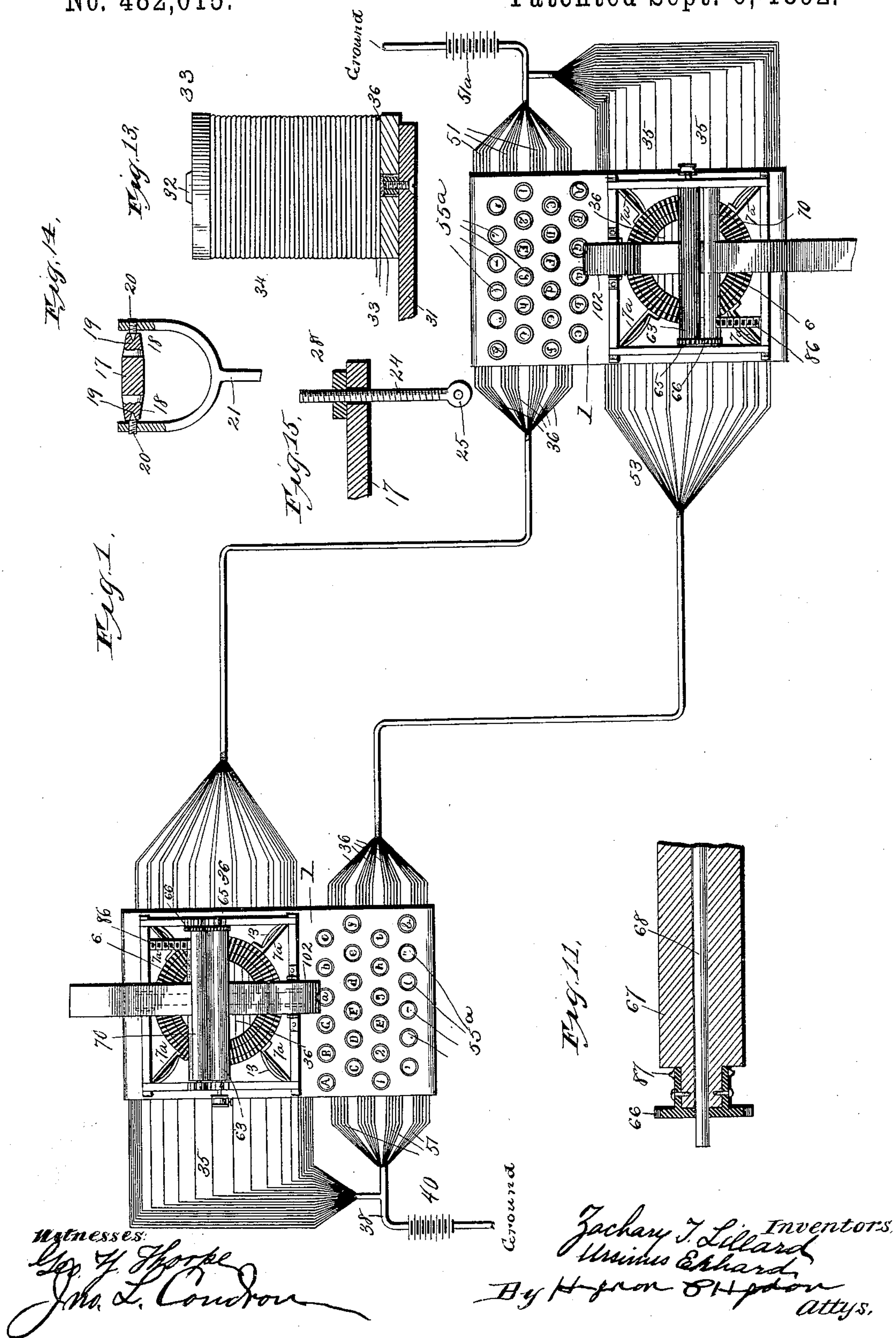


5 Sheets—Sheet 1.

No. 482,015.

Patented Sept. 6, 1892.



(No Model.)

5 Sheets—Sheet 2.

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PRINTING OR RECORDING TELEGRAPH.

No. 482,015.

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Fig. 2.

