(No Model.) 10 Sheets—Sheet 1.

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No. 564,101. Patented July 14, 1896.

Fig 1

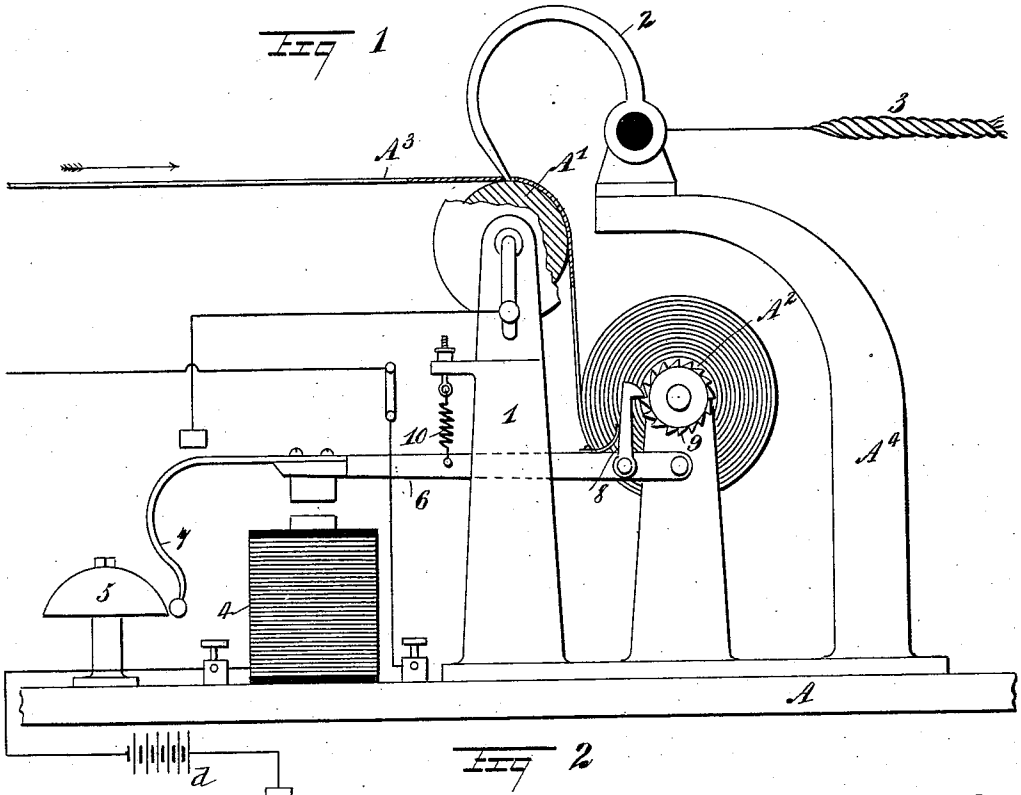
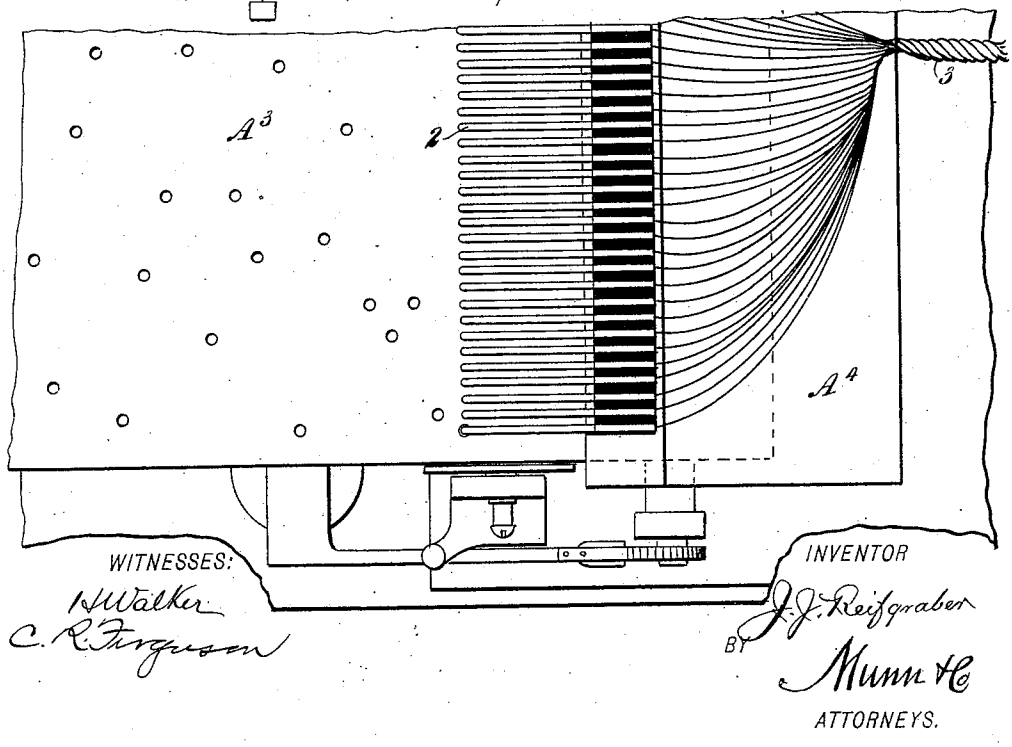


Fig 2



WITNESSES:

A. Walker

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ATTORNEYS.

