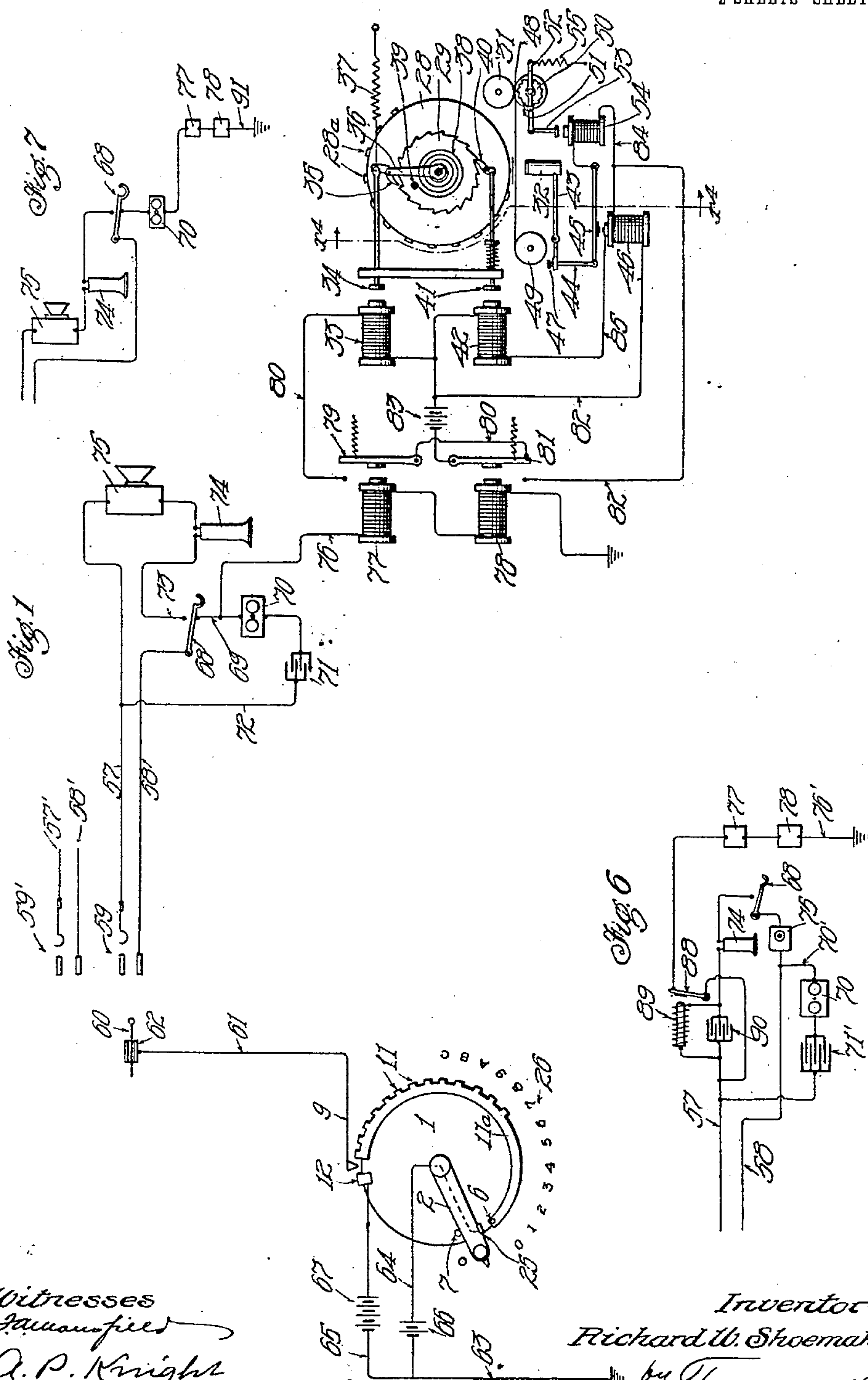


PATENTED JAN. 8, 1907.

APPLICATION FILED FEB. 13, 1905.

2 SHEETS—SHEET 1.



Witnesses
J. J. J. J. J.
A. P. Knight

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No. 840,718.