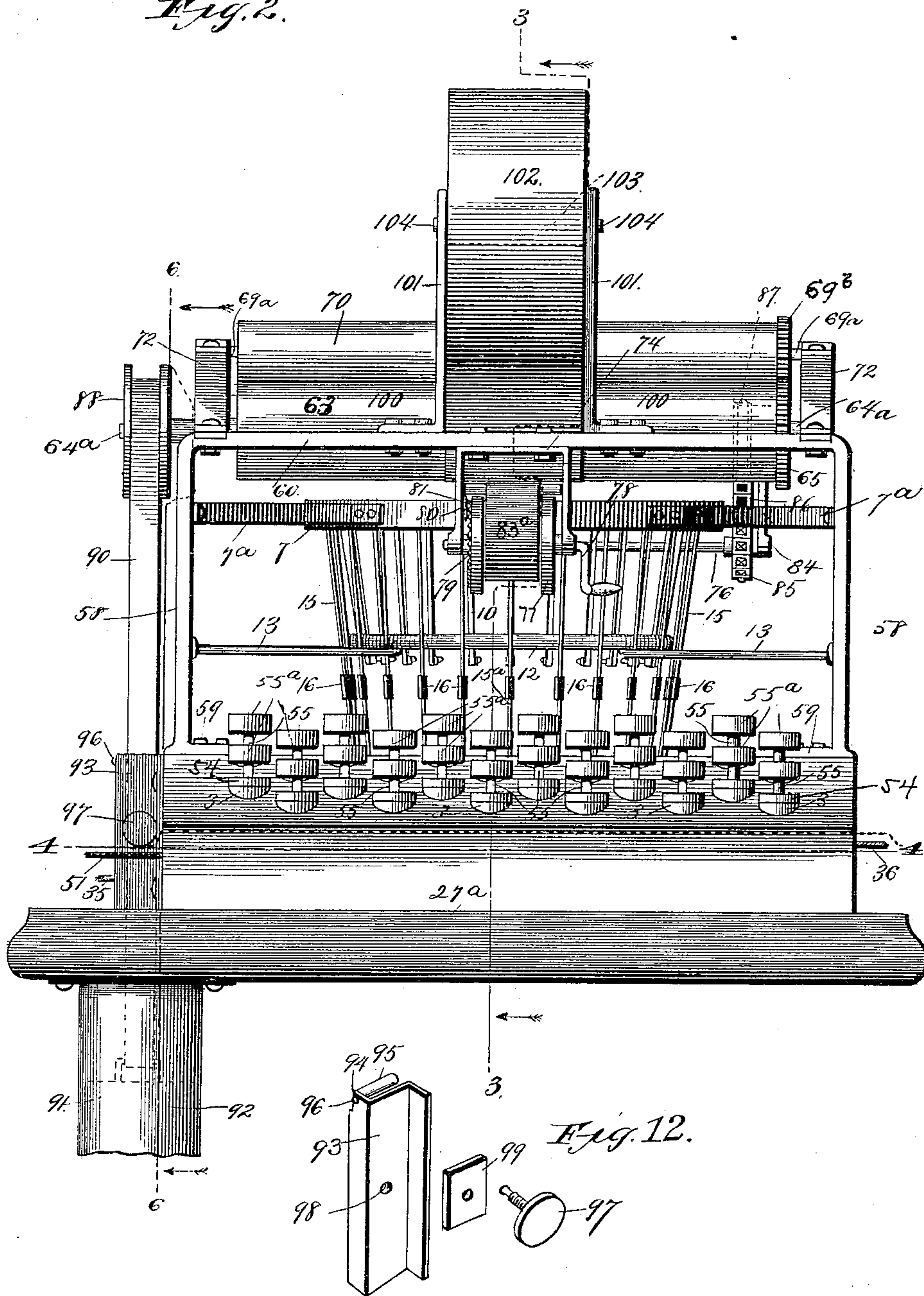


Fig. 12.

