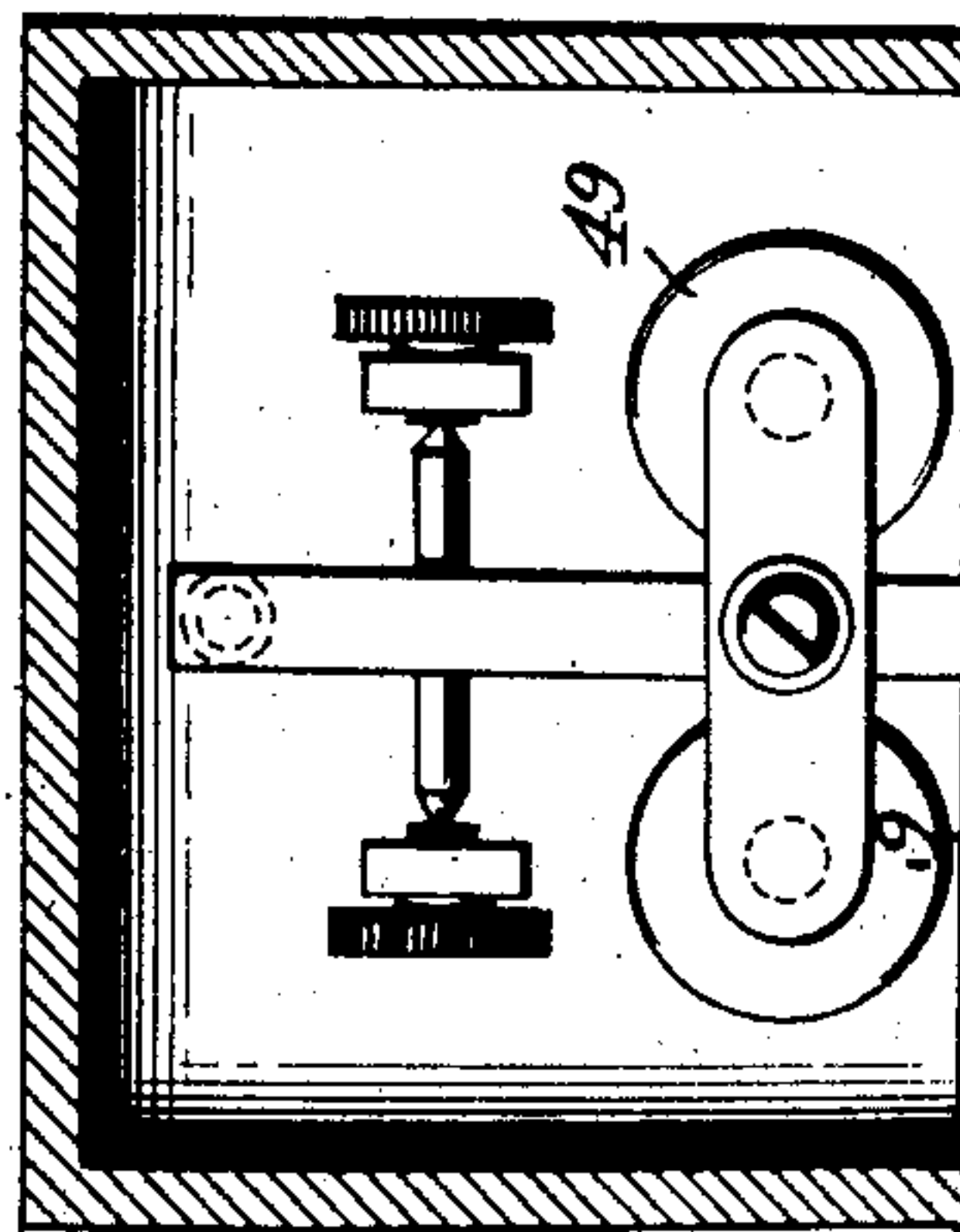
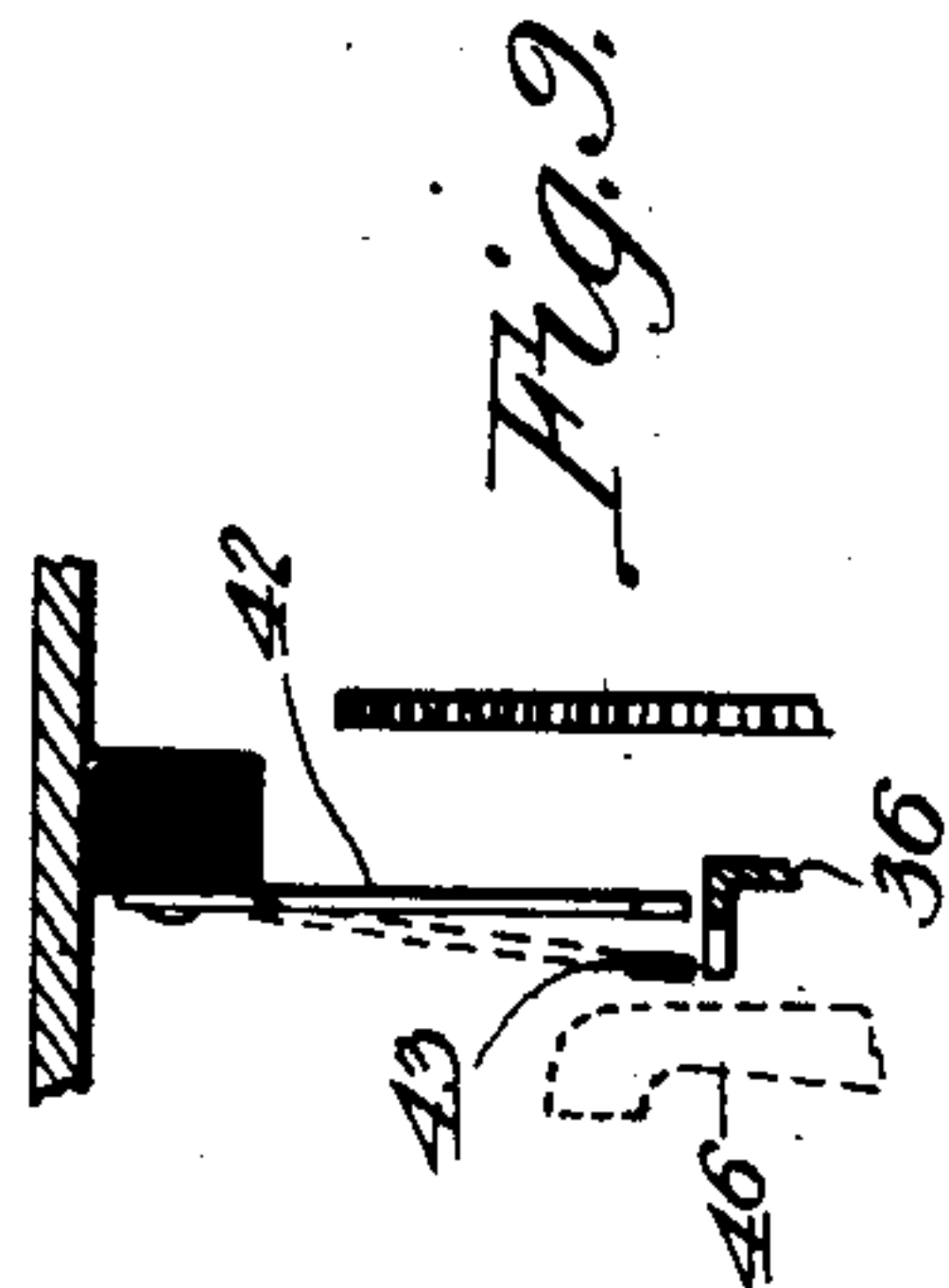


Fig. 1.