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R. W. SHOEMAKER.
VISUAL RECORDER FOR TELEPHONE SYSTEMS.

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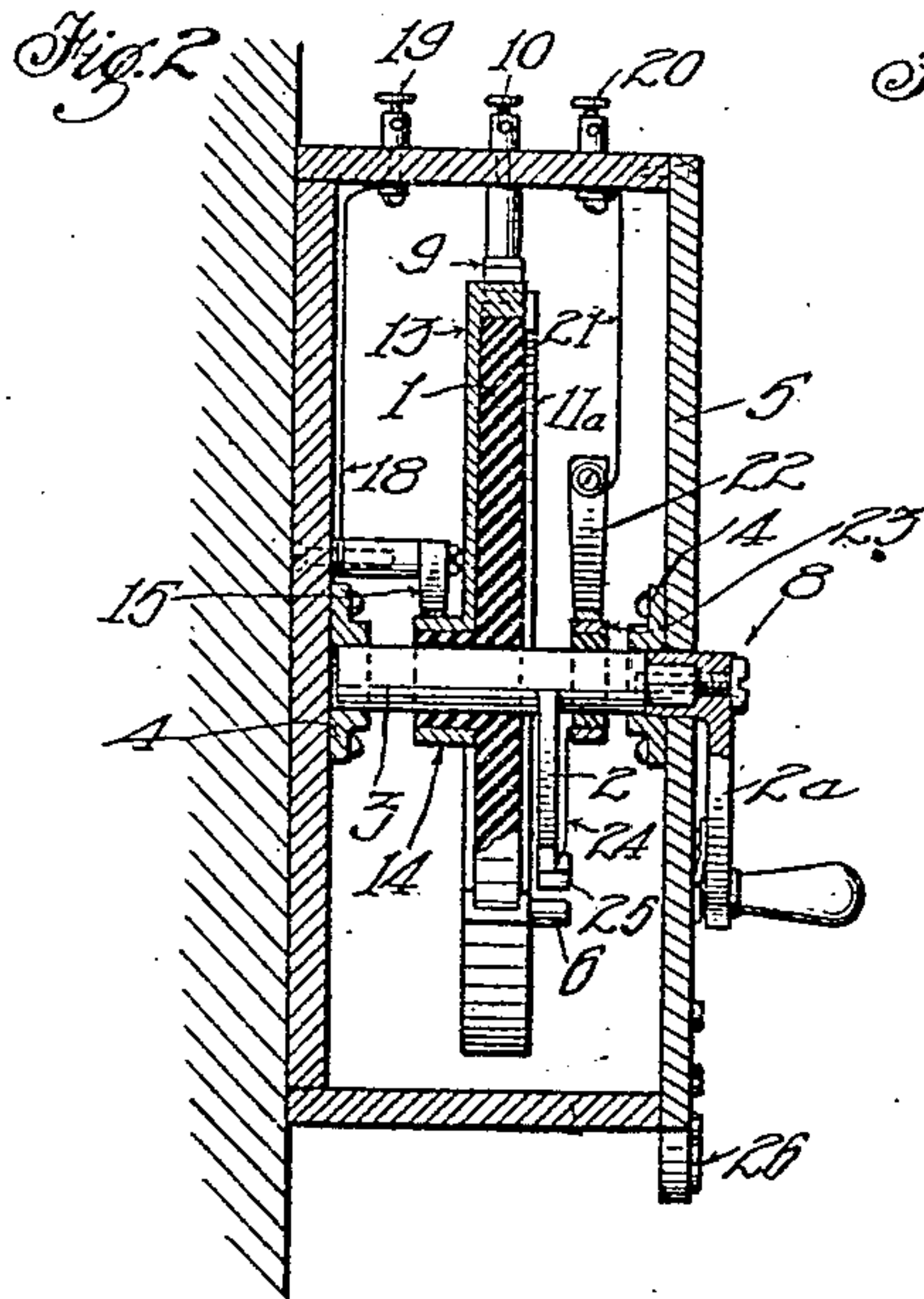