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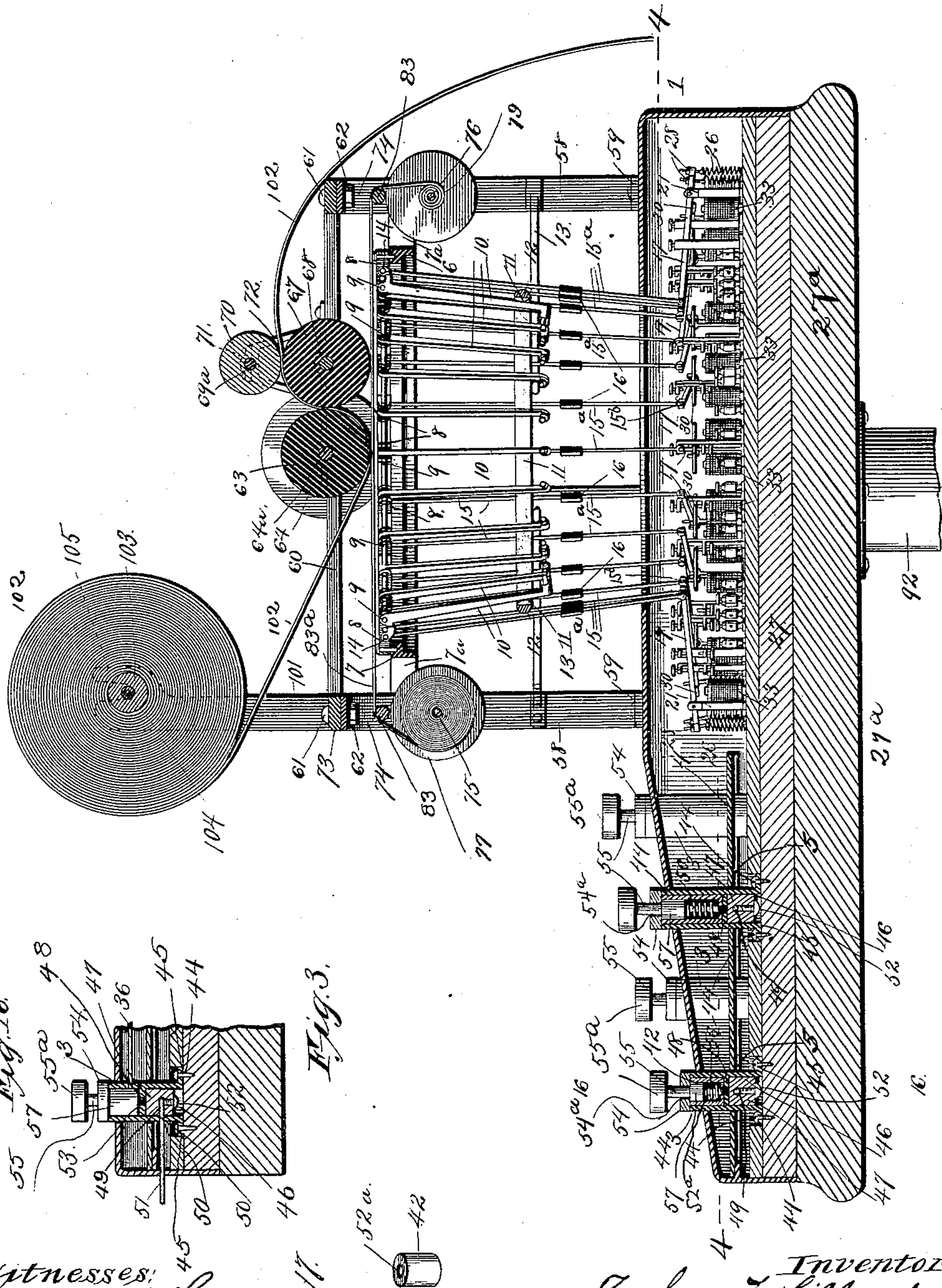
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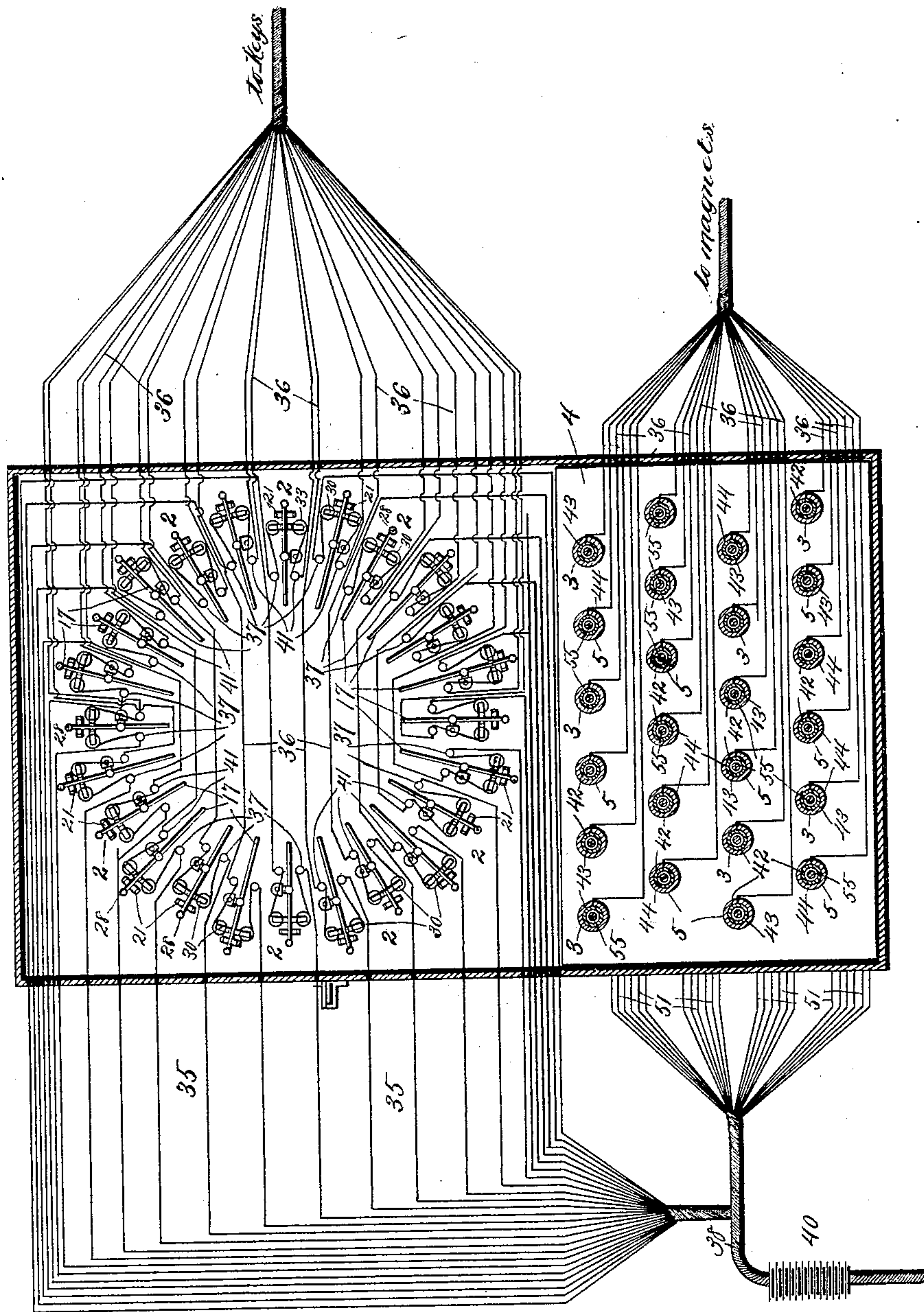
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Fig. 4.