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J. J. REIFGRABER.

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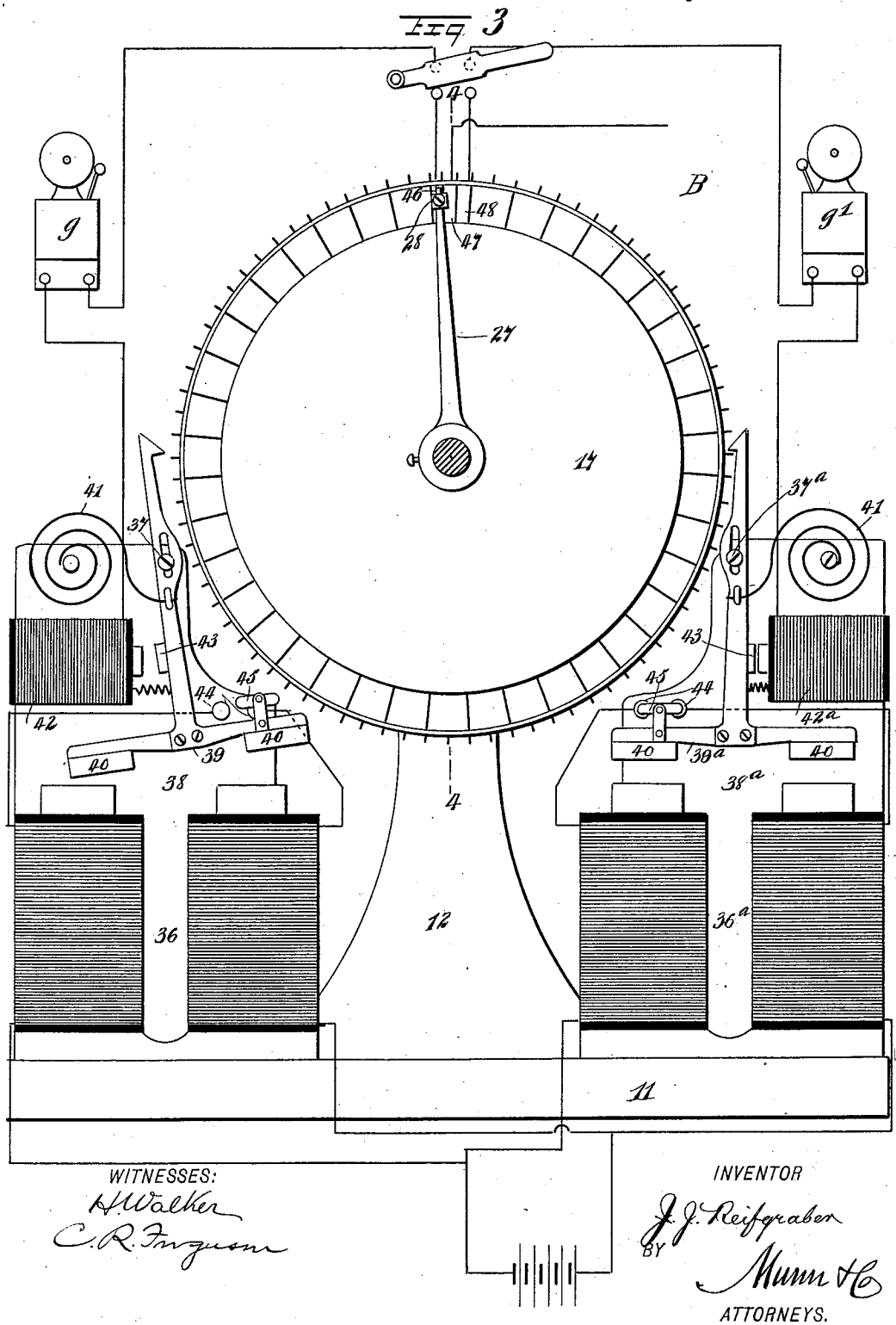
Fig 3



WITNESSES:

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(No Model.) 10 Sheets—Sheet 3.