Fig. 3

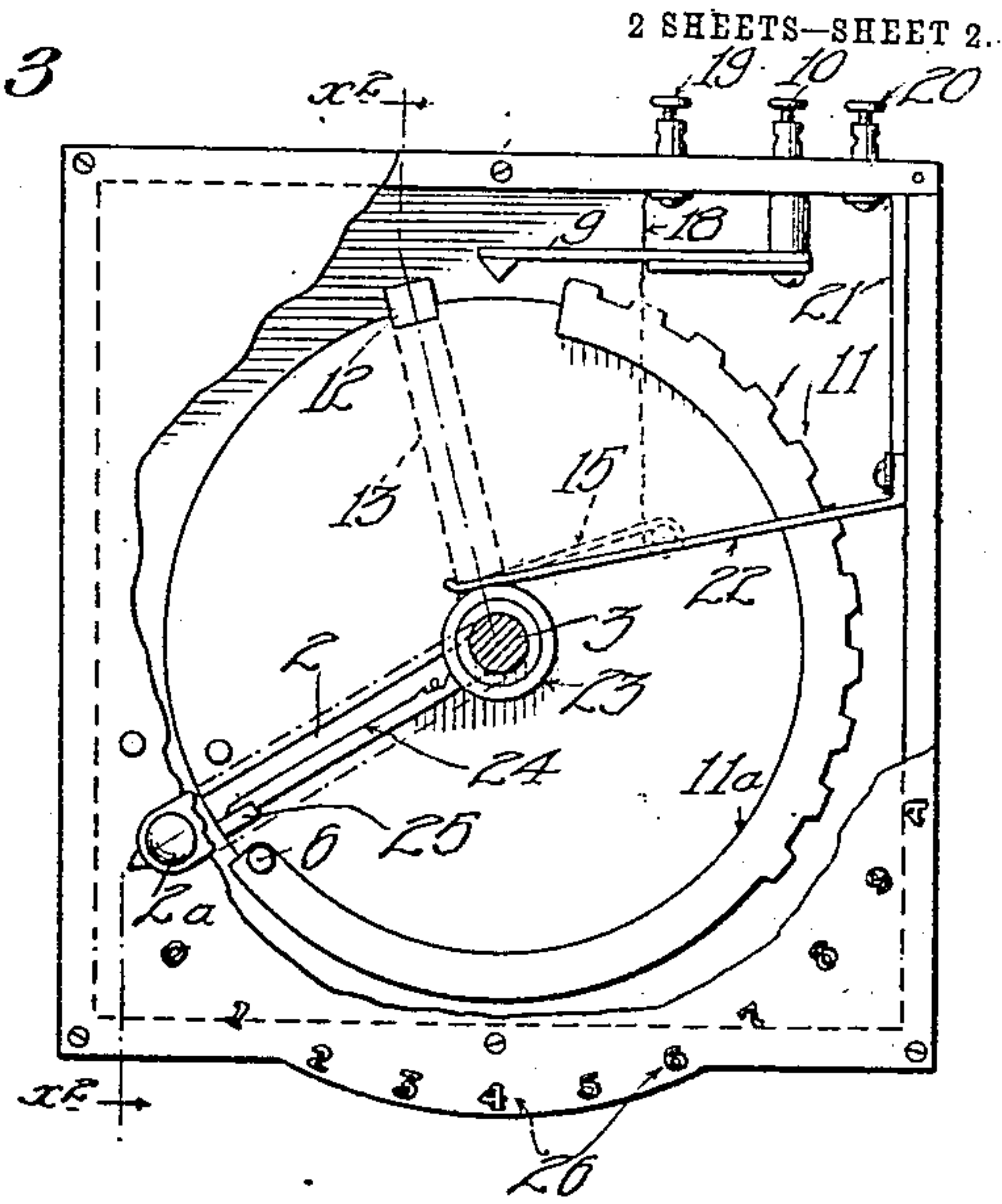