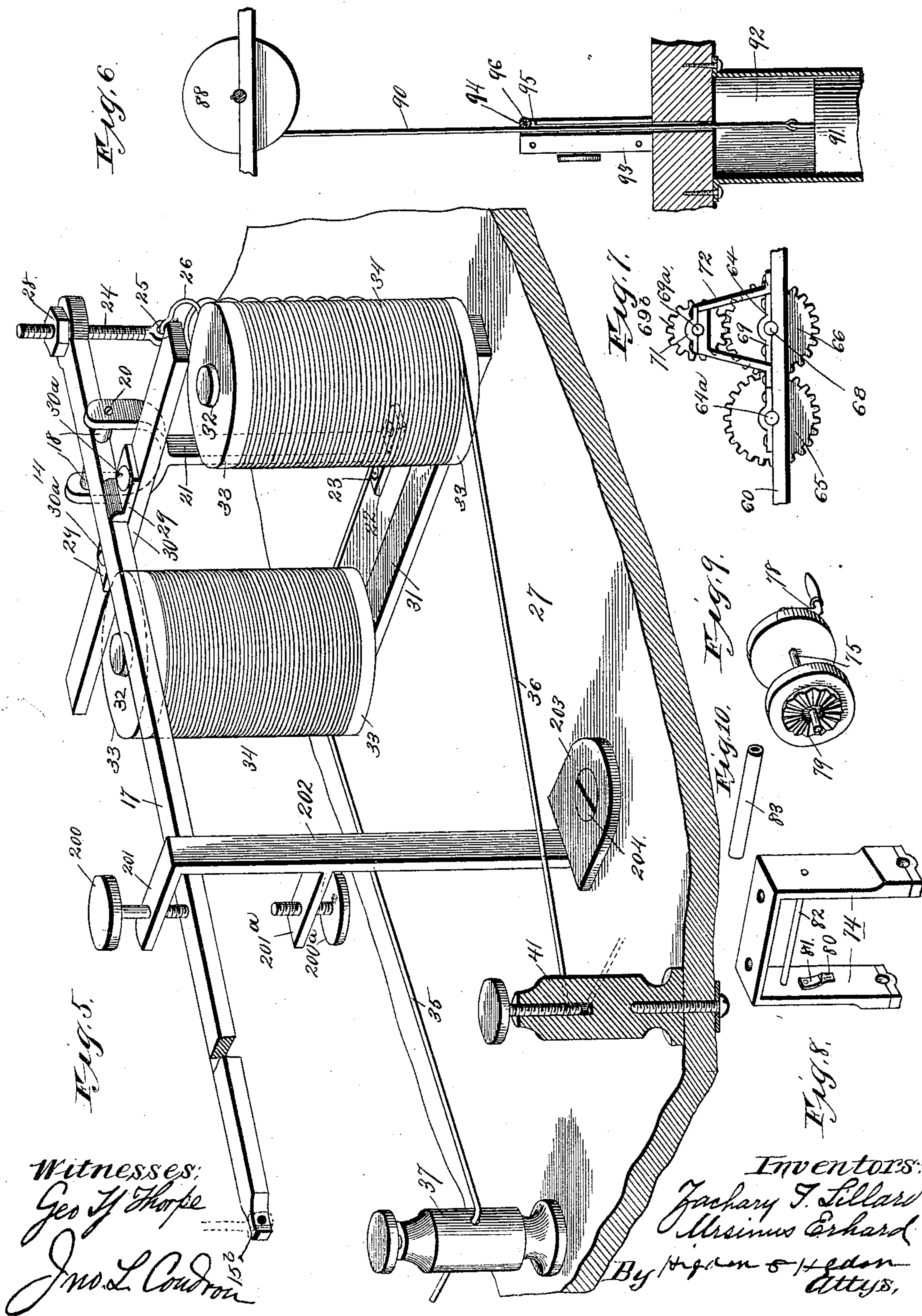
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No. 482,015.

Patented Sept. 6, 1892.



UNITED STATES PATENT OFFICE.

ZACHARY T. LILLARD AND URSINUS ERHARD, OF KANSAS CITY, MISSOURI.

PRINTING OR RECORDING TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 482,015, dated September 6, 1892.

Application filed January 23, 1892. Serial No. 419,031. (No model.)

To all whom it may concern:

Be it known that we, ZACHARY T. LILLARD and URSINUS ERHARD, of Kansas City, Jackson county, Missouri, have invented certain
5 new and useful Improvements in Printing or Recording Telegraphs, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 Our invention relates to that class of telegraphic apparatus the sending and receiving instruments of which are designed to be operated by persons who are not familiar with the usual dot-and-dash or sound codes of telegraphy.

15 The objects of our invention are to produce a telegraphic apparatus by means of which the messages can be sent and received directly in written or printed form and in the
20 written or printed language of the sender, and in which also each instrument shall serve both as a transmitting-instrument and as a receiving-instrument.

A further object of our invention is to produce
25 a telegraphic apparatus in which each character of one instrument shall be in direct electrical connection with the like character of another instrument or with like characters of other instruments, whereby great
30 speed and accuracy of delivery and reception shall be insured; furthermore, to produce a telegraphic apparatus in which each instrument shall be capable of rapid and accurate manipulation by a person unfamiliar with the
35 sound-code and which when operating as a receiver shall require no attention by an operator.

To the above purposes our invention consists in certain peculiar and novel features of
40 construction and arrangement, as hereinafter described and claimed.

