

No. 711,453.

Patented Oct. 14, 1902.

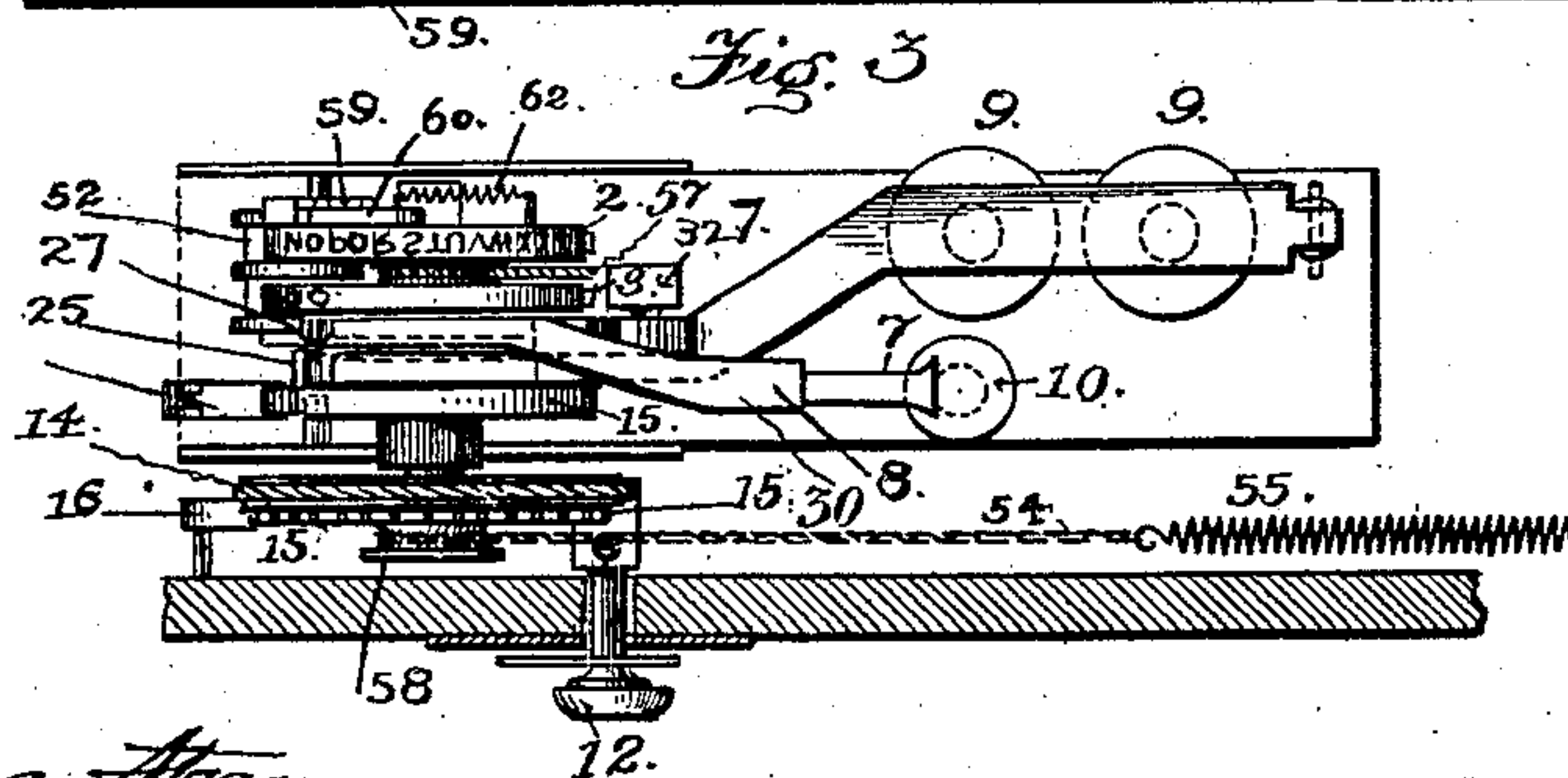