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4 SHEETS—SHEET 2.

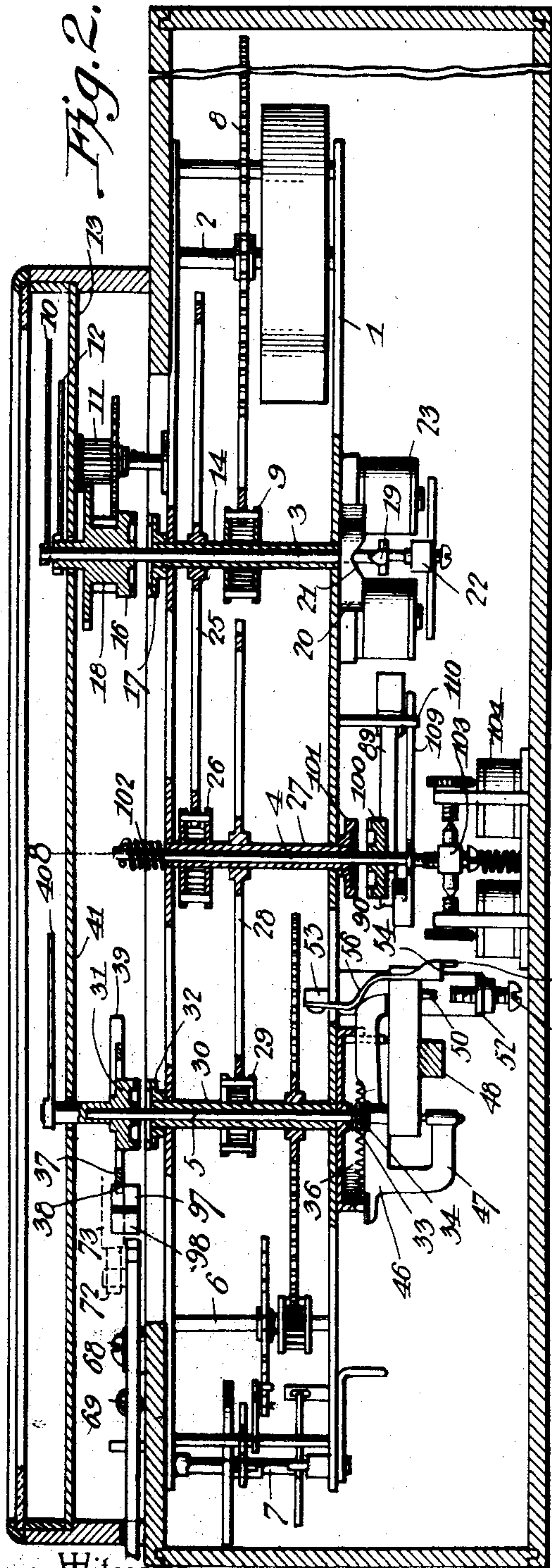


Fig. 2.

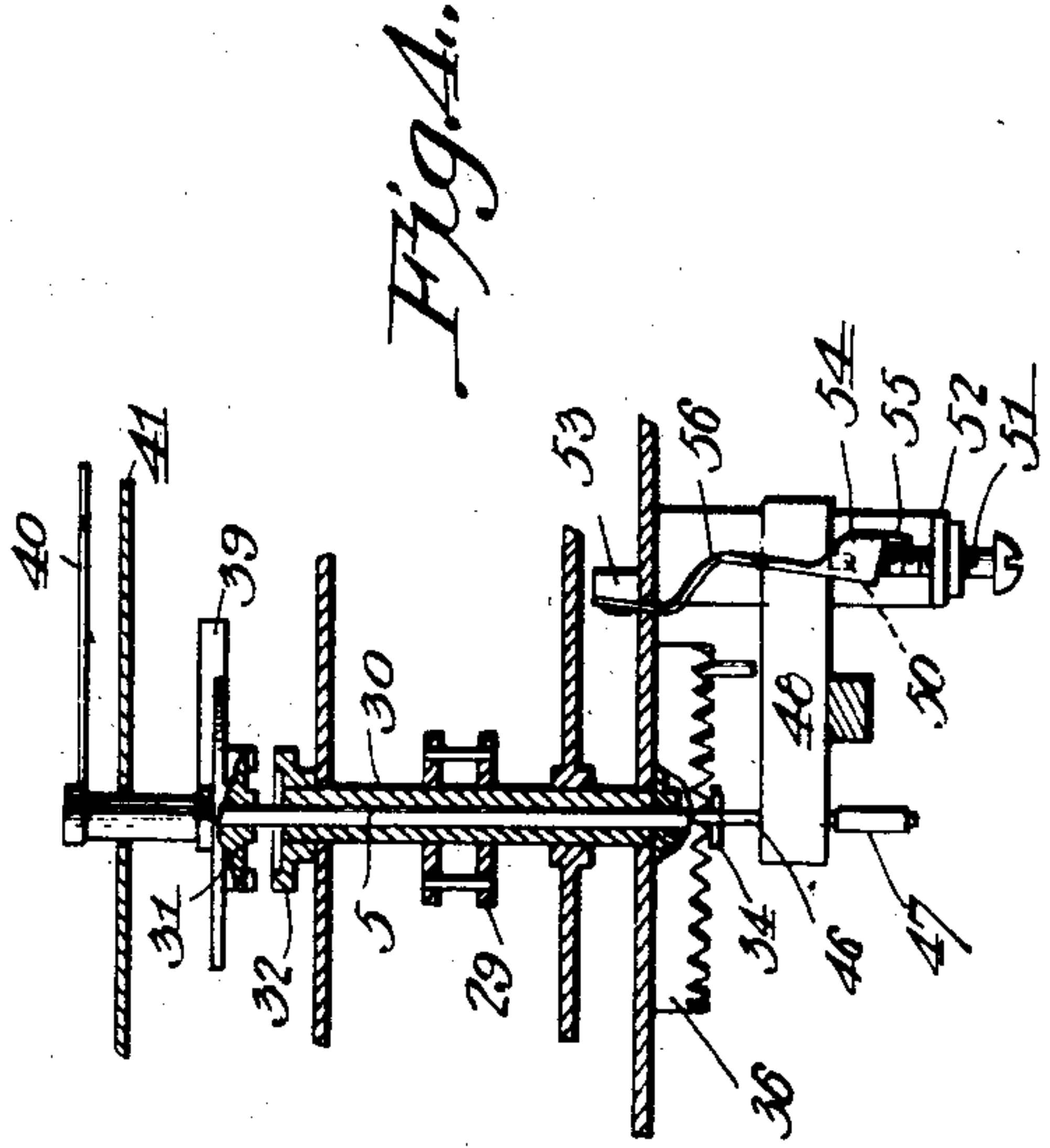


Fig. 4.