In order that our invention may be fully understood, we will proceed to describe it with reference to the accompanying drawings,
45 in which—

Figure 1 is a diagrammatic plan view of a telegraphic apparatus embodying our invention, two transmitting and receiving instruments being shown as properly connected in
50 circuit. Fig. 2 is a front elevation of one of the transmitting and receiving instruments. Fig. 3 is an irregular vertical longitudinal

section of the same on the line 3 3 of Fig. 2. Fig. 4 is a horizontal section of the same on the line 4 4 of Fig. 2. Fig. 5 is a detached perspective view, on an enlarged scale, of one of
55 the armature-levers and its immediate electrical and mechanical operative connections. Fig. 6 is a transverse vertical section of one of the transmitting and receiving instruments
60 on the line 6 6 of Fig. 2, showing the weight for revolving the impression-cylinder and certain of the immediate connections of said weight. Fig. 7 is a detached view in side elevation of the train of gearing for transmitting
65 the motion of the impression-cylinder to the presser-rolls. Fig. 8 is a detached perspective view of one of the hangers for the ribbon-spools. Fig. 9 is a detached perspective view of one of the ribbon-spools. Fig. 10
70 is a detached perspective view of one of the guide-rollers for the inking-ribbon. Fig. 11 is a detached view, in longitudinal section, of one end portion of the lower paper-feeding roller with its gear-wheel and sprocket-hub. Fig. 12
75 comprises detached perspective views of the clamping devices for the strap of the impression-cylinder weight. Fig. 13 is a detached view, partly in side elevation and partly in transverse vertical section, of one of
80 the armature-magnets. Fig. 14 is a view, partly in front elevation and partly in vertical longitudinal section, of the upper part of one of the armature-lever standards and the pivotal connection for said lever. Fig. 15 is a
85 view, partly in side elevation and partly in vertical section, of one of the tension attachments for the armature-levers. Fig. 16 is a view, partly in side elevation and partly in vertical section, of one of the keys and its
90 immediate attachments. Fig. 17 is a detached perspective view of one of the sleeves for the key-stems.

We will first proceed to describe the construction of one of the transmitting and receiving instruments, then the connections of
95 a number of the instruments, and finally the operation of the entire apparatus.

Referring first to the drawings, excepting Fig. 1, 27^a designates the base of one of the
100 transmitting and receiving instruments, the said base being either of wood or of metal, as preferred, and preferably, also, of oblong rectangular form, as shown. This base is in-

tended to be supported upon a suitable desk, table, or similar structure, so as to occupy a horizontal position. Upon the upper side of this base is placed a bottom board 27, which is preferably of wood or of other non-conducting material and which conforms approximately to the shape of the base 27^a. Upon the base 27^a is also supported a top casing 1, which is either of sheet metal or of wood veneer or other suitable material and which incloses a space or compartment immediately above the bottom board 27, such space or compartment extending the full length and width of the base of the machine, and the front, rear, and side margins of the top casing 1 being bent downward so as to rest upon the base 27^a near the margins of the same. The electro-magnets, armatures, and other electrical connections of the instrument are mounted in the rear portion of the instrument, as hereinafter more fully explained, while the circuit closing and breaking keys are mounted in the front portion of said instrument.

Within the front portion of the compartment, which is inclosed by the top casing 1 of the machine, is located a horizontal rectangular partition 4, which may be either of wood or of metal, as preferred, and which extends from the front toward the rear of the machine and also from side to side of the same, as shown, and which may be used for separating the two sets of wires hereinafter described. The front portion of the casing 1 preferably inclines downward and forward, while the rear portion of said casing is horizontal, and upon the horizontal portion of the casing are mounted four vertical standards 58. These standards 58 are provided at their lower ends with feet or flanges 59, which are riveted, screwed, or otherwise securely connected to the top of the casing 1, so as to firmly retain the standards thereon. At their upper portions these standards 58 are connected by front, rear, and side cross-bars 60, four in number and which compose a rectangular horizontal frame.

Between the upper parts of the standards 58 and at a point just below the cross-bars 60 is mounted the circular horizontal yoke-frame 7 of the machine, this yoke-frame being supported in its required position by a number of horizontal bracket-arms 7^a, which extend inwardly from the upper parts of the standards 58 and the outer ends of which are riveted or otherwise secured to the standards 58, while the inner ends of the arms are similarly secured to the yoke-frame. On its inner side the yoke-frame 7 is formed with a number of inwardly-extending pivot-brackets 8, which are arranged in pairs, and between each pair of which is interposed the upper end of one of the type-carrying levers 10; a circular pivot-rod 9 extending transversely through the brackets 8 and also similarly through the under ends of the levers 10. These type-carrying levers are pendent levers and are arranged in circular series, as shown, so as to form a

"nest," and so that each type shall strike a certain central point when raised as an impression of the type is desired to be made. To the outer extremity of the upper end portion of each of these type-levers 10 is connected pivotally the upper end of a pull-rod 15, the arrangement being such that a downward pull upon either of the rods 15 shall cause the lower end of the corresponding type-carrying lever 10 to rise quickly and impart the desired impression from its type. To the lower end of each of these pull-rods is connected a suitable turnbuckle 16, and to each of these turnbuckles is connected the upper end of a connecting-rod 15^a, the lower ends of said connecting-rods being in turn pivotally attached, as at 15^b, to the free end of a corresponding armature-lever 17.