J. J. REIFGRABER.

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Fig 4

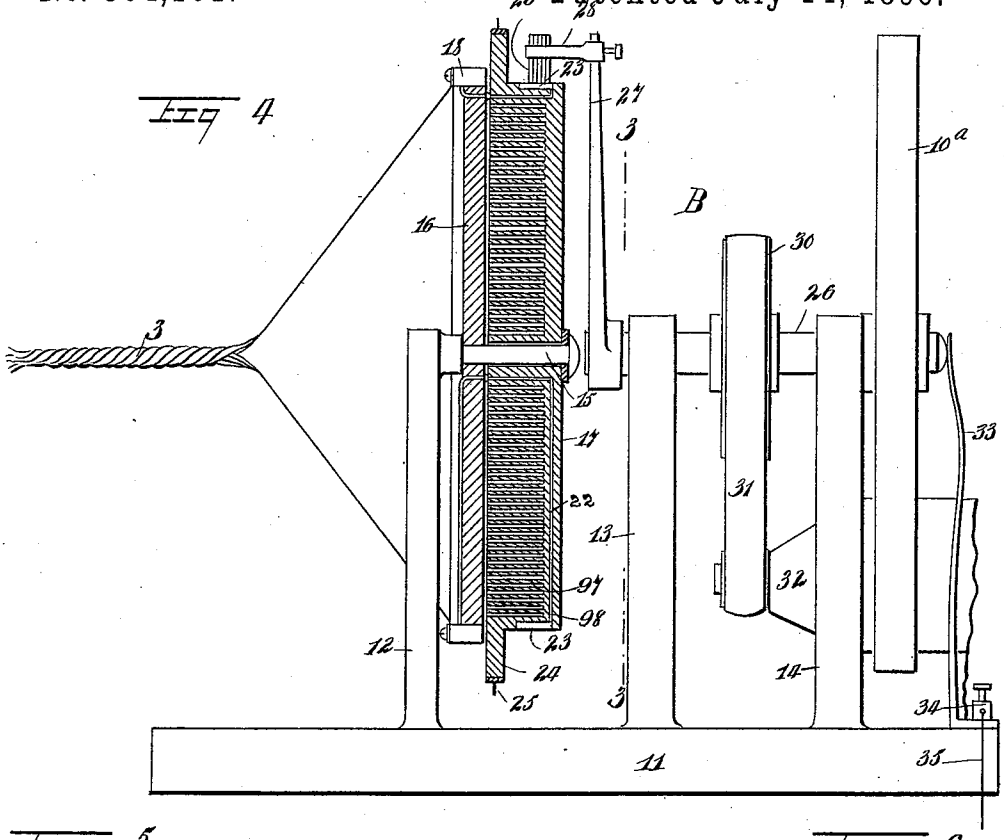


Fig 5

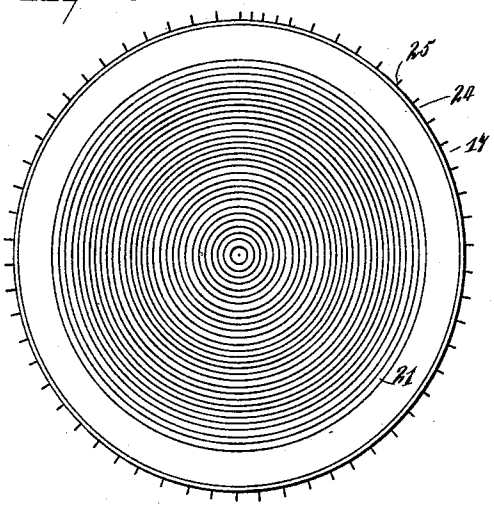
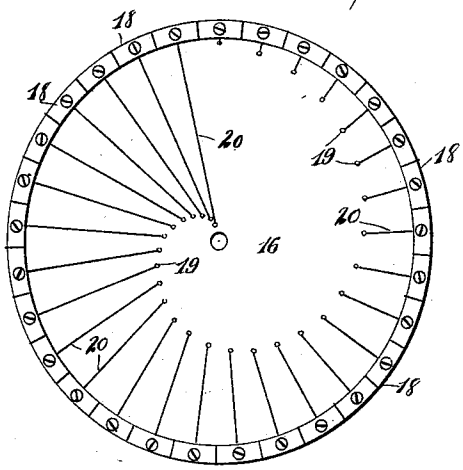


Fig 6



WITNESSES:

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(No Model.) 10 Sheets—Sheet 4.

J. J. REIFGRABER.

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No. 564,101. Patented July 14, 1896.