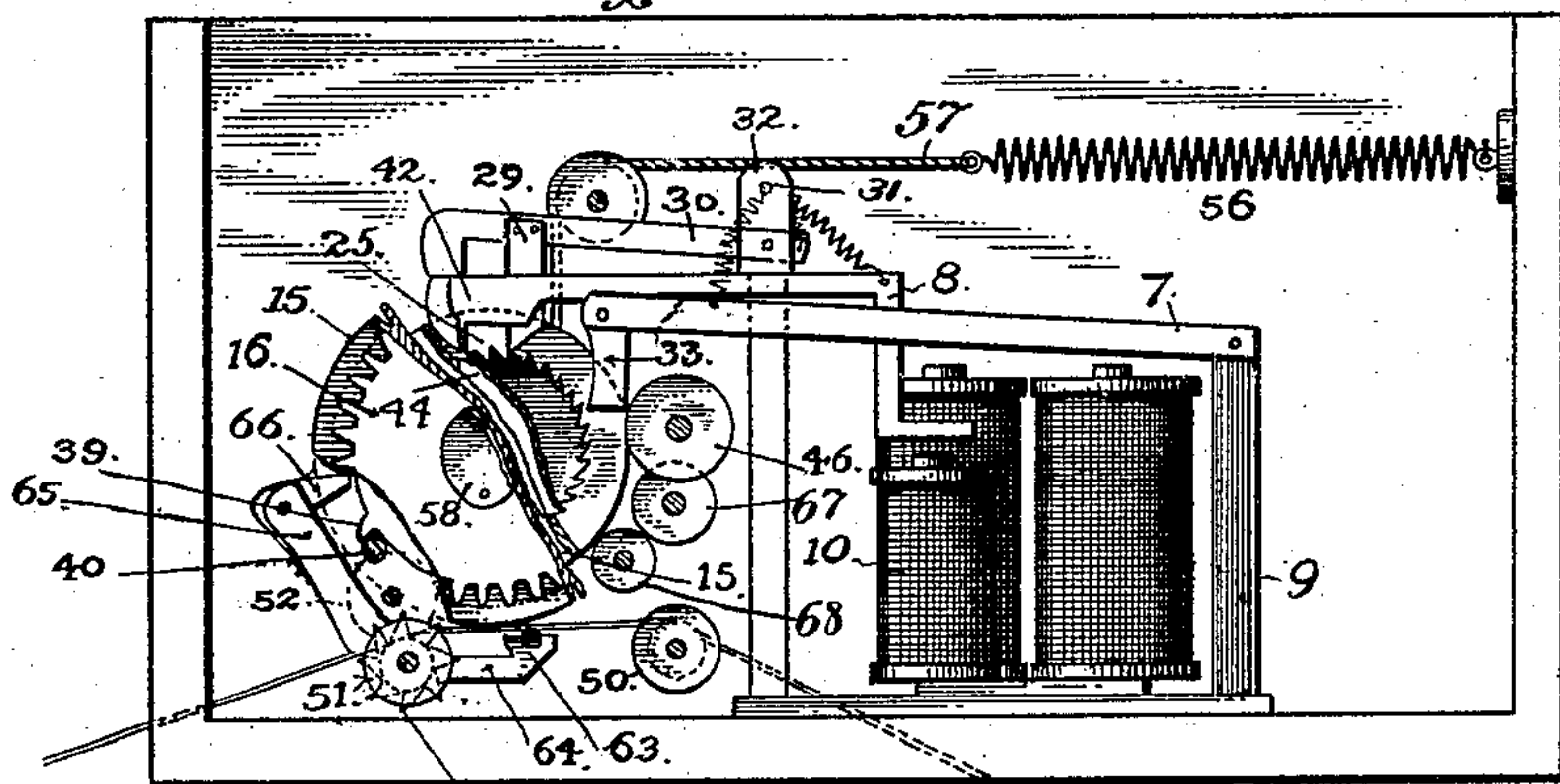
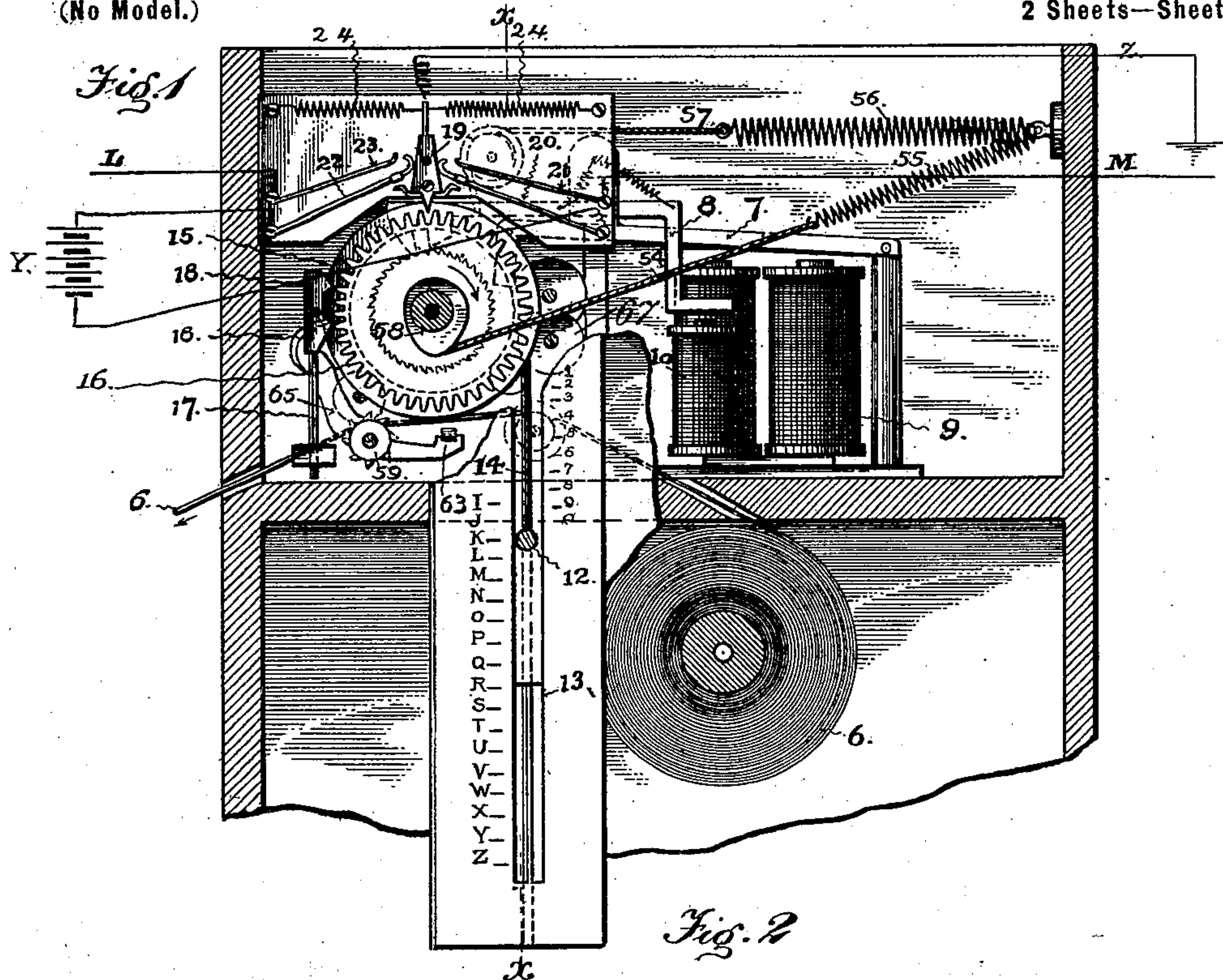
W. F. SMITH.