As above stated, the magnets of the armature-levers are mounted upon the rear part of the bottom board 27 of the machine and are arranged in circular order, so as to attain the utmost compactness consistent with the required operations of the machine. Each of the magnets is provided with the usual coils or spools 34, and has the usual yoke 31, the cores 32 of the magnets extending longitudinally through the coils or spools and the coils being confined between the usual heads 33. Each of the armature-levers 17 carries near one end a transverse armature-bar 30, which lies directly above the upper ends of the magnet-cores 32 and which is preferably secured by screws or rivets 30^a to two lugs or arms 29, which project laterally from the armature-lever. At a point nearer this end each armature-lever 17 is provided with two oppositely-disposed outwardly-extending arms 18, which are interposed between the arms of a fork which is formed at the upper end of a vertical standard 21. This standard has at its lower end a foot or flange 22, which is secured by a screw 23 to the bottom board 27 of the machine. Two bearing-screws 20 are inserted oppositely through openings in the upper extremities of the fork of the standard, and the inner ends of said screws enter recesses in the outer ends of the arms 18 of the lever 17, thus forming the pivot-supports of said lever. Through this extremity of the armature-lever 17 is passed a vertical tension-bolt 24, to the upper end of which is connected a regulating-nut 28, said nut impinging upon the upper side of the lever. The lower end of the bolt 24 is formed with an eye 25, into which is inserted the upper end of a spiral retracting-spring 26, the lower end of which is suitably secured to the bottom board 27 of the machine, and the tendency of said spring being to raise the armature 30 upward out of contact with the core of the corresponding magnet.

Upon the bottom board 27 of the machine at a point adjacent to the free extremity of the armature-lever 17 is placed a vertical standard 202, having at its lower end a foot or flange 203, through which passes a screw 204, so as to secure the standard in position.

At its upper end this standard 202 is formed with an arm 201, which extends at right angles from the standard and which overlies the armature-lever 17. Through the arm 201 works a screw 200, the lower end of which reaches near to the upper side of the lever 17 and which serves to properly limit the upward movement of said lever. From one side of each of these standards 202, at a point below the upper end of said standard, projects laterally an arm 201^a, which underlies the armature-lever 17 and which carries an upwardly-extending regulating-screw 200^a. Thus the armature-levers 17 work vertically between the regulating-screws 200 and 200^a and the length of vibrations of the levers is regulated by turning said screws in one or the opposite direction. One of the wires 35 leads from one of the coils 34 to a binding-post 37 and thence to the key attachments, as hereinafter described, while the other wires 36 lead to binding-posts 41 and thence to the line-cable, as also hereinafter described.

The posts 3 of the keys of the machine are in the form of short cylinders, which are of non-conducting material and which extend vertically upward through suitable openings 5 in the partitions 4 and also through the front portion of the top casing 1. At their lower ends these posts are formed with flanges or feet 45, through which extend attaching-screws 44, which enter the bottom board 27, and thus securely attach the posts to said board. In the lower ends of these posts are inserted plugs 47, which are of metal or other conducting material and which are retained in position by retaining-screws 52, said screws being inserted upward through the lower ends of the posts 3 and into the lower ends of the plugs. The upper ends of the plugs 47 come into contact with internal circular horizontal shoulders 48, which are formed integrally with the said posts 3 and which are provided with central vertical passages 53, for a purpose to be presently explained. Each of the plugs 47 is formed with a horizontal recess or cavity 49, into which is inserted one end of a wire 51, the end of this wire being retained in said recess or cavity by means of the screw 52, before referred to. These wires 51 extend from the recesses or cavities 49 through openings 50, which are formed in the sides of the posts 3 and in alignment with the outer ends of the recesses or cavities. From these openings 50 the wires 51 extend to the battery 51^a, which is connected in the usual manner to ground. Within each key-post 3 is inserted a tubular shell 42, which is of metal or other conducting material, the said shells being located within the upper ends of these posts. The wires 36 extend through these posts 3 and are connected to the shells 42 and extend from said shells to the line-cable, and thence to the magnets of the other instrument or instruments of the system. From this description and from the drawings it will be seen that the keys of each instrument are

connected to the local battery of said instrument and then to ground, and also each through the line to the corresponding magnet of the other instrument in the system, while the magnets of each instrument are also connected to the battery 51^a of said instrument and thence to the ground, and that each magnet is connected through the line to the corresponding key of the other instrument of the system. The upper end of each key-post 3 is provided with a cap 54, having a central vertical opening 54^a, through which extends the stem 55 of the corresponding key 55^a. The head of each of these keys 55^a is preferably of disk form and is designated by a letter, numeral, punctuation-mark, or other sign corresponding to that of the type to which it is connected in circuit. Each stem 55 extends downward through the opening 54^a of the corresponding cap 54 and also into the opening 52^a of the corresponding shell 3, and at a point within each shell 3 each stem is formed with an enlargement or collar 57, which works within the shell. A spiral spring 56 surrounds the lower part of each key-stem 55 and is inclosed within each shell 52, and is also interposed between the upper side of the shoulder 48 and the lower end of the collar or enlargement 57 of the stem, the tendency of said spring being to retain the key and its stem in its elevated position and to return said key and stem to such position after it has been depressed by an operator. Such depression of the key causes the lower end of the stem to pass through the opening 49 of the shoulder 48, and thus come into contact with the upper end of the plug 47 and close the circuit, the current flowing through the plug 47, key-stem 55, and shell 42 to the corresponding wire 36 and through the line to the corresponding magnet of the other instrument, and thus causing the armature of said magnet to operate the corresponding type-carrying lever of the other instrument, and consequently to imprint the character impressed upon the key which is depressed.