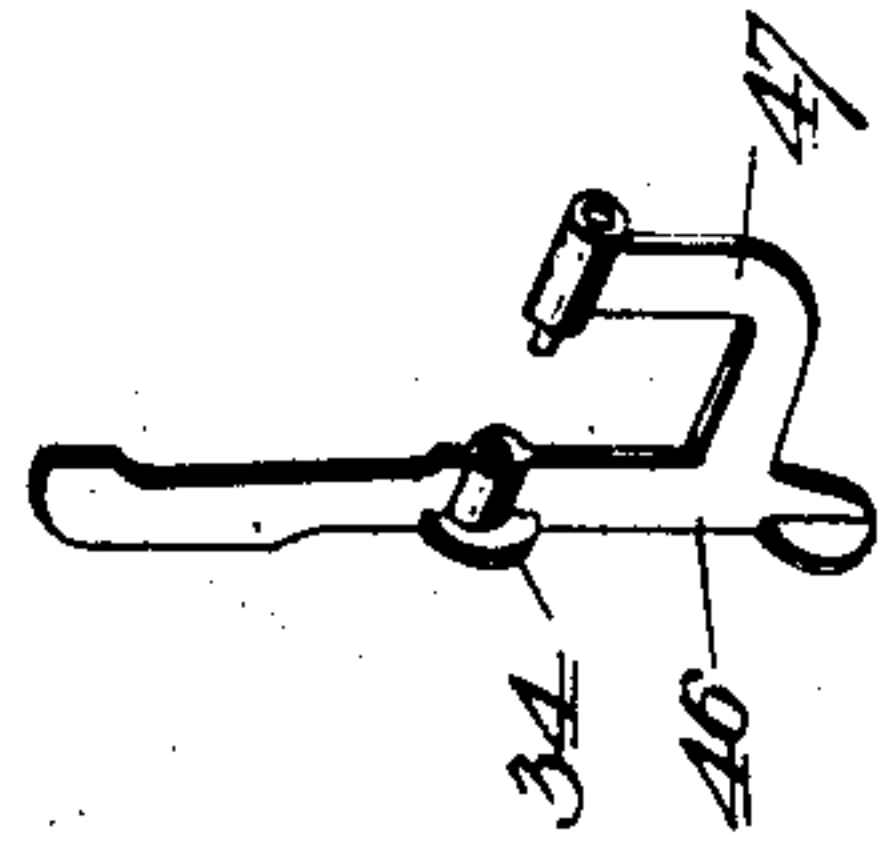


Fig. 5.

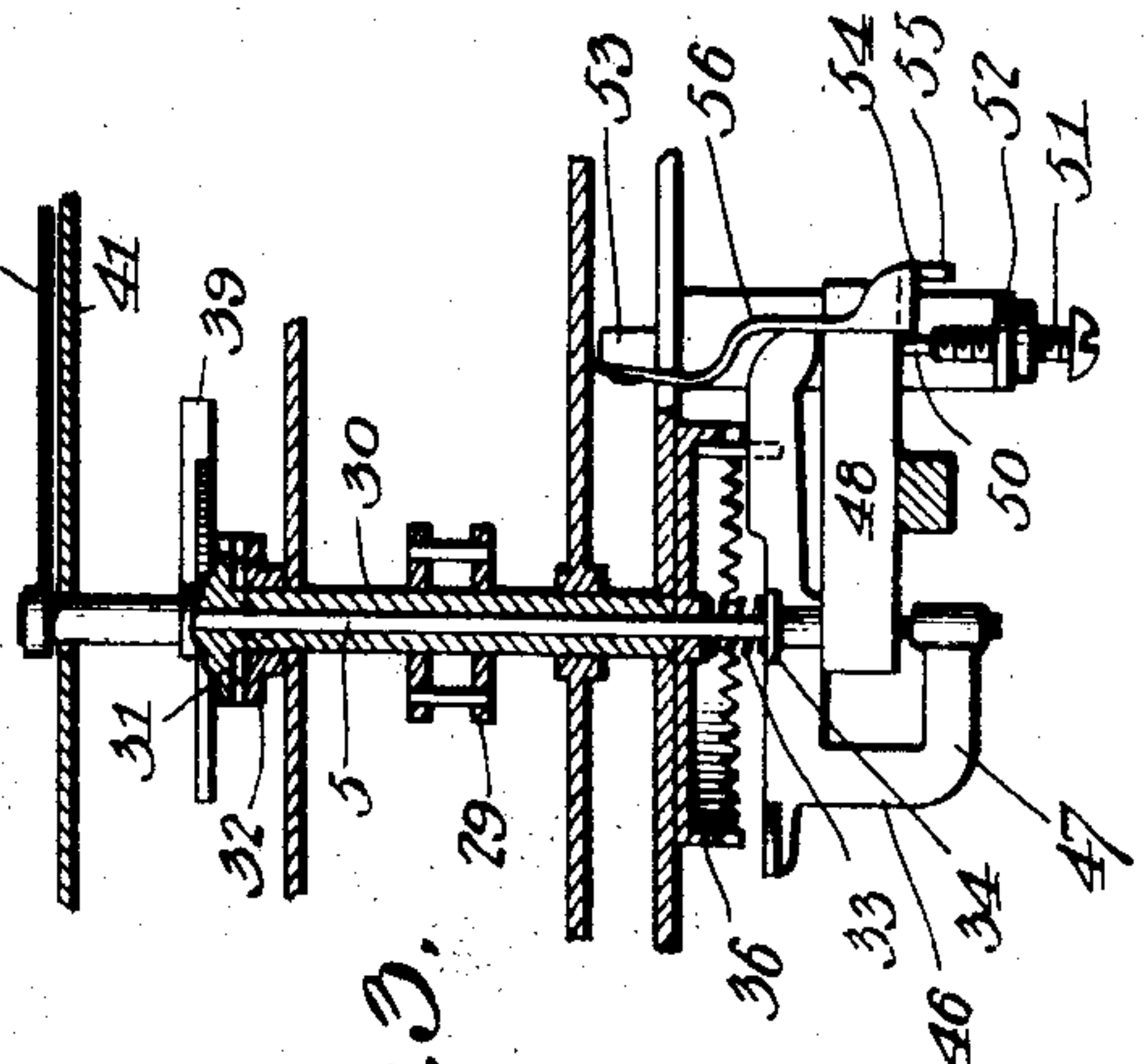


Fig. 3.

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4 SHEETS—SHEET 3.