Fig. 4

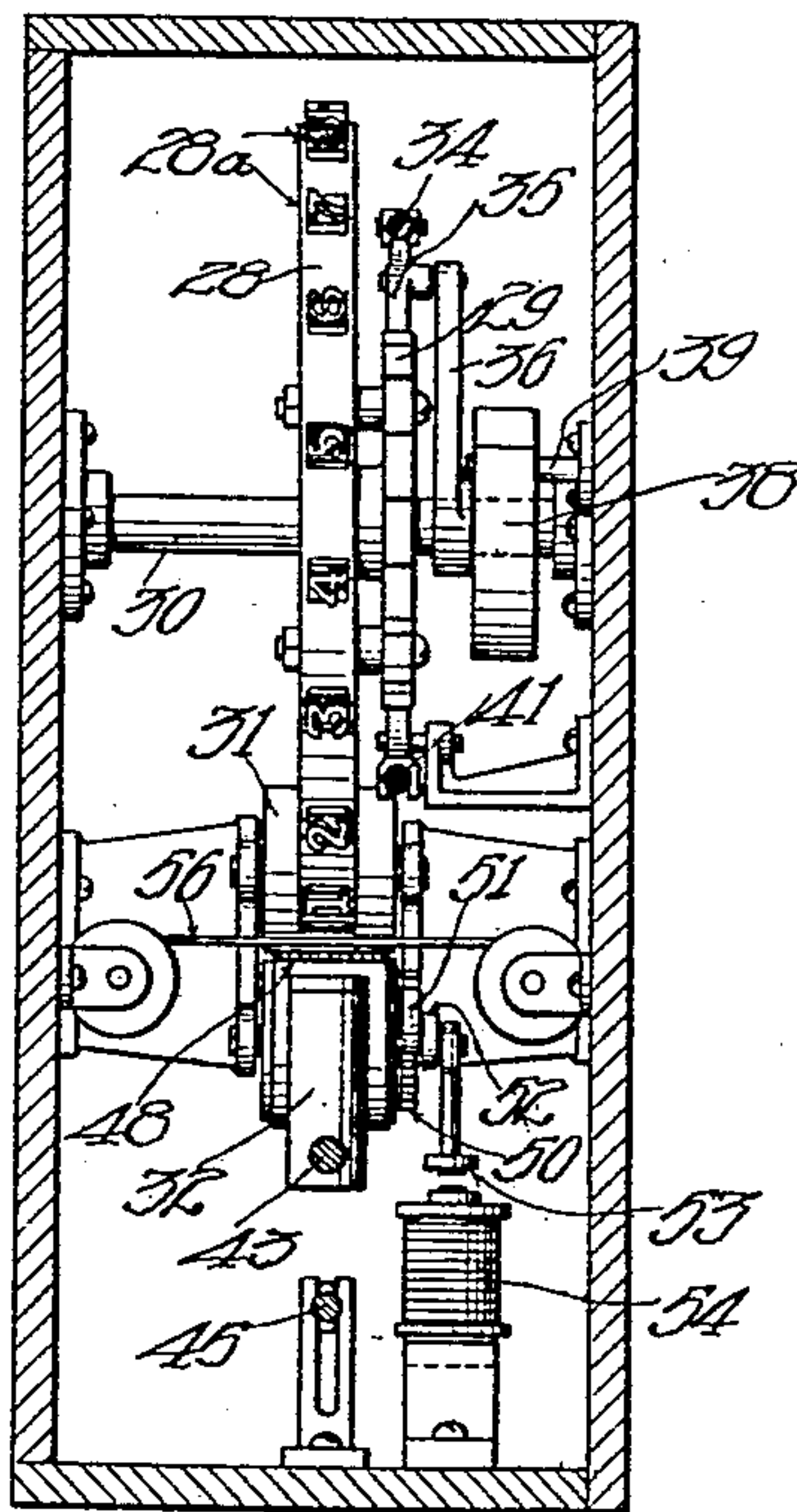