Immediately above the nest of type-levers 10 and supported upon the cross-bars 60 of the standards 58 of the machine are the impression and presser rolls and their attachments, which we will now proceed to describe: 63 designates the impression-cylinder of the machine, this cylinder being of hard rubber or of any other suitable or preferred material and of such length as to extend horizontally across the nest from side to side of the machine, as shown. The ends of the shaft 64^a of this impression-cylinder are journaled in suitable bearings 64, which are bolted upon the upper sides of the side cross-bars 60 of the machine, and at one end of this shaft carries a gear-wheel 65, the purpose of which will be presently explained.

67 designates the lower presser and guide roller of the machine, this roller being of felt, soft rubber, or any other suitable or preferred material, and said roll extending horizontally

of the machine from side to side of the same and parallel with the impression-cylinder 63. At one end the shaft 68 of this lower presser-roller carries a gear-wheel 66, the teeth of which mesh with the teeth of the gear-wheel 65 of the impression-cylinder. The ends of the shaft 68 are journaled in suitable bearings 69, which are secured upon the upper sides of the side cross-pieces 60 of the machine-frame by suitable bolts or in other suitable or preferred manner.

70 designates the upper guide or presser roller, this roller being also of felt, soft rubber, or any other suitable or preferred material. This roller 70 extends horizontally across the machine above the lower roller 67 and parallel therewith, and its shaft 69^a is journaled in suitable bearings 71, which are suitably secured upon suitable supports 72, these supports being, preferably, of inverted-U shape and riveted or otherwise secured at their lower ends to the upper sides of the side cross-bars 60 of the machine-frame and extending upward therefrom. At one end the shaft 69^a of the upper presser-roll carries a gear-wheel 69^b, the teeth of which mesh with the teeth of the gear-wheel 66 of the lower presser-roll.

Upon that end of the shaft 64^a of the impression-cylinder which carries the gear-wheel 65 is mounted a drum 88, which is keyed or otherwise secured upon the shaft so as to turn therewith. To the periphery of this drum is connected the upper end of a strap 90 or a band or other suitable flexible connection, which is designed to be wound upon the drum and to the lower end of which is attached a suitable weight 91. This weight works within a guide tube or casing 92, which is secured in vertical position to the side of the bench, table, or other support upon which the entire machine is mounted.

93 designates a guide-plate, which is of approximately U form in cross-section, and which is secured in vertical position to the outer side of the top casing 1 of the machine at a point directly below the drum 88. At a point about midway of its length the guide-plate 93 is formed with an internally-screw-threaded opening 98, in which works the stem of a clamping-screw 97, the stem of this screw also extending into and being swiveled in the middle of a clamping-plate 99, which conforms in width with the clamping-plate 93. The surface of this clamping-plate 99, which is away from the surface of the guide-plate 93, may be roughened or serrated, if desired, and the strap, band, or flexible connection 90 extends between said guide and clamping plates and the adjacent side of the machine, the arrangement being such that by turning the screw 97 in one direction the plate 99 will engage and hold the flexible connection 90 against the side of the machine-frame, and by turning the screw in the opposite direction the plate 99 will release said flexible connection

and permit the weight 91 to descend, and thus rotate the impression-roll 63 and the upper and lower presser-rolls, for a purpose to be hereinafter explained.

In order to avoid frictional wear, due to the direct contact of the flexible connection 90 against the upper end of the guide-plate 93, a horizontal roller 95 is mounted in the upper end of said guide-plate, the spindles of said roller being journaled in a cut-away portion 96 of the plate.

74 designates two pendent inverted-U-shaped brackets, which are secured one beneath the front cross-bar 60 of the machine and one beneath the rear cross-bar 60 of the same, said brackets being located midway of the length of said cross-bars.

Between the pendent arms of the brackets 74 are interposed two inking-ribbon spools or reels 77, the shafts 75 and 76 of said spools or reels being journaled horizontally in the lower ends of said brackets. The front shaft 75 projects at one end through one of the bracket-arms and carries a suitable crank-arm 78, while to that end of the spool or reel which is farthest from the crank-arm are formed or suitably secured a number of radial teeth or serrations 79. These teeth or serrations are engaged by a spring-detent 80, which is preferably of approximately V form in cross-section and which is carried at the lower end of a spring-arm 81, said arm being suitably secured to the inner side of the corresponding pendent arm of the front bracket 74, and the resilience of the arm causing the detent 80 to always engage one of the notches between said teeth or serrations. Immediately above each spool or reel 77 is located a horizontal rod 82, the ends of which are inserted in the upper parts of the bracket-arms and which are surrounded loosely by a roller or sleeve 83, the ribbon 83^a extending over said rollers from front to rear of the machine-frame and being wound upon the spools or reels 77. The arrangement is such that the detent 80 prevents any retrograde movement of the spools or reels 77, excepting such as is produced by the crank-arm 78 when properly operated. One end of the rear spool-shaft 76 is extended beyond the pendent arm of the bracket 74 and is journaled in the lower end of a pendent hanger 84, which is secured at its upper end to the rear cross-bar 60 of the machine-frame. Near this end the shaft 76 carries a sprocket-wheel 85, over which runs a sprocket-chain 86. This sprocket-chain 86 runs, also, over a sprocket-hub 87, which extends inwardly from the gear-wheel 66 of the lower presser-roller 67 and which surrounds the corresponding end of said roller. The arrangement is such that when the descending weight 91 revolves the impression-cylinder the latter shall, acting through the lower presser-roller and sprocket-chain 86, revolve the rear spool 77, so as to wind the inking-ribbon upon said spool and so, also, as to un-