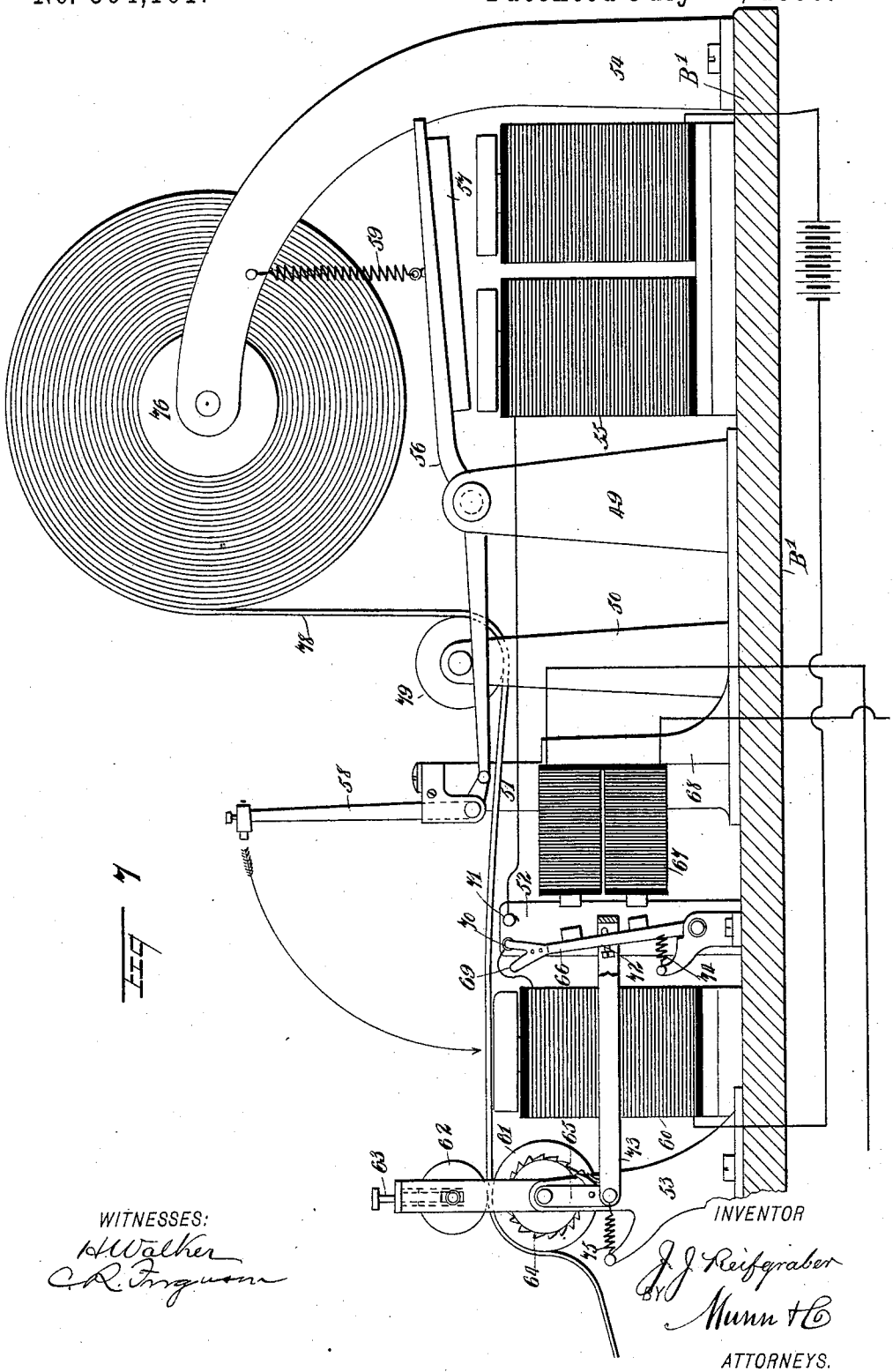

Fig. 4.

WITNESSES:
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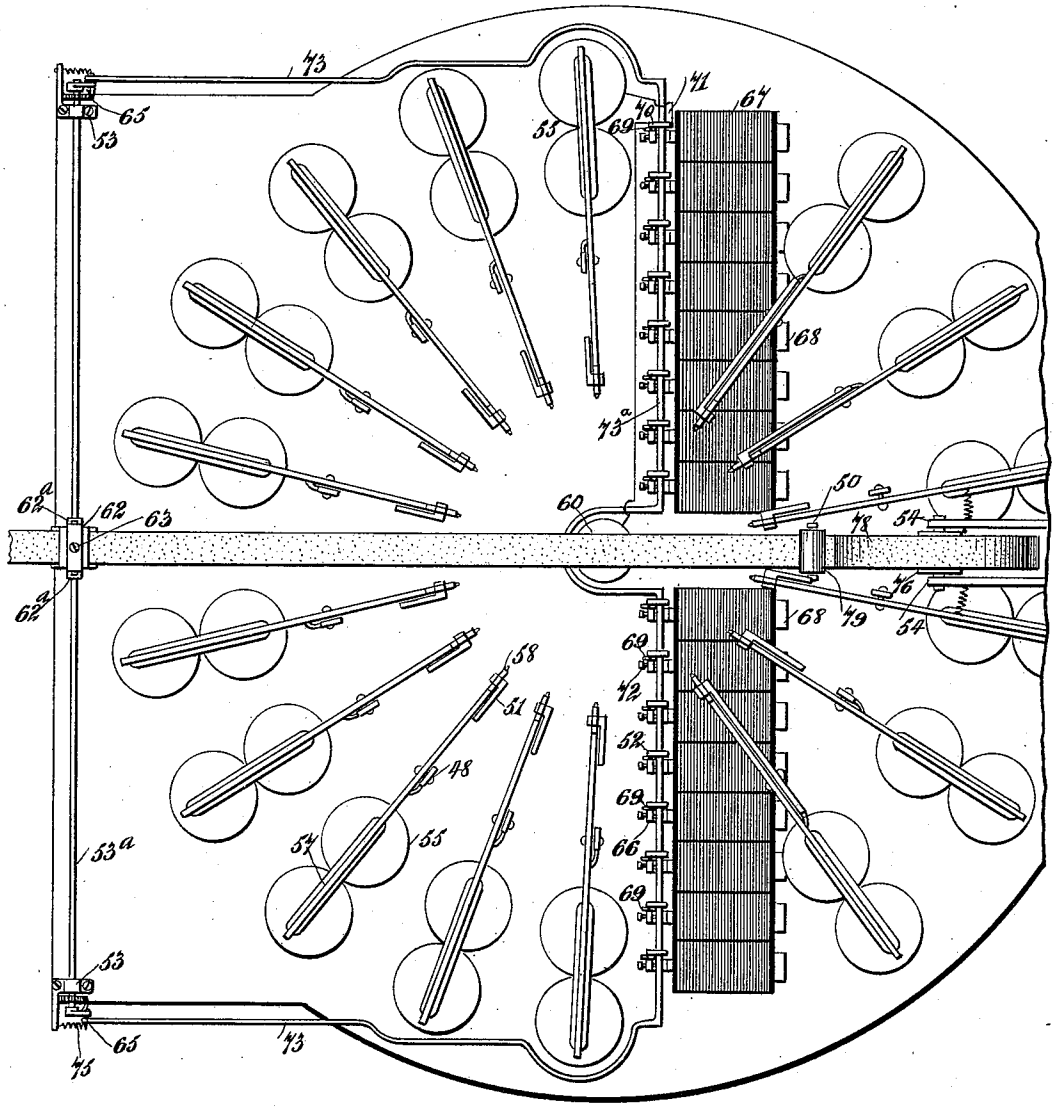
Fig 4a.