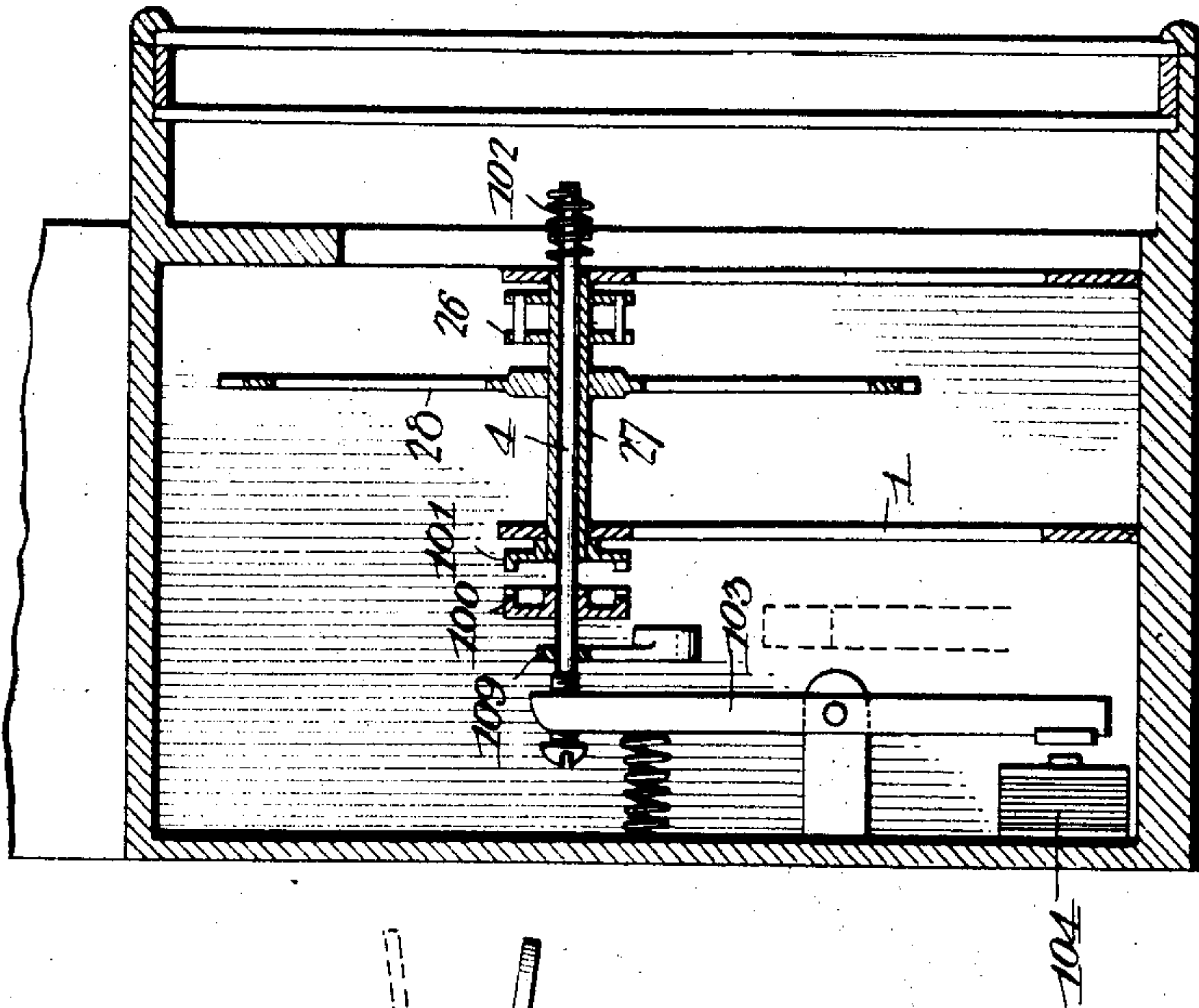


Fig. 8.

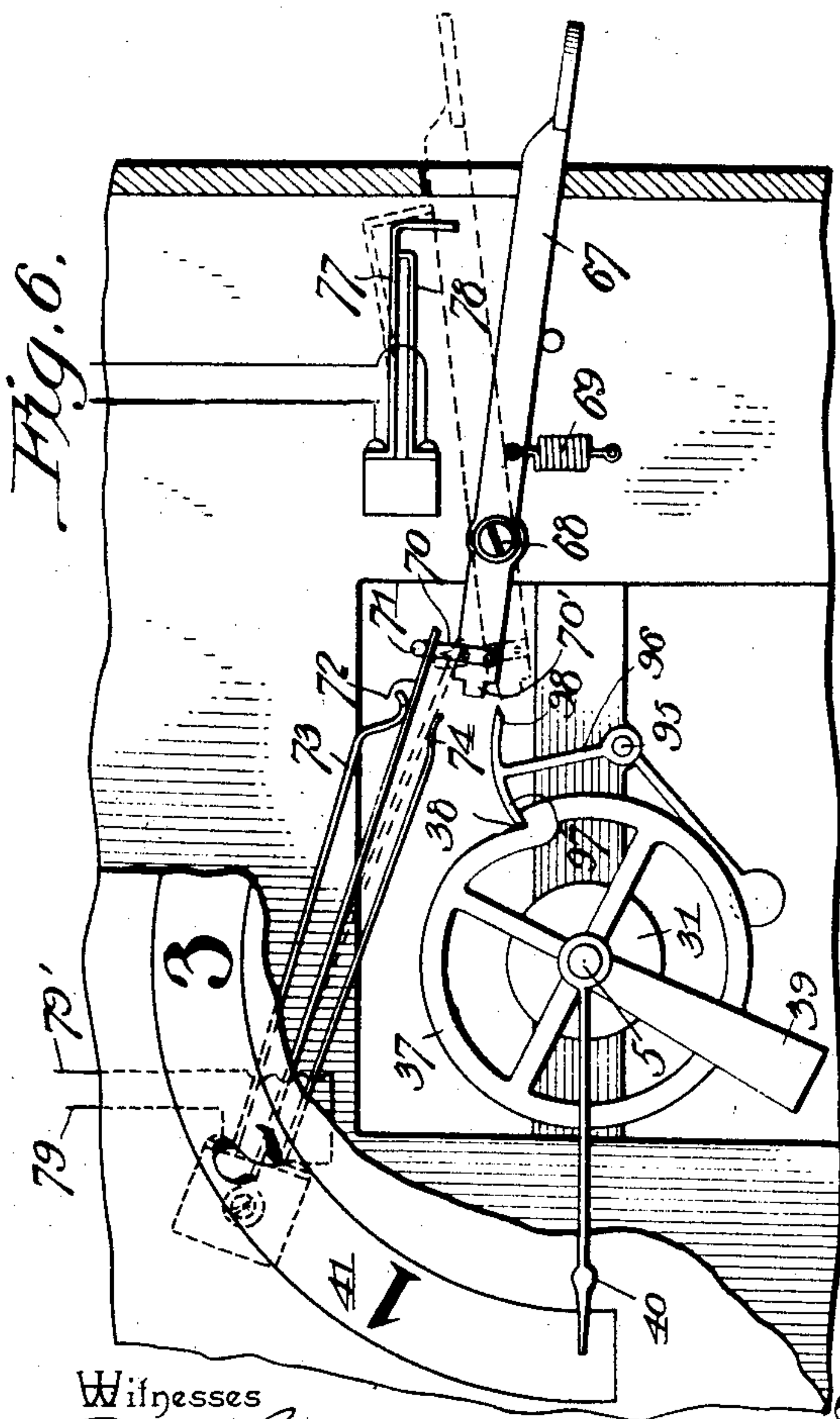


Fig. 6.