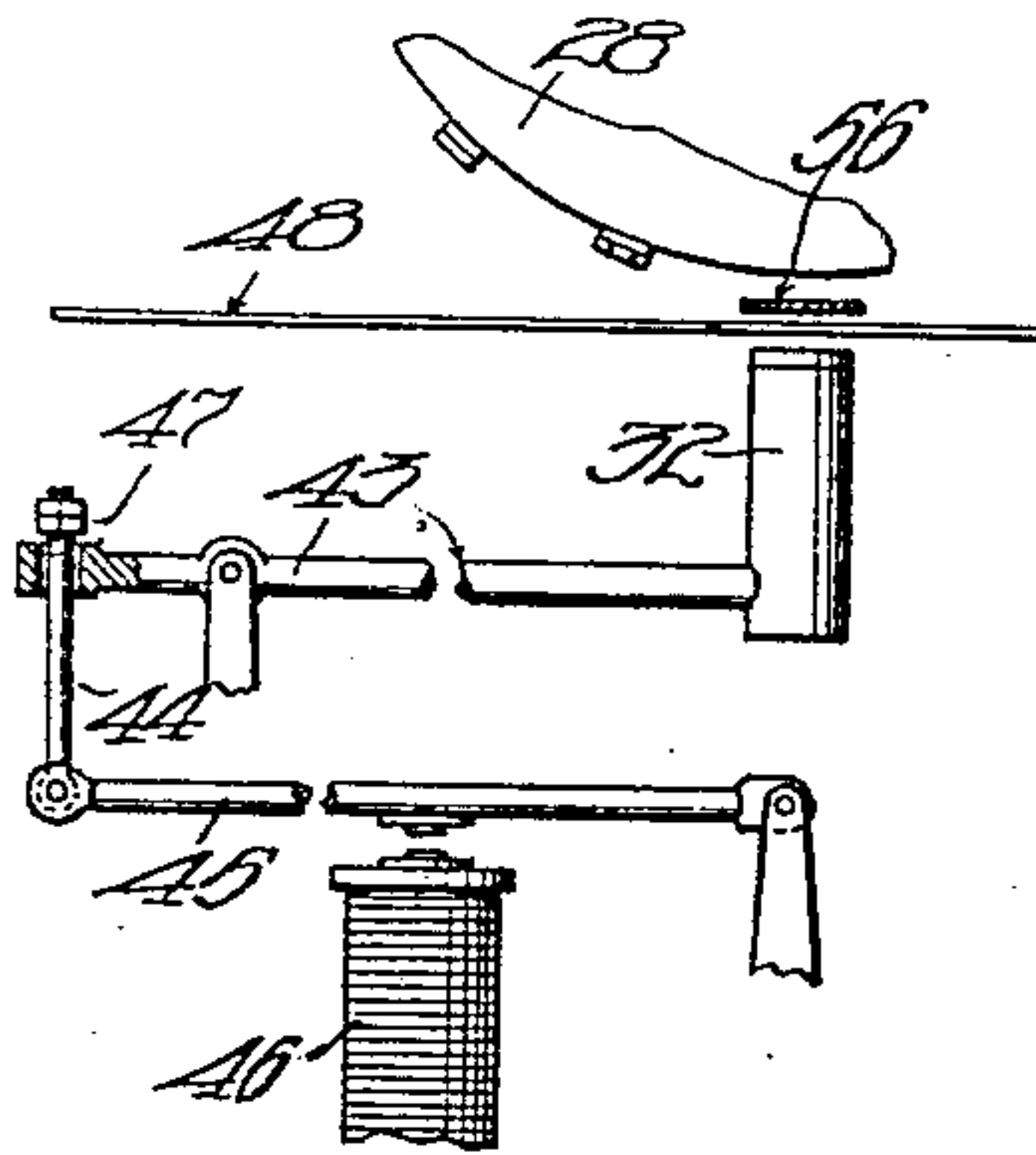