MESSAGE TRANSMITTING AND RECORDING MECHANISM FOR TELEPHONE SYSTEMS.

(Application filed June 17, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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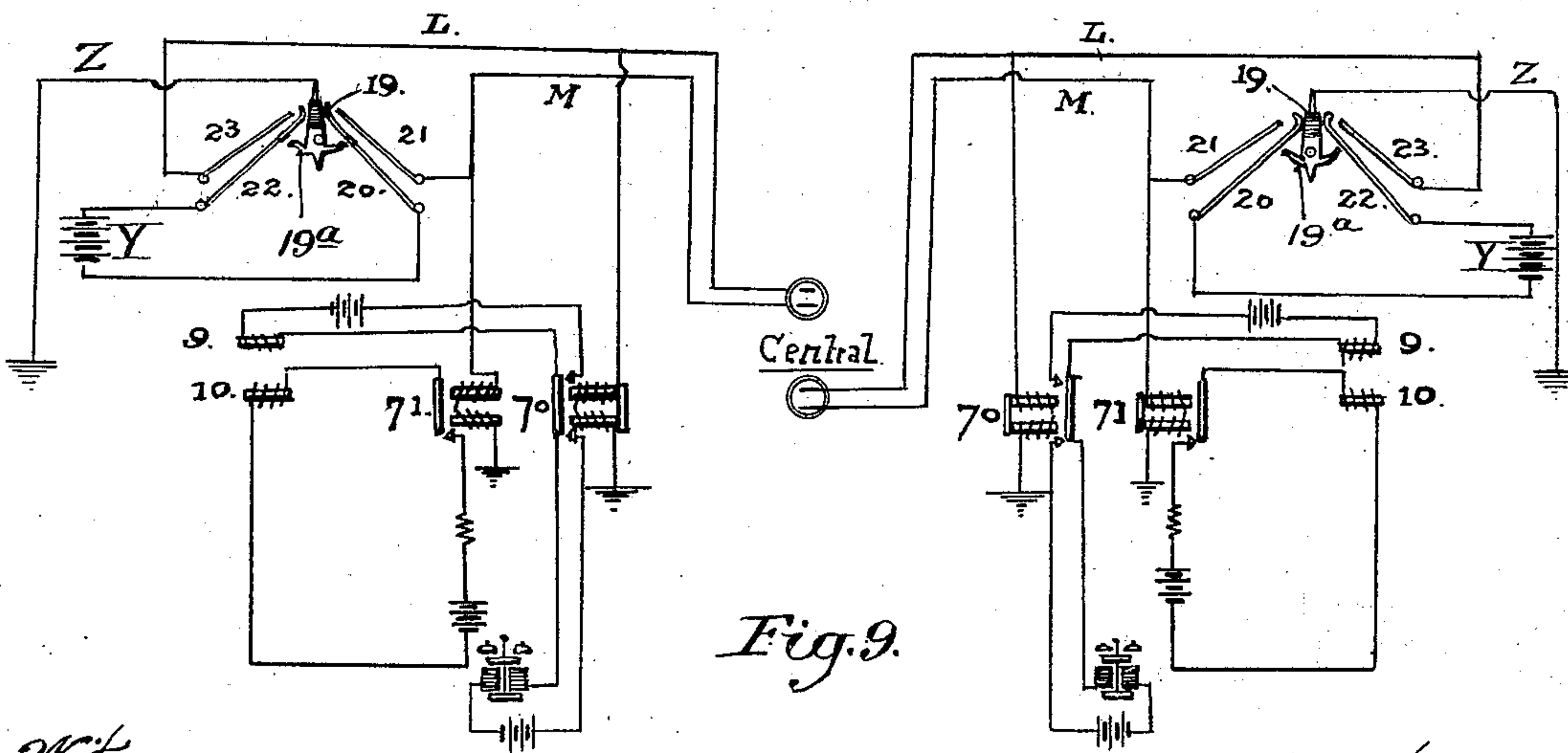
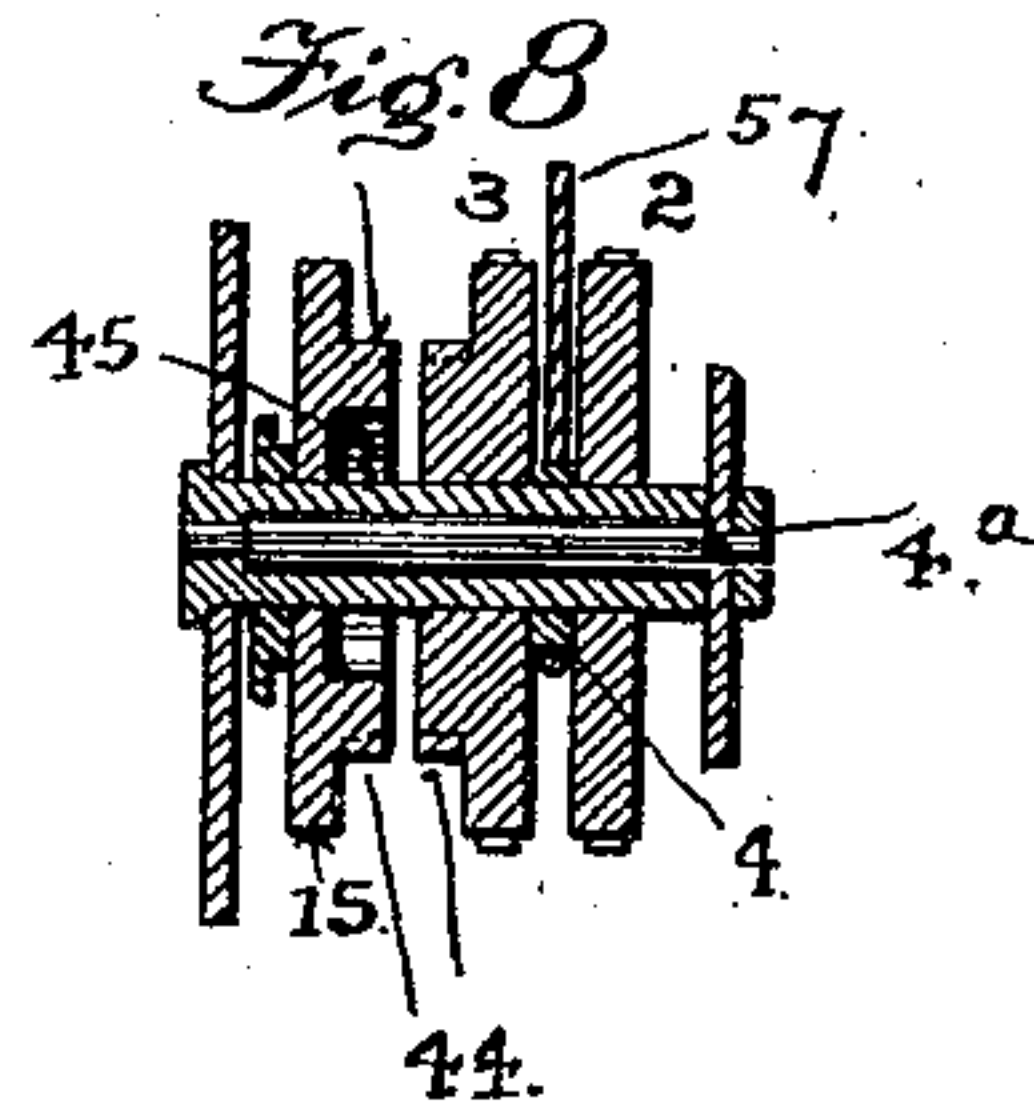