wind said ribbon from the front spool 77. The strip of paper 102, upon which the messages are printed, is unwound from reel 104, the shaft or axle 103 of which is mounted horizontally in the forked upper ends 105 of two vertical standards 101, the lower ends or feet 100 of said standards being bent at right angles to the body portions of the standards and bolted, riveted, or otherwise suitably secured to the upper side of the front cross-bar 60 of the machine. From this description it will be seen that whenever one of the keys 55^a of a transmitting-instrument is depressed the circuit between that key and the corresponding magnet of a similar receiving-instrument is closed and the corresponding type on the receiving-instrument will be brought into printing action. At the same time the corresponding type of the transmitting-instrument will be brought into printing action, and hence a simultaneous duplication or repetition of the message will be effected. It will also be seen that direct and positive operation is secured and that messages in any language may be transmitted and received, and also that cipher and other messages can be handled, even by unskilled operators, with rapidity and reliable accuracy.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. A printing or recording telegraph apparatus comprising a receiver consisting of a number of pivotal type-carrying bars, a number of electro-magnets, each having its armature mechanically connected to one of the type-carrying bars, an impression-cylinder journaled above the type-carrying bars, a presser-roll geared to the impression-cylinder, a drum carried by the impression-cylinder, a band wound upon the drum and carrying a gravity-weight, a sprocket-wheel carried by the presser-roll, a pair of ribbon-feeding spools journaled at opposite points relative to the impression-cylinder, a sprocket-wheel carried by one of the spools, and a sprocket-chain running over the sprocket-wheels of said spool and roll, substantially as set forth.

2. A printing or recording telegraph apparatus comprising a receiver consisting of a number of pivotal type-carrying bars, a number of electro-magnets, each having its armature mechanically connected to one of the type-carrying bars, an impression-cylinder journaled above the type-carrying bars, a lower presser-roll geared to the impression-cylinder and an upper presser-roll geared to the lower presser-roll, a drum carried by the impression-cylinder, a band connected to the drum, and a gravity-weight connected to the band, substantially as set forth.

3. A printing or recording telegraph apparatus comprising a receiver consisting of a number of pivotal type-carrying bars, a number of electro-magnets, each having its armature mechanically connected to one of said type-carrying bars, an impression-cylinder

journaled above the type-carrying bars, a presser-roll geared to the impression-cylinder, a drum, a band wound upon said drum and carrying a gravity-weight, a sprocket-wheel carried by the presser-roll, a pair of ribbon-feeding spools journaled at opposite points relative to the impression-cylinder, a sprocket-wheel carried by one of the spools, a sprocket-chain running over said sprocket-wheel and over the sprocket-wheel of the presser-roll, a number of teeth or serrations carried by the opposite spool, and a spring-detent engaging said teeth or serrations, substantially as set forth.

4. A printing or recording telegraph apparatus comprising a receiver consisting of a number of pivotal type-carrying bars, a number of electro-magnets, each having its armature mechanically connected to one of said bars, an impression-cylinder journaled above the type-carrying bars and carrying a drum, a band wound upon said drum, a gravity-weight carried by said band, a guide-plate mounted vertically upon the machine-frame and having the band passing longitudinally of it, and a clamping-plate and clamping-screw carried by the guide-plate, the clamping-plate being arranged to engage and clamp the band, substantially as set forth.

5. A printing or recording telegraph apparatus comprising an impression-cylinder journaled upon the frame of a receiver, a guide-plate mounted vertically upon said frame and carrying at one end a friction-roll, a clamping-screw working through the guide-plate, a clamping-plate swiveled upon the clamping-screw, a drum carried by the impression-cylinder, and a weighted band connected to the drum and extending past the guide-plate and also engaged at times by the clamping-plate, substantially as set forth.

6. A printing or recording apparatus comprising a transmitting-instrument having a key the stem of which is provided with an enlargement or collar, a tubular post surrounding the stem of the key and having an internal partition, a contact-block located within the post, a conducting-shell surrounding the collar or enlargement of the key and also placed in frictional engagement with the enlargement, and a lifting-spring surrounding the inner part of the key-stem, substantially as set forth.

7. A printing or recording telegraph apparatus comprising a combined transmitter and receiver, consisting of a suitable supporting-framework, a nest or circular series of type-carrying levers mounted above the base of the framework, a circular series of electro-magnets mounted also upon the base of the framework and immediately below the nest of type-levers and each having an armature-lever mechanically connected to one of the type-levers, a series of keys mounted upon the base of the framework and each surrounded by a tubular stem having an internal shoul-

der, a conducting-plug inserted into the lower
end of each post and connected electrically to
the line, and a conducting-shell located in the
upper part of each post and connected elec-
5 trically also to the line and in electrical con-
tact with the stem of the key, each magnet
being separately connected to the key of a
similar instrument in the circuit, and each
key being also separately connected to a mag-

net of such similar instrument, substantially 10
as set forth.

In testimony whereof we affix our signatures
in the presence of two witnesses.

ZACHARY T. LILLARD.

URSINUS ERHARD.

Witnesses:

S. N. KERR,

JNO. L. CONDRON.