Fig. 5



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UNITED STATES PATENT OFFICE.

RICHARD W. SHOEMAKER, OF PASADENA, CALIFORNIA, ASSIGNOR OF FIFTY-FIVE ONE-HUNDREDTHS TO REGINALD H. SHOEMAKER, JR., OF PASADENA, CALIFORNIA.

VISUAL RECORDER FOR TELEPHONE SYSTEMS.

No. 840,718.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed February 13, 1905. Serial No. 245,381.

To all whom it may concern:

Be it known that I, RICHARD W. SHOEMAKER, a citizen of the United States, residing at Pasadena, county of Los Angeles, and State of California, have invented certain new and useful Improvements in Visual Recorders for Telephone Systems, of which the following is a specification.

This invention relates to means whereby a subscriber may be notified that a call has been made on his telephone during his absence from the instrument and may be informed of the number of the party making the call, so that he may on his return call up said party.

The invention is also applicable generally to the recording of any message to the subscriber.

The main object of this invention is to provide apparatus for the above purpose which will be operative with the telephone systems now in use, wherein the main line is normally open-circuited to direct current.

The accompanying drawings illustrate the invention.

Figure 1 is a diagram showing the circuit connections. Fig. 2 is a vertical sectional view of the transmitter on line $X^2 X^2$ in Fig. 3. Fig. 3 is a front elevation thereof with the front of the case partly broken away. Fig. 4 is a vertical section of the recording apparatus on the line $x^4 x^4$ in Fig. 1. Fig. 5 is a detail of the printing device. Figs. 6 and 7 are diagrams showing different connections of the recording devices.

The transmitter, which is located at a central station of the telephone system, comprises a disk or wheel 1 and an arm or lever 2, journaled concentrically with said disk or wheel and rotatable to a limited extent independently thereof. Said arm may be attached to the shaft 3, mounted in bearings 4 in a box or case 5, and the disk or wheel 1 may be rotatable on said shaft. Pins or projections 6 7 on said disk extend on opposite sides of said arm 2, so that upon rotation of the latter in one or the other direction it will move for a limited extent independently of said wheel, and then striking the projections on that side it will carry the wheel around with it. A handle 2^a may also be provided for operating the shaft 3, which handle may,

as shown in Fig. 1, be an extension of said arm 2, or in case the apparatus is inclosed in a casing (shown at 8) said handle may be a separate member connected to said shaft and extending outside of the casing.

A contact-spring 9, connected to a circuit-terminal 10, extends in position to make contact with contacts 11 12 on the disk 1. Contacts 11 are arranged in a row or series corresponding to the numbers or signals to be transmitted—for example, zero and nine digits—and are connected by a conductor 11^a with the pin 6 aforesaid. Contact 12 is connected by a conductor 13 with a contact-ring 14, engaged by a brush 15, from which a wire 18 leads to a circuit-terminal 19. Another circuit-terminal 20 is connected by wire 21 to a brush 22, bearing on a ring 23, connected by wire 24 to a contact 25 on arm 2. Disk 1 is of insulating material, and the various conducting parts are insulated in well-known manner. Suitable characters or marks 26 are provided adjacent to the handle 2^a, corresponding to the digits above referred to and to letters designating, for example, prefixes, such as "main," &c.

The receiver, which is located at one or more of the subscribers' stations in the telephone system, comprises a printing or type wheel 28, provided with type projections 28^a, corresponding to the digits, &c., above referred to, a ratchet-wheel 29, fast on the shaft 30 of said type-wheel, paper-feed devices 31, a printing-hammer 32, and suitable magnets for operating the various devices.

33 designates a magnet whose armature 34 is connected to a pawl 35, pivoted to an arm 36, mounted concentrically with wheel 28. A spring 37 normally holds the pawl clear of wheel 29, but when armature 34 is attracted it turns the pawl into engagement, and then on further movement draws the pawl and the arm 36 around to turn wheel 28. A spring 38, connected to shaft of wheel 28 and to a fixed support 39, operates to turn the wheel 28 in opposition to the magnet 33. A pawl 40 engages ratchet-wheel 29 to hold the same against such return movement, and an armature 41, operated by a magnet 42, is connected to said pawl to release the same.

The printing-hammer 32 is carried at one end of a lever 43, whose other end is perfo-

rated for the passage of a rod 44, pivoted to an armature-lever 45, operated by a magnet 46. Rod 44 has a head 47, which on operation of the lever 45 by its magnet strikes the lever 43 to give a blow or impact to the hammer-lever, the hammer moving onward by its momentum to effect the printing and then falling back to clear the paper.

The paper (indicated at 48) is supplied from a roll 49 and is drawn forward between the wheel 28 and hammer 32 by the feed-rolls 31, one of which carries a ratchet-wheel 50, engaged by a pawl 51 on a lever 52, carrying an armature 53, operated by a magnet 54. Energization of magnet 54 turns the lever 52 in opposition to a spring 55, and on release of the armature said spring returns the lever, and the pawl 51 turns the feed-rolls a definite amount. 56 designates inking means, such as an ink-ribbon.