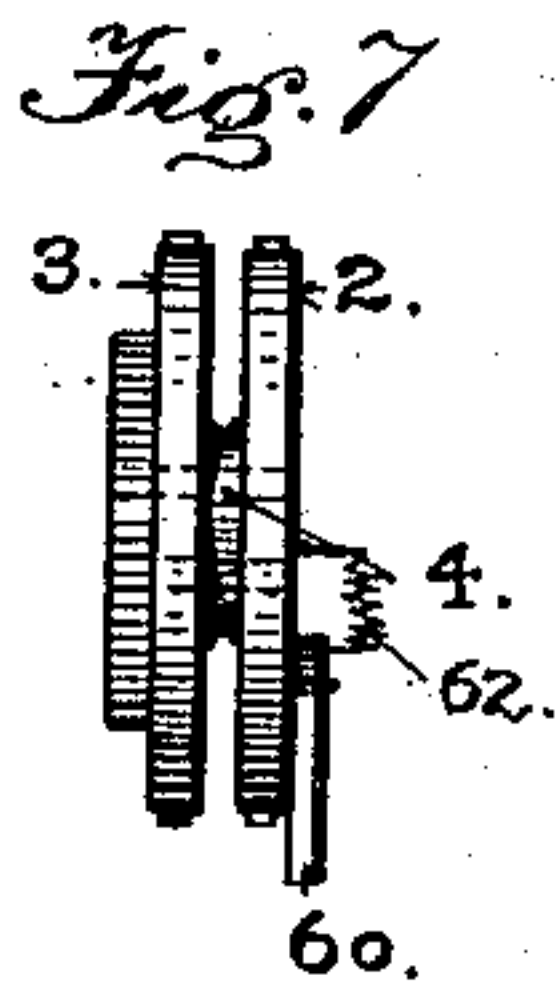
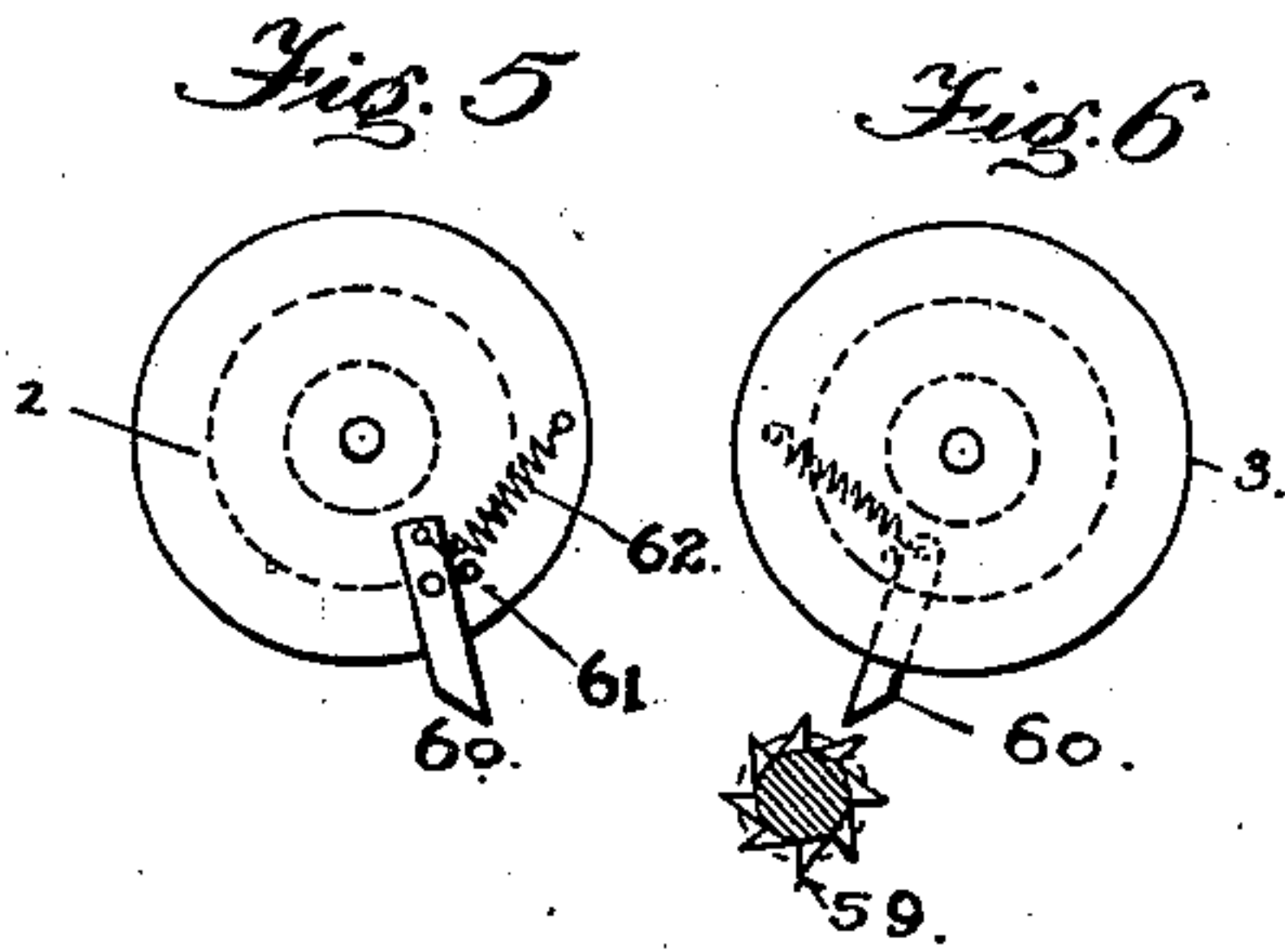
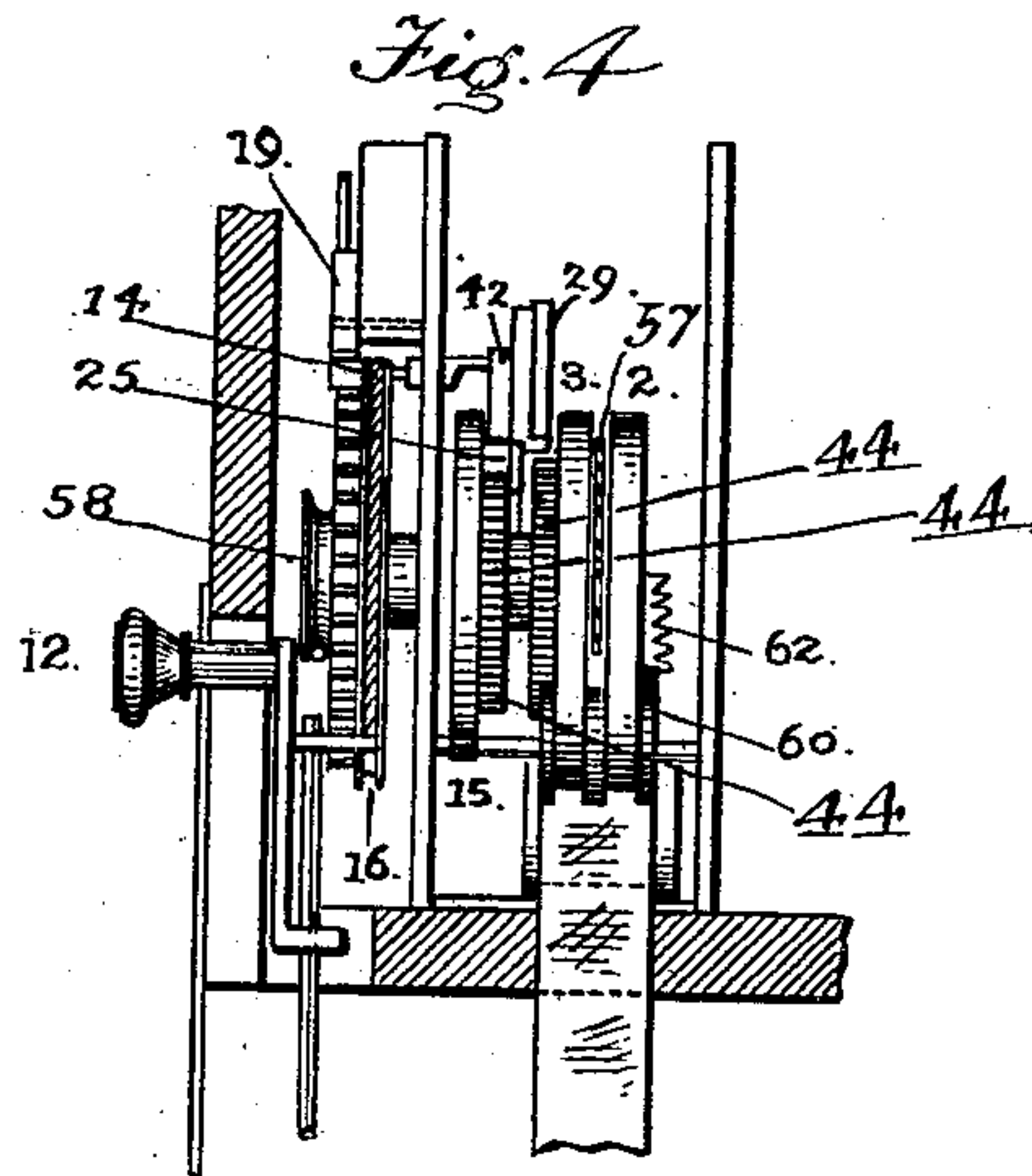
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(Application filed June 17, 1901.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:

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# UNITED STATES PATENT OFFICE.

WILLIAM FREDERICK SMITH, OF SAN FRANCISCO, CALIFORNIA.

MESSAGE TRANSMITTING AND RECORDING MECHANISM FOR TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 711,453, dated October 14, 1902.

Application filed June 17, 1901. Serial No. 64,786. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM FREDERICK SMITH, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented new and useful Improvements in Message Transmitting and Recording Mechanism for Telephone Systems, of which the following is a specification.

10 This invention has for its object the production of a device or apparatus for transmitting telegraphically from one subscriber's station to any other selected station in a telephone system words to form a sentence or arbitrary combinations of letters or figures to produce a cipher message and for recording the same in a permanent form on a paper tape.

20 To this end and object the invention comprises improved construction and combination of recording mechanism and means or devices for operating the recording mechanism electrically from another station after the usual connections or "switch" has been made between the two stations.

25 The invention includes also certain novel parts and combination of parts, as hereinafter described, and pointed out in the claims at the end of this specification, reference being had to the accompanying drawings, forming part thereof.

30 In the drawings, Figure 1 is a front elevation of a complete apparatus embodying my improvements and arranged at a telephone or subscriber's station in a telephone system, the front of the box inclosing the working parts being broken away. Fig. 2 is a front view of the mechanism, showing some of the working parts in front broken away and removed to uncover parts of the mechanism behind. Fig. 3 is a top plan. Fig. 4 is a vertical transverse section. Figs. 5, 6, 7, and 8 show parts in detail. Fig. 9 is a diagrammatic representation of the circuits and connections between two stations and the circuits of the local making and breaking devices at both stations.

45 The complete device or apparatus provided at each telephone includes two separate sets of mechanism, which will be hereinafter designated and referred to as the "transmitting" mechanism, or that part by which the apparatus at one telephone is operated electrically from another connected telephone, the other

part as the "recording" mechanism, or that part of the apparatus by which the transmitted words, letters, or numerals are printed on the paper tape at the receiving-telephone.