WITNESSES:

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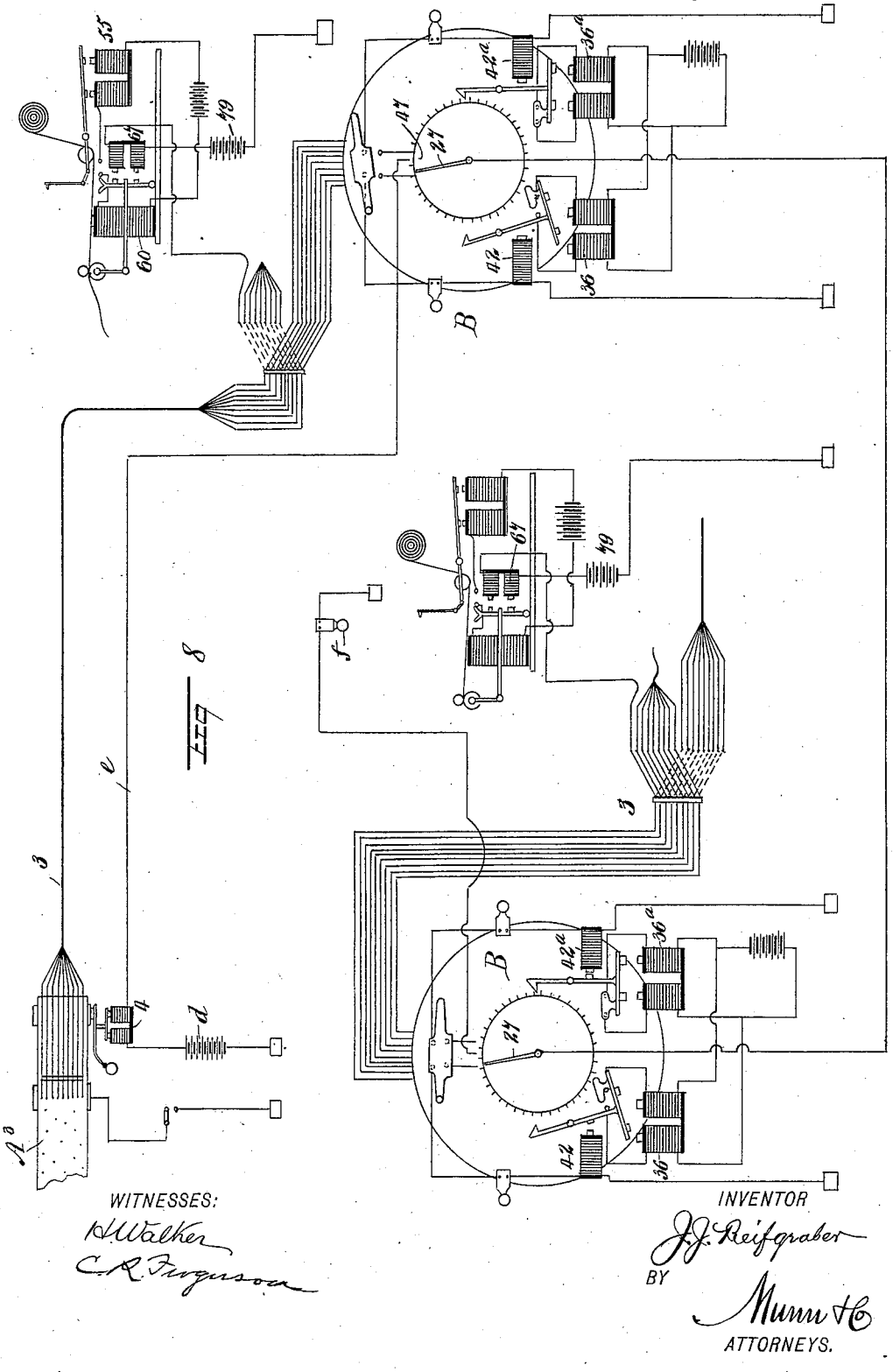

Fig. 8

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(No Model.) 10 Sheets—Sheet 7.