The above-described apparatus will be connected to the telephone-system lines in various ways, according to the system to which it is applied. Fig. 1 illustrates the application to one of the usual systems, the subscriber's connections being shown substantially complete, but certain of the central-office connections being omitted, as will be understood. In this system the telephone connections are established by a complete metallic circuit, the two sides or wires of the line (indicated at 57 58) being connected, as usual, to the two sides of a spring-jack 59. The plug 60 establishes connection from the central-office devices or connectors through the spring-jack 59 to the wire 58 of the subscriber's line. In operating with such a system the printing or visual-record devices may be controlled or brought into action through a circuit including one of the line-wires, as 58, and ground connections therefrom. A connection 61 leads from one member—for example, the outer member 62 of plug 60—to the contact-spring 9, and a ground-wire 63 is connected, through branches 64 65, including batteries 66 67 of different strength—for example, ten and twenty volts, respectively—to the brush 22, leading to contact 25 on arm 2 and to brush 15, leading to contact 12 on disk 1.

At the subscriber's station or end of the line the usual form of the telephone and call-bell are indicated, the hook-switch 68 normally closing connection from line-wire 58, through a wire 69 and the bell 70, to one side of a condenser 71, whose other side is connected by arm 72 to line-wire 57. The "up" or open contact of switch 68 is connected by wire 73, through telephone-receiver 74 and transmitter 75, to line-wire 57. The connection 76 for energization of the visual recording devices is taken for the normally closed connections at 69 and leads through relays 77 78 to the ground. Said relays are of dif-

ferent sensitiveness, being respectively adapted for effective energization by the respective batteries 66 67 aforesaid. Armature 79 of relay 77 controls and normally opens the circuit 80 of type-wheel-actuating magnet 33. Armature 81 of relay 78 normally closes this circuit by its back contact and opens a circuit 82, leading through printing-magnet 46, both of these circuits including the local battery 83. A branch circuit 84 leads from one side of circuit 82 through the feed-operating magnet 54 to other armature-lever 45 of printing-magnet 46, which when attracted closes connection with the core of said magnet to continue the circuit through a wire 85, leading to the other side of the local battery.

It will be understood that the line of each subscriber who pays for or is otherwise entitled to the device will be furnished with the receiving device above described, a single transmitter at the central office serving for a number of lines and being interchangeably connected to the different lines by a switch-board apparatus.

In Fig. 1, 59 59' designate two sets of spring-jack devices, and 57 58 57' 58' two sets of telephone-lines illustrating the application of the invention to a plurality of lines. The spring-jacks 59 59' constitute part of the usual switchboard and are used in connection with the usual connector-plugs (not shown) for establishing the telephone connections. By suitable connections these regular plugs may be used to effect the purpose of plug 60.

The operation of the system is as follows: The central-office operators having called up the line and receiving no response will on request of the calling subscriber inform the called subscriber that a certain number—say, for example, "283"—is to be called. For this purpose "central" inserts plug 60 and turns the transmitter-handle in the direction toward the right in Fig. 1 until two teeth or contacts 11 have passed under the spring-contact 9. The initial movement of the handle establishes connection at pin 6 from the low-voltage battery 66 to contacts 11, and the passage of said contacts under spring 9 sends two impulses to line, the current passing from battery 66 through wire 64 and the connections above described to contact 25 on handle 2, pin 6, conductor 11^a, contacts 11, spring 9, connections 61, outer members of plug 60, spring-jack 59, line-wire 58, hook-switch 68, connections 76, relays 77 and 78 to ground and back to other side of battery 66. This current is of sufficient strength to operate relay 77, but not relay 78. Armature 79 closes local circuit of magnet 33, the armature of which is therefor operated a number of times, depending on the number of impulses—in this case two—and will move the type-wheel forward a corre-