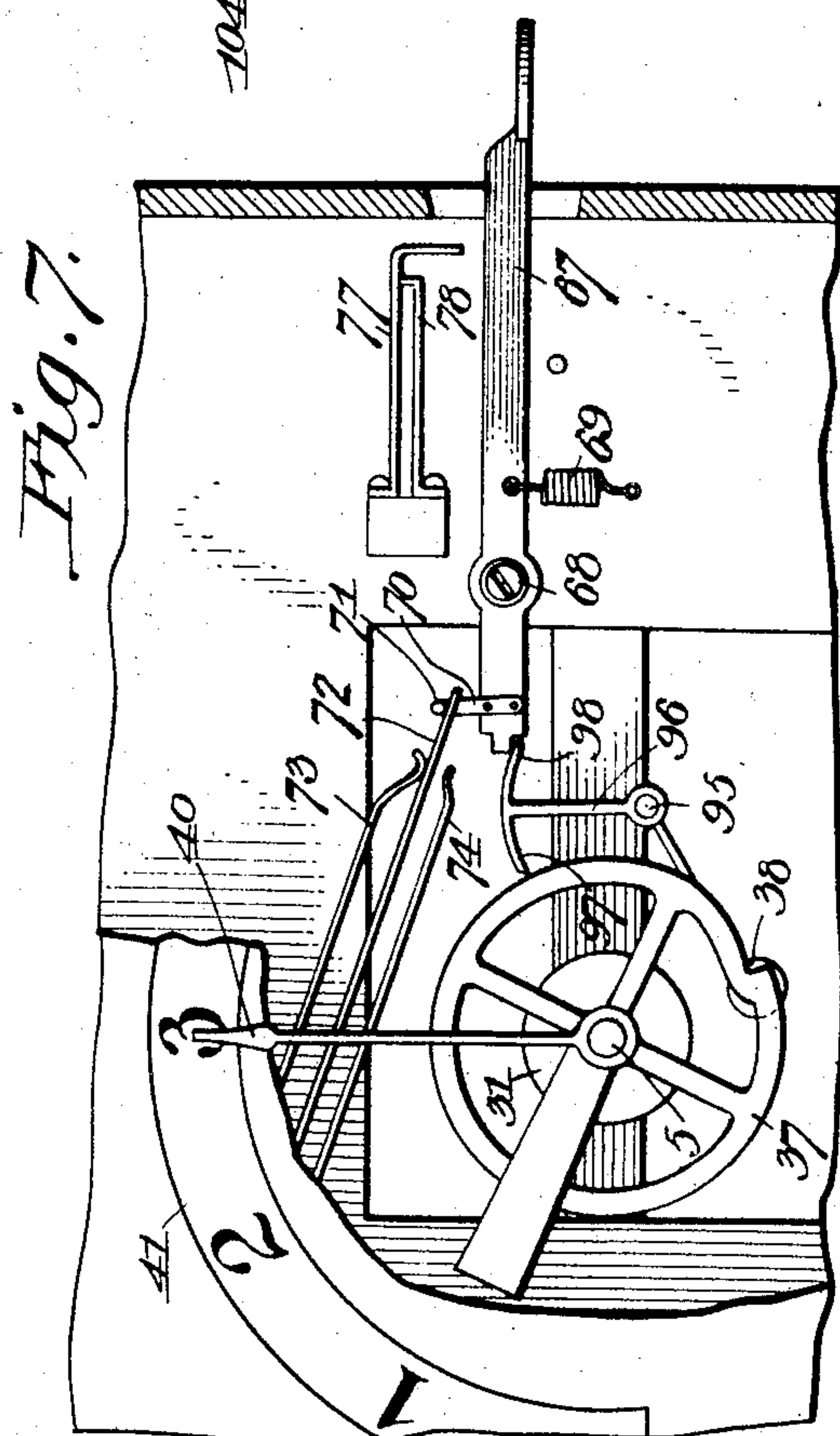


Fig. 7.

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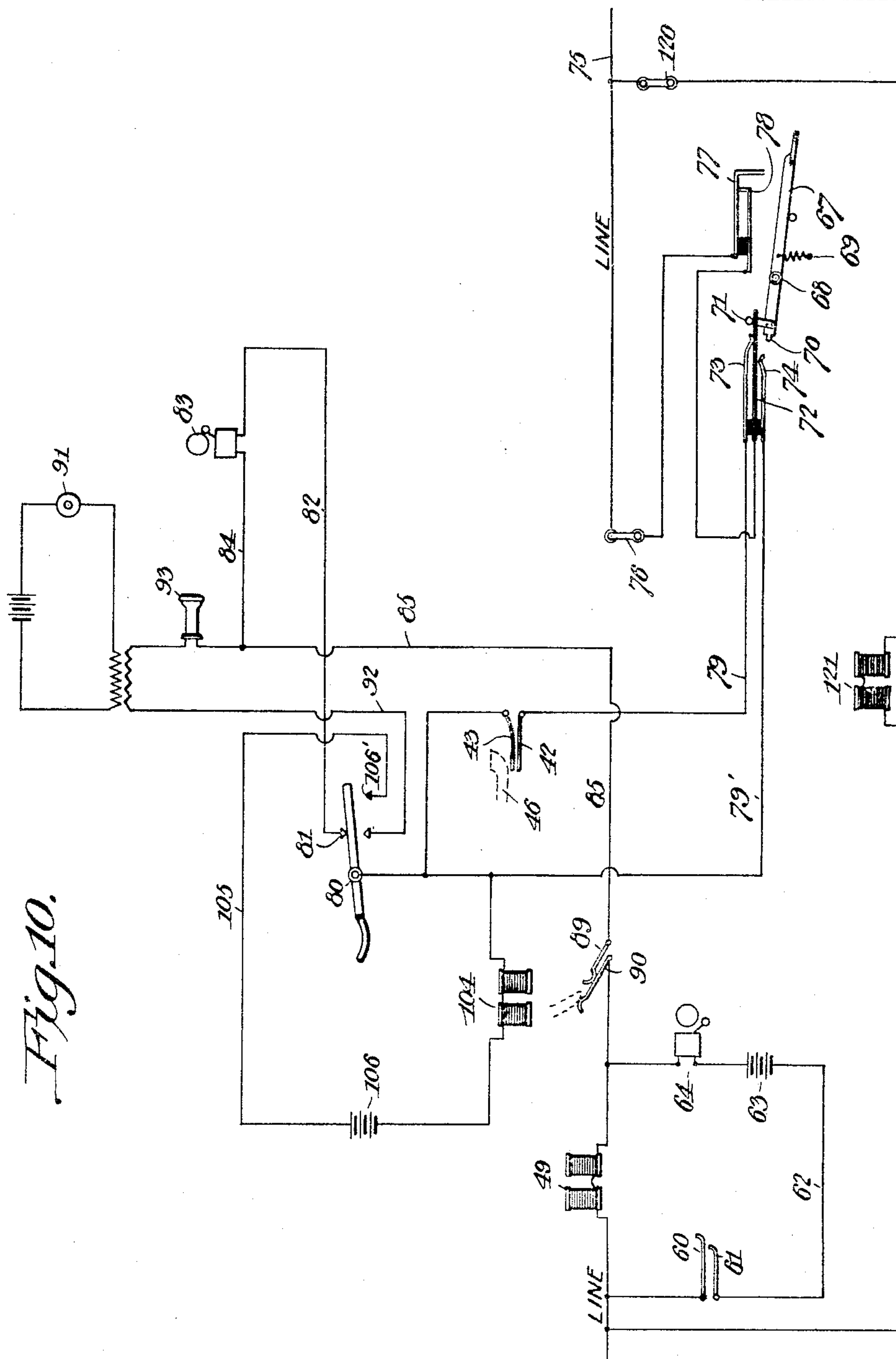
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4 SHEETS—SHEET 4.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN P. JACKSON, OF ORLEANS, INDIANA.

TELEPHONE SELECTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 785,103, dated March 21, 1905.

Application filed June 30, 1903. Serial No. 163,786.

To all whom it may concern:

Be it known that I, JOHN P. JACKSON, a citizen of the United States, residing at Orleans, in the county of Orange and State of Indiana, have invented a new and useful Telephone Selecting Mechanism, of which the following is a specification.

This invention relates to certain improvements in telephone systems.

10 The principal object of the invention is to provide a mechanism by means of which any one subscriber on a party-line may ring the call-bell of any selected subscriber without disturbing any of the other stations on the line.

15 A further object of the invention is to provide a novel form of timing device whereby at the end of a predetermined period, as from three to five minutes, the line will be cut and the subscribers disconnected.