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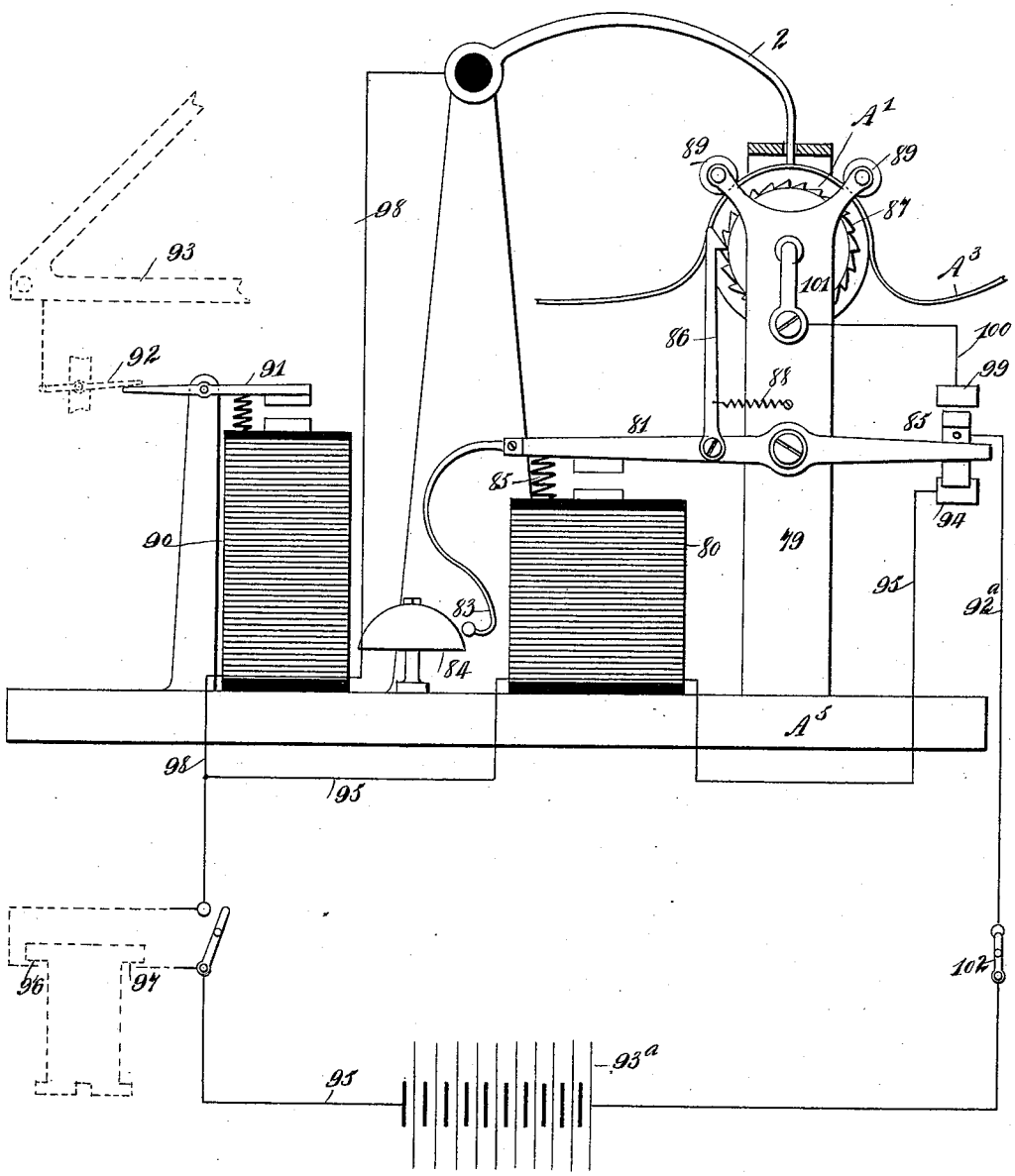
No. 564,101. Patented July 14, 1896.

Fig 9



WITNESSES:

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(No Model.) 10 Sheets—Sheet 8.

J. J. REIFGRABER.

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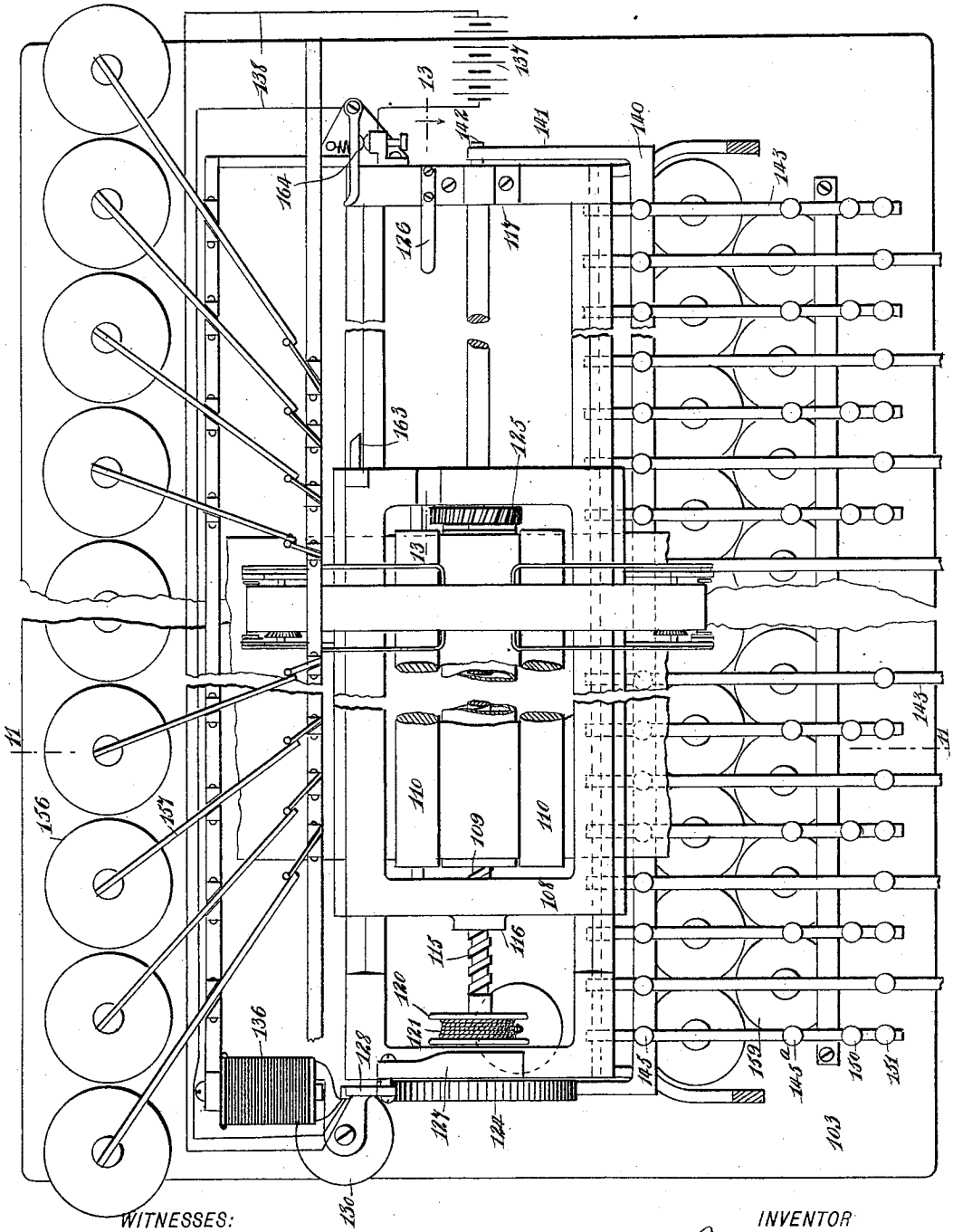
No. 564,101. Patented July 14, 1896.