sponding number of steps, bringing, say, numeral "2" into printing position, the wheel being held from return movement by pawl 40. Central then turns arm 2 in the opposite direction, thereby first breaking the above-described circuit at contacts 25 6, so as not to permit duplicating the impulses, and then in its final movement making connection at contacts 12 9 and sending an impulse for the stronger battery 67 through the line connection above described. This impulse will energize both relays 77 78, but only the latter will be operative, as armature 81 of relay 78 will on its initial movement break the circuit of magnet 33 before relay 77 has time to close it, but said armature on completing its movement closes circuit from local battery 83 through printing-magnet 46, which operates to effect the printing and also to close the local circuit of release-magnet 42 and paper-feed magnet 54. Magnet 42 then operates to release the pawl 40 for the ratchet-wheel 29, allowing the printing-wheel to be restored to normal position by its spring 38, and magnet 54 operates on the return stroke of the armature to feed the paper forward. The succeeding numbers—for example, "8" and "3"—are sent in a similar manner by turning the transmitter-wheel to cause the proper number of contacts to pass under spring 9, the character 26 indicating to the operator when the handle has been turned to the proper number. The telephone and call-bell do not affect the relay, as they are transmitted over the same line-wires 57 58, and not through ground connections.

It will be understood that any suitable means, such as are well known in the art of telegraphy, may be used for differentiating between the type-wheel-feeding impulses and the printing impulse. In the present case such differentiation is by difference in the voltage; but I do not limit myself thereto, as the relay means may be adapted to respond to impulses of different characters in any respect, the transmitter having correspondingly varied to produce such impulses. Furthermore, the characters on the printing-wheel may be such as to provide for any desired kind of message, and any suitable form of visual recorder may be used in place of that shown.

The connection of the receiving devices to the telephone-system lines may be varied according to special conditions. Thus in Fig. 6 is shown a connection that may be used when a permanent "ground" at the subscriber's end may be considered undesirable. The ground connections 76', including the relays 77 78, is normally closed by the armature 88 of the relay 89, connected in the line 57, leading to the telephone devices 74 75, this circuit being normally interrupted by the hook-switch 68. On removing the tele-

phone from the hook this circuit is closed and immediately operates relay 89 to open the ground connections 76', so that the latter cannot interfere with the operation of the system. A condenser 90 shunts the relay 89 to prevent dampening of the telephone impulses. The ground connection is taken from the line side of relay 89, so that recording impulses do not operate the latter. The call-bell 70 is connected in a cross-circuit 70' between the two line-wires 57 58, including a condenser 71'. When the call-bell 70 is located in a ground connection, (indicated at 91 in Fig. 7,) said connection being normally closed by the hook-switch 68, the relays 77 78 may be included directly in this ground connection, the said relays being sufficiently sluggish to prevent them from responding to the rapidly-alternating call impulses.

In the above-described embodiments of the invention the character-printing mechanism and the transmitter for operating same are included in a supplementary circuit comprising one wire or side of the line and a supplementary connection—namely, the branches leading from said line through the transmitter and printing mechanism and the ground connection between such branches.

What I claim is—

1. The combination with a telephone-system line, subscriber's telephone apparatus connected therein, a call-bell having a connection to the line, open-circuited to direct current but responsive to alternating current, the subscriber's station having a switch normally open-circuiting the telephone connection to line, a character-printing mechanism and electromagnetic controlling means therefor and an operating connection for said controlling means having a normally closed connection to the line.

2. The combination with a telephone-system line, subscriber's telephone apparatus connected therein, a call-bell having a connection to the line, open-circuited to direct current but responsive to alternating current, the subscriber's station having a switch normally open-circuiting the telephone connection to line, a character-printing mechanism and electromagnetic controlling means therefor and an operating connection for said controlling means having a normally closed connection to the line, and means controlled by the aforesaid switch to open the operating connection for the printing mechanism when the telephone connection is closed.

3. The combination with a telephone-system line, subscriber's telephone apparatus connected therein, a call-bell having a connection to the line, open-circuited to direct current but responsive to alternating current, the subscriber's station having a switch normally open-circuiting the telephone connection line, a character-printing mechanism

and electromagnetic controlling means there-
for and an operating connection for said con-
trolling means having a normally closed con-
nection to the line, a relay in the telephone-
5 line, connected to control the printing-mech-
anism circuit, and a connection shunting said
relay.

In testimony whereof I have hereunto set
my hand, at Los Angeles, California, this 2d
day of February, 1905.

RICHARD W. SHOEMAKER.

In presence of—

ARTHUR P. KNIGHT,
EARL A. R. LYNN.