55 Proceeding to describe first the recording mechanism, 2 3 are two disks, herein termed the "printing-wheel," united by a common hub 4, that is fitted to rotate on a stationary axis, the two disks being set at a distance apart sufficient to allow a cord 57 to be attached to and wound on the hub between them. On the rim of one disk are type-letters arranged alphabetically and properly spaced, while the other disk is provided with type-numbers also spaced at regular intervals apart.

60 6 is a paper tape mounted on a spool and supported by means of two sets of rollers 50 51 beneath and in close relation to, but not in actual contact with, the faces of the printing-wheel. The roller 51, forming one of a pair of feed-rolls, is operated at intervals between the printing operations to draw the paper tape forward a proper distance each time to space the words or characters as printed. The manner of actuating this feed-roller will be described hereinafter.

70 15 is a rotatable disk loosely mounted on the axis 4<sup>a</sup> in front of the printing-wheel, but separated from the latter, and 16 is a grooved wheel or sheave loose on its axis.

75 14 is a cord fastened at one end in the groove of the wheel 16 at a point below its axis and at the other end connected to a slide-button 12, the cord being laid over and around the wheel 16, so that by drawing down the slide-button in its guide-slot 13 the disk 16 will be rotated on its center in the direction indicated by the arrow, Fig. 1.

80 54 is a cord attached at one end to a coiled spring 55 and at the other end made fast to a hub or small sheave 58 of an eccentric shape on the front side of the grooved wheel 16. The movement of the wheel as effected by the cord and slide-button before mentioned will put the spring 55 in tension by winding up the cord 54 on the sheave 58, while the spring being allowed to react as soon as the slide-button is released its retractile force will bring back the grooved wheel to its original position, or starting-point, in the upper part of the guide-slot.



16 is a toothed wheel fixed against the front face of the grooved wheel 15 and practically a part of that wheel, the teeth being uniformly spaced and set to make contact with a rocking finger or piece 19. The last-named piece is pivotally mounted over the toothed wheel to rock or vibrate in a vertical arc between two sets of contact-springs 20 21 and 22 23. These springs are arranged in pairs on opposite sides of the piece 19, and their free ends are placed in such relation to the vibrating piece that when the latter is moved out of the perpendicular in one direction the spring 20 will be brought in contact with its fellow-spring 21, while its movement in the opposite direction brings the two springs 22 23 of the other set in working contact. The oscillating piece 19 is always connected to a "ground" by a wire Z, and the contact-springs 20 and 22 are connected to the opposite poles of a local battery Y and contact-springs 21 and 23 with the line-wires L M in such manner that when the piece 19 is rocked in one direction the line L will be connected to one pole of the battery and the other pole grounded, but when rocked in the opposite direction the connections will be reversed, thereby closing the line M on the battery on one side and grounding the remaining side of the battery. In these movements the free upturned end of the long spring 20 comes in contact with the insulated body of the piece 19 when the latter rocks toward the end of that spring, so that the last-mentioned spring is pressed upward against the shorter spring directly above, while the contact-stop 19<sup>a</sup> on the bottom of the piece 19 is pressed at the same moment against the long spring of the set on the opposite side of the piece 19. Thus, for illustration, if the top end of the piece 19 be moved out of its vertical position of rest toward the left the insulated part of the piece pressing against the long spring 22 will bring it in contact with the spring 23 above, while the opposite long spring 20 and the contact-stop on the bottom of the piece directly under that spring are brought together at the same moment, the result of which movement of the piece 19 in the direction mentioned is to connect the line L to the side of the battery to which the spring 22 is connected and to ground the opposite pole that has for its terminal the spring 20, the ground connection being made through the contact-stop 19<sup>a</sup> and the wire Z. By the operation of this make-and-break mechanism pulsations are sent over the line L or the line M, according to the direction in which the toothed wheel 16 may be rotated.

To the line L at every telephone is connected an electromagnet 9, so arranged in the circuit that the pulsations transmitted over the line operate simultaneously both the magnet at the sending-telephone and the corresponding magnet at the receiving-telephone by rocking the circuit-closing piece 19 in one direction, and by the reverse movement of the piece the vibrations are transmitted to

the similar magnet 10 at both telephones over the line M. These two sets of magnets acting on their respective armature-levers actuate and set the recording mechanism at the message-receiving telephone simultaneously with the corresponding mechanism at the sending-telephone through the following parts: The oscillating circuit-closer 19 is held normally at rest in a perpendicular position by coiled springs 24, and the toothed wheel 16 is rotated in one direction by drawing down the button 12 and in the opposite direction by the spring. These parts thus actuated transmit over one line to the magnet in circuit a greater or less number of vibrations according to the number of teeth that are caused to act on the oscillating circuit-closer. On the release of the button 12 the coiled spring 55 turns the toothed wheel back to the starting-point, and the movements of the circuit-closer being reversed, as already described, the other magnet is energized and its armature-lever is operated. A loosely-pivoted pendulum 17, carrying pallets 18 and arranged at one side of the toothed wheel 16 to engage its teeth, operates after the manner of an escapement to control and regulate the speed with which the wheel moves when it is rotated in the one direction by the pulling force applied to the cord 14, and in the contrary direction by the reaction of the spring 55. These vibrations imparted to the armature-lever 7 turn the printing-wheel step by step through a pawl 33 on the lever engaging a circle of ratchet-teeth 44 on the side of the disk 70, loosely rotatable on the same axis as the printing-wheel and connectible to the last-mentioned wheel by a stop 25 on the side of the disk and a stop 27 on the adjacent side of the printing-wheel. The two stops are so arranged that as the disk 70 is turned on its axis in a forward direction its stop 25 engaging the stop on the printing-wheel takes up and carries that wheel around with the same extent of travel. By means of a locking-pawl 42 on the end of the armature-lever of the second magnet the setting-disk 70 is held at rest against the reactive force of a coiled spring 45 within the disk until the battery-circuit is closed on the magnet 10 through the reverse movement of the oscillating circuit-closer; but when that takes place the setting-disk 70 is returned, while the printing-wheel remains at rest ready to print the letter or figure to which it was set, in which position it is held by a locking-dog 29 on a pivoted lever 30, having a fulcrum 31 in a fixed support 32. The locking-dog last mentioned does not release the printing-wheel until after the paper has been brought in contact with the character to be printed, and this throwing-off operation is effected from the reverse movement of the setting-disk 70 by the stop 25 striking and throwing up the locking-dog 29. In the interval between the release of the setting-disk 70 from the dog 42, that locks it in the setting



movement, sufficient time is provided for the printing mechanism to operate before the setting-disk 70 arrives at the starting-point. This takes place when a tooth 39 on the rim of the setting-disk 70 strikes a fixed stop 40, that projects from the stationary frame. This stop is shown in Fig. 2. The pawl 33, that moves the setting-disk 70 and is herein termed the "setting-pawl," is held up to the ratchet-teeth by a grooved roller 46, and the roller is so adjusted that it prevents the pawl from acting on and moving the setting-disk 70 more than one tooth at a time in each down-stroke of the pawl.