20 A still further object of the invention is to provide a mechanism whereby all of the telephones on the line except those connected will be locked out, and thus prevent one station from listening to a conversation between two other stations.

25 A still further object of the invention is to provide means for automatically returning the selecting mechanism to normal position after the conversation has ceased, and, further, to provide for the automatic return to initial position in the event that the selecting mechanism be allowed to move beyond a predetermined point.

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

35 In the accompanying drawings, Figure 1 is an elevation, partly in section, of a telephone selecting, timing, and synchronizing mechanism constructed in accordance with the invention. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1. Fig. 3 is a de-

tail sectional view of a portion of the mechanism shown in Fig. 2, illustrating a portion of the selecting mechanism in a different position. Fig. 4 is a view corresponding to Fig. 3, illustrating the position of the parts immediately after the selecting-arm has returned to its normal angular position, but before the line has been reenergized to cause movement of the arm to the full position. Fig. 5 is a detail perspective view of the selecting or circuit-closing arm. Fig. 6 is an elevation of a portion of the front of the instrument, illustrating the circuit-closing lever and the lock-out mechanism. Fig. 7 is a view corresponding to Fig. 6, the lock-out mechanism being shown in operative position. Fig. 8 is a transverse sectional elevation of the mechanism on the line 8 8 of Fig. 2. Fig. 9 is a detail sectional view of a portion of the circuit-closing mechanism, the section being taken on the line 9 9 of Fig. 1. Fig. 10 is a diagram showing the wiring system.

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

The mechanism forming the subject of the present invention is designed to be placed in a switch-box of an ordinary telephone in such manner as to expose the dial of the clock for convenience in ascertaining the time and a second or selecting dial over which travels a hand or pointer to indicate the position of the selecting or circuit-closing arm of each telephone on the line. The system used may be of any ordinary class, the phones being connected in series with a ground at each end or in bridging bell or metallic return. The wiring system is preferably such as to include but a single line-wire, normally in circuit with the selecting and signaling mechanisms and connected to the local talking-circuits only after the selecting mechanism has been operated.

1 indicates a suitable frame having bearings for a number of shafts 2, 3, 4, 5, 6, and 7, the shaft 2 being connected to or forming the central arbor of a spring-barrel containing a clockwork-actuating spring, while shafts 6 and 7 carry, respectively, an escapement-wheel and a balance-wheel. These portions of the mechanism may be of any construction

ordinarily employed in clockwork, and the parts may be arranged in closer relation than is here illustrated, the several shafts being widely separated in order to clearly show the construction and arrangement of the parts.

On shaft 2 is a gear-wheel 8, connected to a pinion 9 on shaft 3, the latter carrying the minute-hand of the clock, as indicated at 10 in Fig. 2, and being connected by the usual reducing-gearing 11 to the hollow arbor that carries the hour-hand 12. These hands rotate over a suitable time-indicating dial 13 of any ordinary construction. The shaft 3 is surrounded by a sleeve 14, to which is keyed the barrel-pinion 9, previously referred to, and rotative movement is imparted from the sleeve 14 to said shaft through the medium of a pair of clutching-disks 16 and 17, the adjacent faces of which are provided with interengaging teeth. The clutching-disk 17 is rigidly secured to the sleeve 14, while the disk 16 is rigidly secured to a pinion 18, forming one of the reducing-train, said pinion being adjustable with the shaft in a direction longitudinally of said shaft. The outer end of shaft 3 is provided with a radially-disposed arm 19, normally traveling with the shaft at a point immediately over a ring 20, having a notch 21, provided with angularly-disposed walls adapted to guide the arm 19 to a central or intermediate position, which at the hour and minute hands corresponds with any even-hour-designating mark on the dial, preferably the hour of noon, when the time-clocks are to be synchronized. Against the outer end of the shaft 3 bears an armature-lever 22, disposed within the field of force of an electromagnet 23, which may be energized from the main line in the manner hereinafter described. When the electromagnet is energized, the armature is attracted and shaft 3 is forced outward, carrying with it the arm 21, clutch-disk 16, pinion 18, and the minute-hand 10. This movement temporarily disengages the two clutching-disks 16 and 17, so that this portion of the mechanism is entirely disconnected from the remaining portions of the clock-frame and may be readily adjusted to synchronize the clock. As the walls of slot 21 are tapering, the arm 19 will be drawn in an angular direction, as well as longitudinally with the shaft, until it strikes against the bottom of the slot, at which time the hands will have been properly set. The effective synchronal is of course limited by the width of the slot, but will be effective should the clock be within ten minutes, or thereabout, of the proper time. As soon as the magnet is deenergized, the disks 16 and 17 are again engaged, and operative movement of the spring is transmitted to the hands in the usual manner.

On shaft 3 or, rather, its sleeve 14 is secured a gear-wheel 25, intermeshing with the barrel-pinion 26 on a sleeve 27, that is carried by shaft 4. This sleeve 27 carries a gear 28,

intermeshing with a barrel-pinion 29 on a sleeve 30, that is carried by the shaft 5. These parts are so proportioned that the sleeve 30 may rotate about once in each minute, while the shaft 4 and sleeve 27 are rotated once each six or seven minutes.

To the shaft 5 is secured a clutching-disk 31, and on the end of sleeve 30 is a similar clutching-disk 32, said disks being engaged, on deenergizing of the line, by the armature-spring or by a spring 33, extending between a collar 34 on the shaft 5, and disk 36, having a toothed annular flange that serves in part to correct the movement of the selecting-arm should the operator fail to close the circuit at the proper time. Shaft 5 also carries a lock-out disk or wheel 37, having a single peripherally-disposed notch 38, that must be in proper position before a subscriber can close his local talking-circuit with the main line. If all the notches of the disks be in proper position, all of the subscribers can be connected for general conversation, as may be at times desirable. This disk or wheel is provided with a counterweight 39, which serves to return it to initial position after each operation, thus to adjust the position of all of the selecting-arms and automatically place the system in condition for use without the necessity of any preliminary adjustment on the part of the calling subscriber. This shaft 5 is further provided with a hand or pointer 40, traveling over a numbered dial 41, on which are placed marks or numerals of any kind to indicate the various phones on the line. At the rear of the frame are placed circuit-closing strips 42 and 43, these constituting a pair of normally separated circuit-closers that when in contact establish connection between the main line, the receiver, and the transmitter and battery of the local station. The angular positions of these circuit-closers vary in the same manner as the angular positions of the numerals or other indicating marks on the dial and the angular positions of the notches 38 of the lock-out disk or wheel. Each subscriber has a pair of contacts, and a calling subscriber by watching the position of his hand or pointer 40 can determine when the closing of the circuit will cause these two contacts to engage each other.