WITNESSES:

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Fig. 10.

(No Model.) 10 Sheets—Sheet 9.

J. J. REIFGRABER.

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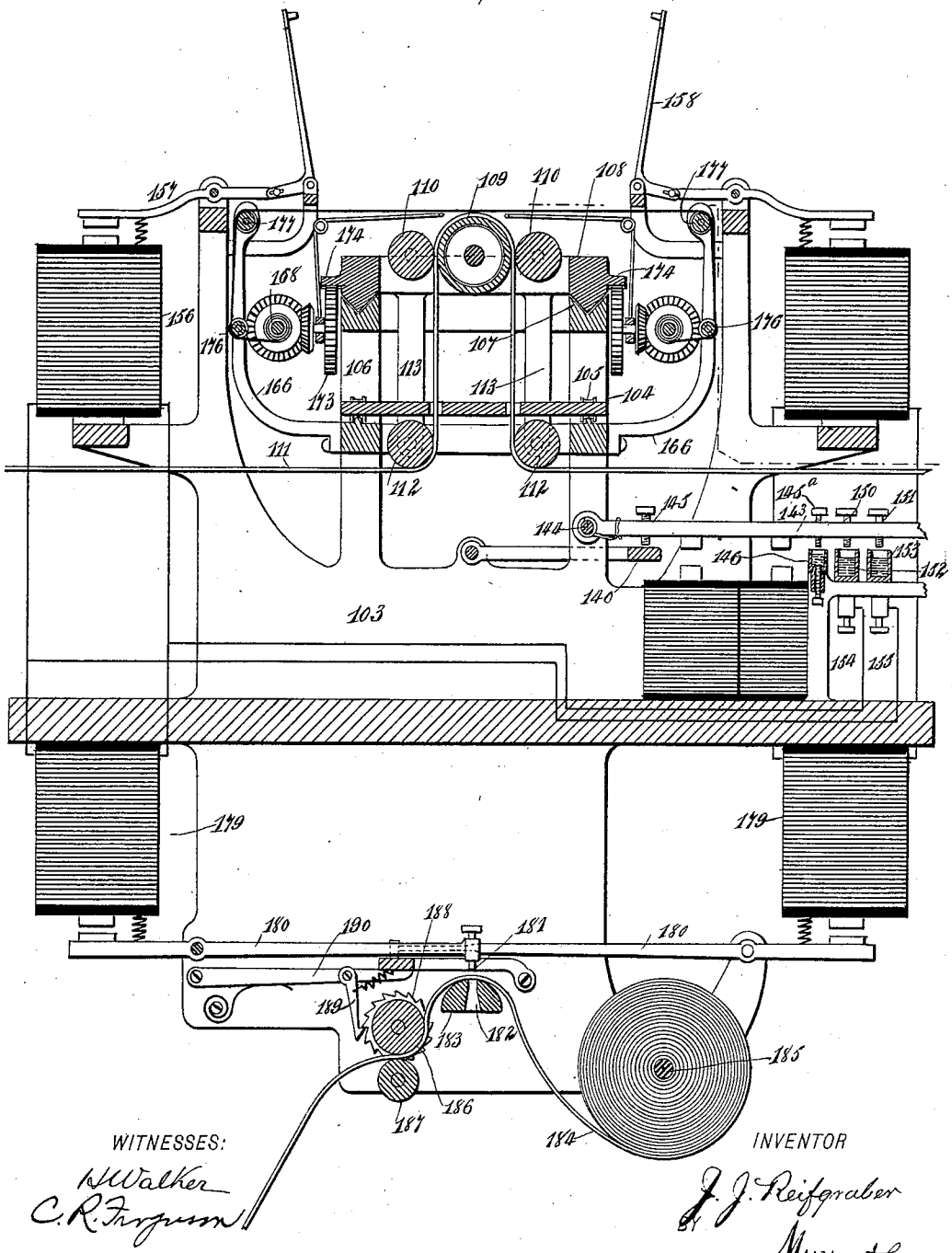
No. 564,101. Patented July 14, 1896.