The paper strip 6, on which the characters are impressed by the printing-wheel, is carried and guided by rollers 50 51 52 and is fed by an intermittent movement given to the roller 51 from the printing-wheel through a star-wheel 59 on the axis of the feed-roller, and a vibrating dog 60, pivotally attached to the outer side of the printing-wheel and arranged to have a yielding movement when the printing-wheel turns in one direction, but held against a stop - pin 61 by a spring 62 when the wheel turns in the opposite direction, so that the point of the dog engaging the star-wheel will turn it as the printing-wheel rotates in one direction, but will slip by and not move the feed-roller when the motion of the printing-wheel is reversed. A step-by-step movement of the paper is thus produced from the rotations of the printing-wheel. The paper strip is brought against the printing-wheel by an impression-pad 63 on the end of a lever 64, fast on a rock-shaft, having an upwardly-standing member 65, on the upper end of which is a yielding finger 66, projecting in the path of the tooth 39 on the setting-disk. The finger is pivoted on the end of the arm 65 and is free to yield and let the tooth on the setting-disk pass by without moving the rock-shaft; but in the contrary movement of the setting-disk the tooth strikes the finger from above, and that part being rigid on the arm in that direction the latter is thrown out and the pad 63 is thrown up against the paper strip under which it lies. At the end of that operation the setting-disk is arrested by the tooth 39 coming against the fixed stop 40, whereupon the setting mechanism is ready for the next operation.

The necessary inking-rollers 67 68 are arranged in proper relation to the printing-wheels to ink the type thereon.

Operating in the manner above described the setting-disk 15 moves the printing-wheel step by step forward as many spaces as are required to bring the desired letter or character in position to print, and then while the setting-disk is released and allowed to return to its first position by the locking pawl or dog being thrown out of the ratchet-teeth of the disk the printing-wheel is held stationary by the dog 29 29 resting in the ratchet-teeth on the wheel until the impression-pad is thrown against the printing-wheel, and afterward the

dog being thrown off by the stop 25 on the setting-disk, as already described, the printing-wheel is brought back to the starting-point ready for the next setting movement. The next letter or figure to be transmitted and recorded is then set and printed by actuating the circuit-closing mechanism at the sending-telephone, as before, until the whole number required to form the message or signal is recorded. By the means thus provided at every station a person desiring to transmit words or characters from one telephone to another first obtains electrical connection with the desired subscriber's telephone in the system in the usual manner by calling up the central station and getting connection through the station switchboard and switch-plugs. Then working his transmitting mechanism he moves his slide-button 12 along the slot to one letter or character after another, allowing the button to return each time to the starting-point, with sufficient intervals between the downward movements for the setting and recording mechanism to operate. The message or signal is recorded by the printing mechanism operating in this manner at the receiving-telephone at the same time that it is recorded by the corresponding mechanism at the sending-telephone, and thus a record of the message is made at both telephones. Messages transmitted from one telephone are thus mechanically recorded at another station in such permanent form that in the absence of a person at the receiving-telephone the message can be read from the paper strip at any time afterward on his return.

In the simplest form the apparatus above described consists of a circuit making and breaking mechanism at a sending station and a recording mechanism at the receiving station; but as a complete system would include both the transmitting and the recording mechanisms at every station I have illustrated and described that construction and arrangement as constituting the complete and preferable form of my apparatus.

The diagram Fig. 9 illustrates the electromagnets, circuits, and batteries, and the circuit making and breaking devices at two stations connected at the "central" switchboard, the figure showing also the manner of connecting the bell-signal, which is actuated over the line from the central station by the operator through the usual plug connections, and of throwing in additional battery force at the receiving-telephone. In this arrangement the circuit from the battery and over the line-wire L to the opposite telephone when the springs 22 23 are brought together by the oscillating piece 19 actuates the circuit-closer 70 and by closing the battery-circuit on the magnet 9 energizes the latter, the vibrations of which produce the step-by-step movements of the setting-disk through the mechanism hereinbefore described, and afterward as the springs 20 21 are vibrated the circuit-closer



71, actuated in corresponding manner to the other one, 70, but through a circuit over the other line-wire M, closes the circuit on the magnet 10. Thereupon through its armature-  
 5 lever and associated mechanism, already described, that magnet 10 acts to release the setting mechanism and restore the printing device to be set to record and afterward to record on the paper the next letter or char-  
 10 acter in the word or signal being transmitted.

Having thus fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a transmitting and recording device  
 15 for telephones, the combination with a recording-wheel, paper-feeding devices, electrically-actuated means including an electromagnet operating to impart step-by-step ro-  
 20 tative movements of variable length to the recording-wheel, and an electrically-actuated controlling device including a second elec-  
 25 tromagnet operating to control the recording-wheel in the intervals of the step-by-step rotation and means operating to throw off  
 30 said controlling means at the end of the recording operation; of a pair of contact devices connected to the opposite poles of a bat-  
 35 tery, a second pair of contact devices connected to the opposite poles of a battery, a  
 40 second pair of contact devices which are terminals respectively of line-wires connected separately with the said electromagnets, an  
 oscillating circuit-closer movable in an arc with relation to the contact devices and op-  
 45 erating to connect one or the other of the line-wires with the positive or the negative pole of the battery according to the direction  
 50 of the movement imparted to the circuit-closer, a contact-piece on said circuit-closer  
 55 connected with a ground and operating in the movements of the circuit-closer to ground the one pole of the battery when the other  
 60 pole thereof is connected through the contact devices with a line-wire, and means for  
 65 imparting oscillating movement of variable duration to the circuit-closer.