To the inner end of shaft 5 is secured a circuit closing or selecting arm 46, extending diametrically across the disk 36, and the outer end of said arm is so arranged that when the shaft 5 is moved outward, or in the direction of the hand or pointer 40, it will come into contact with the circuit-closers 42 and 43, and any slight variation in proper position of the arm will be corrected by the inclined notches or grooves between the teeth of the disk 36. The selecting-arm 46 is provided with an extension 47 in the form of a bracket, and between the bracket and the arm extends one end of an armature-lever 48, arranged within

the field of force of an electromagnet 49, that is normally in circuit with the main line and is normally energized, so that the shaft 5 will be forced outward and the clutch-disks 31 and 32 will normally be separated. This positively locks the selecting-arm 46 in one of the notches of disk 36, and the movement of the clock-train will not in any manner affect movement of the circuit-closing arm until the two disks are allowed to move into clutching engagement on the deenergizing of the electromagnet 49, the selecting movement starting as soon as the electromagnet is deenergized and ceasing as soon as the circuit is again established. In the operation of this portion of the mechanism the calling subscriber opens the circuit and deenergizes the electromagnets of all of the telephones on the line. All of the selecting-arms, including that of the calling subscriber, instantly start to travel with the shafts 5, and their positions are indicated by the hands or pointers 40, so that when the proper number has been reached the calling subscriber again closes the line and reenergizes all of the magnets, causing a corresponding simultaneous movement of all of the selecting-arms; but the movement of all save one of these arms is ineffective, and it is only the selector-arm of the called subscriber which engages the strips 42 and 43 and closes the local talking-circuit with the main line.

On the armature-lever 48 is placed a pin 50, which at times comes into engagement with the end of an adjustable stop-screw 51, carried by stationary arm 52. When the pin is allowed to come in contact with the screw 51, the two clutch-disks 31 and 32 engage each other and movement of the clock-train is transmitted to the shaft 5. When the selecting movement has been completed and the conversation finished, it becomes necessary to return the selecting-arm to its normal position; but this cannot be accomplished without providing some means for preventing the engagement of the two clutch-disks. In the present case I employ a spring 53, having an arm 54, that at times will be interposed between the pin and screw, and thus limit outward movement of the armature-lever and the selecting-arm. Arm 54 is provided with an outwardly-extending flange 55, which limits movement of the arm and spring by engaging against one side of screw 51, as indicated in Fig. 4. At an intermediate portion of the spring 53 is an inclined cam 56, with which may engage a similarly-inclined end of the selecting-arm 46, and when so engaged and the electromagnet is energized the spring 53 will be retained in a position (shown in Fig. 2) out of alignment with both the pin and screw. When the magnet is deenergized, the first effect will be a sharp outward movement of the armature under the influence of the usual armature-spring, and

the pin 50 will come into engagement with screw 51 at the end of a complete outward movement. This allows the two clutch-disks to come into contact, and the clock-train is thus connected to the shaft 5 and the selecting-arm. When the selecting-arm arrives at proper position, the magnet is energized, and the arm and shaft are forced longitudinally in the direction of the hand or pointer, causing the described movement of the arm into contact with the circuit-closers 42 and 43. The magnet is held energized until the conversation is finished, and during this time the arm 54 has been moved toward shaft 5 under the influence of spring 53 and is interposed between the pin 50 and screw 51, so that, the conversation being finished and the magnet deenergized, outward movement of the armature will be limited and the parts cannot be moved to such position as to cause the engagement of disks 31 and 32. The selector-arm and shaft 5 are now free and under the influence of counterweight 39 return to the initial angular position, being stopped by a pin or lug 58. The line is then again energized, and the angular end of the selector-arm engages cam 56 and moves the spring 53 to the position shown in Fig. 2, all parts being retained in this position until the next operation. In order to avoid injury to the parts, the operative movement of the selecting-arm is limited, and as subscribers are often careless and fail to make connection at the proper time it sometimes happens that the selector-arm is allowed to rotate for a distance greater than the angular space in which all of the designating-marks on the dial are included. At a point beyond the designating-mark of the last subscriber or subscriber of the highest number are placed two strips 60 and 61, forming the terminals of a local circuit 62, connected in shunt with the main line and including a battery 63 and, if desired, an alarm 64. This shunt is normally open; but when the selector-arm reaches its limit of movement the circuit will be established and the electromagnet energized. When the magnet is energized, the selector-arms are forced outward, and the disks 31 and 32 are disconnected from each other, the parts remaining in this position until one or other of the subscribers deenergizes the line and allows the selecting-arm to move to zero.

The circuits are in part controlled by receiver-hook switch-contacts of the character somewhat similar to those employed on the ordinary telephone and in part by a switch-lever 67, preferably disposed at the right-hand side of the telephone switch-box. This lever is mounted on a pin 68 and normally is held in inoperative position by a tension-spring 69. The inner end of this lever is provided with a strip or lug 70 and carries a projecting arm 71, engaging a contact-spring 72, that is disposed between two contact-springs

73 and 74 and normally is in mechanical and electrical contact with the spring 73.

The main-line wire 75 is provided with a switch 76, by which the subscriber may initially open the line to deenergize all of the electromagnets of the selecting mechanism and again close the line by means of this switch in order to cause the selecting mechanism to connect the called-subscriber's local talking-circuit to the main line. When a circuit is closed, it will be found to extend from switch 76 to a pair of contacts 77 and 78, hereinafter described, the central contact 72, contact 73, wire 79, contacts 42 and 43, receiver-hook switch 80, contact 81, wire 82, call-bell 83, wire 84, wire 85, contacts 89 and 90, and to main line. When the arm 67 is moved to engage contacts 72 and 74, the circuit may be traced from line-wire 75, switch 76, contacts 77 and 78, contacts 72 and 74, wire 79, receiver-hook switch 80, contact 81, and the called subscriber having removed his receiver from the hook, the inner end of the hook, to wire 92, receiver 93, wire 85, contacts 89 and 90, the electromagnet and main line, although in some instances the magnet may be connected in shunt in order to avoid resistance in the talking-circuit.

The function of the two switches 77 and 78 is to allow the line to be conveniently opened and then closed at the completion of the conversation. The contact 77 is disposed in the path of movement of switch-lever 67, and when the latter is elevated to a point beyond that necessary to bring contacts 72 and 74 into engagement with each other the main-line circuit will be temporarily broken in order to deenergize the electromagnets and allow the selecting-arms to be restored to their initial positions. When the arm is released, it moves by gravity or under the influence of spring 69 to the lowest position and allows contacts 77 and 78 to automatically reengage and by completing the circuit again energize the electromagnets and restore the system to proper position for a subsequent operation.

Turning now to the lock-out mechanism, (shown in Figs. 6 and 7,) it will be observed that disk 37 is provided with a single notch 38. At one side of the disk is a pin 95, carrying a lever 96, having two arms 97 and 98. The arm 97 enters the notch 38 under the influence of the weighted end of said lever, while arm 98 may be forced out into the path of movement of the teat or lug 70' on switch-lever 67. When moved to the out position, this arm will engage directly under the teat and render it impossible for the switch-lever to move into such position as to cause engagement of contacts 72 and 74, so that no subscriber can connect his receiver in the main-line circuit and listen to a conversation between other subscribers unless the notch 38 of his instrument be in proper position. In connection with the contacts 72, 73, and 74 it

is to be noted that contact 73 is in the form of a spring which will follow up the movement of contact 72 until after the latter has been engaged with contact 74. This prevents momentary breaks in the circuit and the consequent premature release of the selecting-arms.