2. The combination with a rotatable printing device, and paper-feeding devices, of an electromagnet, an armature moved thereby,  
 50 means actuated by the armature to rotate the printing device with a variable extent of movement in one direction, a spring effecting  
 reverse movement, a controlling means operating to hold the printing device against the  
 55 force of the spring, a second electromagnet, an armature moved thereby operating to throw the controlling means in and out of  
 action, a battery, line-wire separately connecting the two electromagnets with the bat-  
 60 tery, circuit-closing devices in the circuits of the two magnets and the poles of the battery operating to pass the current from the pole  
 of the battery through one line-wire to the first magnet with a varying number of pulsa-  
 65 tions, and afterward to close the circuit from the other pole of the battery through the second line-wire to the second magnet.

3. The combination of circuit making and breaking devices, a battery, two line-wires normally disconnected from the battery, 70  
 means operating to bring the line-wires in successive order in circuit with the battery, an electromagnet connectible with the bat-  
 tery over one line-wire, a second electromagnet connectible in circuit over the other line- 75  
 wire, a rotatable disk, ratchet-teeth thereon, a pawl engaging said teeth, an armature ac-  
 tuated by the first magnet operating the pawl to rotate the disk, a locking-pawl, an arma- 80  
 ture actuated by the second magnet operating to throw the locking-pawl in and out of ac-  
 tion, a spring to reversely rotate the disk, a rotatable printing device, means operating to  
 engage the disk with the printing device in the forward movement of the disk and to dis- 85  
 connect the printing device in the reverse movement, a locking device operating to hold  
 the printing device at rest in the reverse movement of the disk and means operating to  
 release the printing device at the end of the 90  
 reverse movement of the disk.

4. The combination of circuit making and breaking devices, a battery, an electromagnet connectible in circuit therewith through a  
 line-wire and the circuit making and break- 95  
 ing devices, an armature, a rotatable disk, a spring producing rotation in one direction,  
 ratchet-teeth on said disk, a pawl actuated by the armature of the magnet effecting vary-  
 ing length of rotative movement in the disk 100  
 in opposition to the spring, a second electro-  
 magnet connectible in circuit with the bat-  
 tery through a second line-wire and the cir-  
 cuit making and breaking devices, a rotata- 105  
 ble recording device, means operatively con-  
 necting the disk with the recording device in the forward rotation of the former, and dis-  
 engaging the recording device by the reverse  
 movement of the disk, an armature actuated 110  
 by the second magnet and means operated  
 thereby to control the recording device, paper-  
 feeding devices and means operated from the  
 movement of the recording device to make  
 contact of the paper strip with the recording  
 device; said circuit making and breaking de- 115  
 vices being adapted to close the battery first  
 upon one magnet with a varying number of  
 pulsations and afterward upon the second  
 magnet to release the setting-disk and the re-  
 cording device at the end of the setting and 120  
 the recording operations.

5. A transmitting and recording device adapted to transmit signals from one tele-  
 phone and record them at another telephone  
 over the connecting-lines, comprising circuit 125  
 making and breaking devices at one tele-  
 phone including contacts which are termi-  
 nals of the line-wires, a battery, means op-  
 erating to connect the line-wires separately and  
 successively with one pole of the battery and 130  
 ground the opposite pole, and a recording de-  
 vice located at the other telephone including  
 a rotatable recording device, paper-feeding  
 devices, a setting-disk, an electromagnet con-



5 nected with one line-wire, an armature moved  
by said magnet, means operated by an arma-  
ture to rotate the disk step by step with va-  
rying extent of movement, means operatively  
10 connecting the disk with the recording de-  
vice in one direction of its rotation, a spring  
producing reverse rotary movement of the  
recording device, locking devices operating  
to control the reverse movements of the disk  
15 and the recording devices, a second electro-  
magnet in circuit with the circuit making and  
breaking devices over the second line-wire,  
an armature and means actuated by said ar-  
mature to operate the locking devices in suc-  
cessive order to release the disk at the end of  
its setting movement and afterward the re-  
cording device.

6. In a telephone system, the combination  
at each telephone, of circuit making and  
20 breaking devices, a battery, a rotatable re-  
cording device, paper-feeding devices, an  
electromagnet connectible in circuit with the  
battery and the line-wire through the circuit  
making and breaking devices, means actu-  
25 ated by said magnet to impart step-by-step  
movement of varying extent to the recording  
device, a spring operating to produce reverse  
movement, a locking device to control said  
recording device, a second electromagnet con-  
30 nectible in circuit with the battery through  
the second line-wire and the circuit making  
and breaking devices, means operating to  
bring the recording device and paper in con-  
tact to record the characters of the recording  
35 device at the end of each setting operation,  
means actuated by said second magnet to  
throw off the locking device and release the

recording device at the end of the recording  
operation, and circuit-controlling devices at  
each telephone connecting the magnets at the 40  
telephone in circuit over the line-wires with  
the circuit-controlling means and circuit mak-  
ing and breaking devices at another connected  
telephone.

7. In a telephone system, the combination 45  
with each telephone, of a circuit making and  
breaking device, a battery, in circuit with  
separate line-wires of the telephone operat-  
ing to transmit pulsations of varying number  
and in successive manner over the line-wires, 50  
a recording device, paper-feeding devices,  
means controlled from the movements of the  
recording device to bring the paper and the  
recording device in contact, means electric-  
ally actuated from the pulsations produced 55  
in the current transmitted from the circuit  
making and breaking device at one telephone  
over the line-wires to another connected tele-  
phone and operating to simultaneously move  
and set the recording devices at the two con- 60  
nected telephones to record the same char-  
acters, and circuit-controlling means at each  
telephone through which the actuating means  
of the recording devices of any two connected  
telephones are operated in unison through the 65  
pulsations transmitted over the lines between  
the two telephones.

In testimony that I claim the foregoing I  
have hereunto set my hand and seal.

WILLIAM FREDERICK SMITH. [L. S.]

Witnesses:

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GEO. T. KNOX.