In general telephone systems, and especially those where prepayment is necessary, it is desirable that a certain time period should be adopted in order that connected subscribers should not be allowed to monopolize the line, especially in long-distance toll-lines, where connections are usually established for from three to five minutes. In the present case it is desired to arrange the mechanism in such manner that after a predetermined period of time any connected subscriber is automatically cut off. This mechanism is operated through the clockwork and is carried principally by shaft 4. On shaft 4 is mounted the previously-described sleeve 27, through which the movement of the spring is transmitted to the clockwork. The shaft is normally stationary and is provided with a clutch-disk 100 for cooperation with a clutch-disk 101, carried by sleeve 27 and arranged in such manner that the two are normally separated, this being accomplished by a small compression-spring 102. It is desirable that the toll period shall not commence to operate until the receiver is taken from the hook, this being presumably the time at which conversation commences, and for this purpose the clutching-disks are in part under the control of the receiver-hook lever. At one end of the shaft is an armature 103, disposed within the field of force of an electromagnet 104, disposed in a local circuit 105 and including a battery 106, although this battery may be connected with the battery 63 or only a single battery be used, as desired. It is to be understood that at a local station it is necessary only to employ one battery, although the diagram illustrates a number of batteries in order that the arrangement of the circuits may be made clear. The circuit 105 has one terminal leading to the receiver-hook 80 and a second terminal 106', that is normally out of contact with the receiver-hook; but when the receiver is removed and the inner end of the hook descends the circuit is completed and the armature is attracted, to the end that the two clutching-disks 100 and 101 shall be connected and the movement of the clock-train transmitted to the shaft 4.

On shaft 4 is mounted the bell-crank lever 109, of which one arm is counterweighted, the other arm forming a closer and having a normal position, (indicated in Fig. 1, where it is held and retained by the stop-pin 110.) When the receiver-hook is released, the local battery will energize the magnet, and the two clutch-disks will be engaged in such manner as to transmit the movement of the clock-train to shaft 4. The arm 109 will be moved and af-

ter a predetermined period of time, usually five minutes, will come into contact with strip 90 and move said strip from engagement with its mating strip 89, thereby breaking or cutting out the main line and the two local circuits. As soon as the receiver is placed on the hook the local energizing-circuit is broken and the parts are allowed to resume position under the influence of spring 102.

It is to be observed that these selecting mechanisms may be employed in connection with bridging-bell, metallic, single-wire, or grounded circuits of any character and that the selecting mechanism may be employed in connection with other forms of lock-out and that the timing device may be employed as a separate piece of mechanism in connection with toll-lines without the employment of the particular form of actuating mechanism herein described.

The synchronal operation of the various local stations may be established through a separate switch 120, through which an electromagnet 121 may be connected in shunt with the main line, as the subscriber may desire, and under ordinary circumstances this switch will be moved to close the shunt at the noon-hour in order that the clockwork mechanism may be synchronized.

Having thus described the invention, what is claimed is—

1. In electric signaling mechanism, a selecting device including a constantly-operative clock-train, an electromagnet and its armature, a circuit-closer having operative connection with the armature, a closed circuit in which the electromagnet is arranged and by which the circuit-closer is held disengaged from the clock-train, means operable on the breaking of the circuit for clutching said circuit-closer to the clock-train, and contacts arranged at predetermined distances for engagement by the circuit-closer when the circuit of the electromagnet is again closed.

2. In electric signaling mechanism, a circuit-closer, a clockwork mechanism with which said closer may be engaged, an armature for controlling the movement of the circuit-closer, an electromagnet for attracting the armature, and means independent of the electromagnet for varying the extent of movement of the armature.

3. In telephony, a clock-train, a selecting mechanism including an electromagnet and its armature, a circuit-closer carried by the armature, and normally disconnected from the clock-train, a clutching means operable on movement of the armature for connecting the circuit-closer to the clock-train, and means controlled in part by the selecting device for varying the effective movement of the armature.

4. In telephony, a selecting mechanism including a clock-train, a normally inactive shaft or arbor, an indicating-arm secured to the arbor, a circuit-closer carried by said arbor,

and a normally energized electromagnet holding the arbor from connection with the clock-train.

5. In telephony, a selecting mechanism including a clock-train, a local station including circuit-closers for the talking-circuit, a shaft or arbor normally disconnected from the clock-train, an electromagnet, an armature arranged within the field of force of the magnet and connected to the arbor, an indicating hand or pointer carried by the arbor, and a selecting-arm also carried by said arbor and operable on the energizing of the electromagnet.

6. In telephony, a selecting mechanism including a clock-train, local stations having normally disconnected talking-circuits, circuit-closing devices disposed at the stations and arranged each at a different point in such station, an arbor, an indicating hand or pointer carried by the arbor, a selecting-arm also carried by said arbor, an armature connected to the selecting-arm and arbor, and an electromagnet for actuating the armature and connecting said arbor to the clock-train.

7. In telephony, a selecting mechanism including a clock-train, normally disconnected local talking-circuits, an arbor, a hand or pointer carried thereby, a selecting-arm also carried by the arbor, an electromagnet, an armature disposed within the field of force of the electromagnet, and connected to said arbor, and means controllable by the selecting-arm for varying the effective movement of said armature.

8. In telephony, a selecting mechanism including a clock-train, a normally disconnected arbor, a hand or pointer carried by the arbor, a selecting-arm also carried by said arbor, an electromagnet, an armature arranged within the field of force of the electromagnet and connected to the arbor, and a spring controllable by the selecting-arm for limiting the movement of the armature.

9. In telephony, a selecting mechanism including a clock-train, a normally disconnected arbor, a normally cut-out local talking-circuit, a hand or pointer carried by the arbor, a selecting-arm also carried by the arbor, an electromagnet, an armature arranged within the field of force of said magnet and connected to said arbor, and a spring having a shoulder or cam for engagement with the selecting-arm.

10. In telephony, a selecting mechanism including a clock-train, local stations normally disconnected from the main line, circuit-closers disposed at the stations, a shaft or arbor normally disconnected from the clock-train, a hand or pointer carried by the shaft, a circuit-closing arm also carried by said shaft, an electromagnet disposed in the main line and normally energized, an armature arranged within the field of force of the electromagnet, and connected to said shaft, and a movable member controlled in part by the arm for limiting the effective movement of said armature.

11. In telephony, a selecting mechanism including a clock-train, a normally inactive disk, electromechanically-actuated means for connecting the clock-train to the disk, a normally inoperative local talking-circuit, a manually-operative switch for closing the circuit, and means controllable by said disk for limiting the movement of the switch.

12. In telephony, a selecting mechanism including a clock-train, a shaft or arbor, a normally energized electromagnet disposed in the main line, an armature arranged in the field of force of the electromagnet, and connected to said arbor, a revoluble member carried by the arbor, a normally cut-out local talking-circuit, a switch for connecting the circuit to the main line, and means controllable by said revoluble member for limiting the movement of said switch.

13. In telephony, a selecting mechanism including a clock-train, a normally cut-out local talking-circuit, a switch for connecting said circuit to the main line, an arbor, an electromechanically-actuated mechanism for connecting the arbor to the clock-train, a notched disk carried by said arbor, and a pivoted arm arranged between the notched disk and the switch.

14. In telephony, a selecting mechanism including a clock-train, circuit-closers, a selecting-arm, means for connecting the selecting-arm to the clock-train, and means for correcting the movement of said selecting-arm in both directions.

15. In telephony, a selecting mechanism including a clock-train, a normally inactive selecting-arm, means for connecting the arm to the clock-train, a normally cut-out local talking-circuit, circuit-closing devices, and a flanged disk having a tapering slot for receiving and correcting the movement of the selecting-arm.

16. In telephony, a clock-train, a circuit-breaker carried by said clock-train and normally disconnected therefrom, means controllable by the receiver-hook for connecting the circuit-breaker to the clock-train, and means for returning said circuit-breaker to its normally inactive position.

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

JOHN P. JACKSON.

Witnesses:

C. E. DOYLE,

J. ROSS COLHOUN.