Fig 11



WITNESSES:

N. Walker

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J. J. REIFGRABER.

PRINTING TELEGRAPHY.

No. 564,101. Patented July 14, 1896.

Fig 12

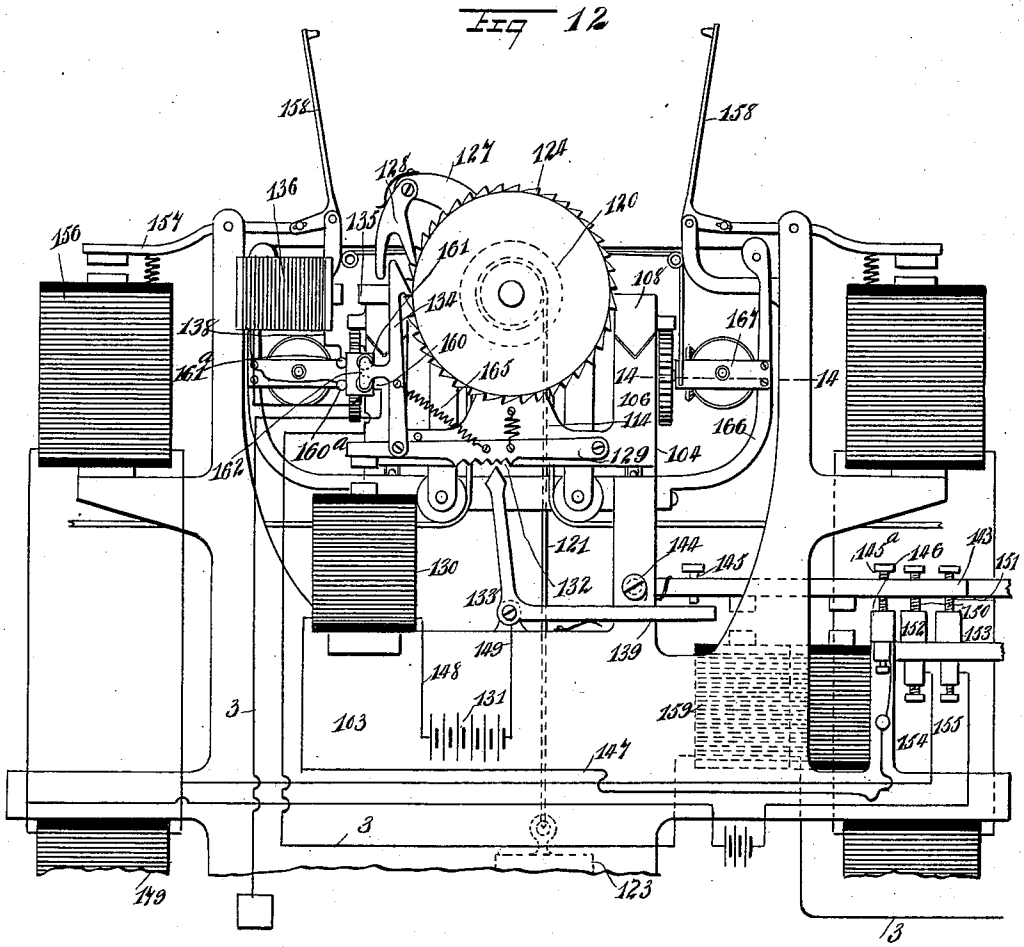


Fig 13

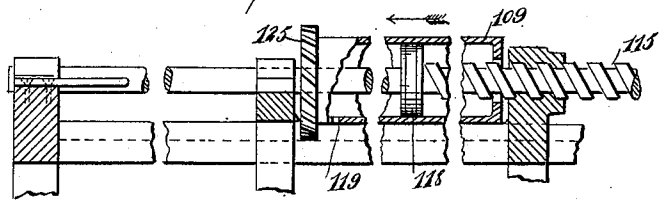
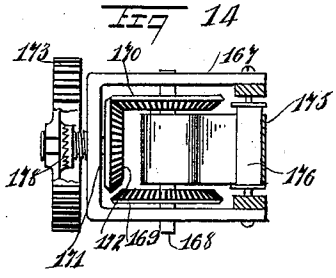


Fig 14



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH JOACHIM REIFGRABER, OF ST. LOUIS, MISSOURI.

PRINTING TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 564,101, dated July 14, 1896.

Application filed July 30, 1895. Serial No. 557,595. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH JOACHIM REIFGRABER, of St. Louis, Missouri, have invented a new and Improved Printing Telegraphy, of which the following is a full, clear, and exact description.

The object of my invention is to construct apparatus by means of which messages or matter for printing may be transmitted to a distance and formed into lines of type, suitable for setting in columns for forms for printing newspapers or books, or for transmitting and printing messages electrically.

My object is also to compose solid or displayed matter having the same appearance as handwork, and to impress the letters or characters in material suitable for a matrix for an electrotype or stereotype; or said matter may be received and reproduced by the receiving, printing, and reproducing mechanism herein described in two copies, one type-written and the other in perforations in a strip of paper, which perforated copy-strip may then be used in connection with the special mechanism provided for that purpose, which is also herein described, to work and operate any one of the several type-composing or type-bar-producing machines, such as the Mergenthaler linotype-machine or others, which are operated by key-levers to reproduce said characters or message in type or type-bars for printing purposes.

My invention consists in an instrument which I call the "originator," for preparing a perforated transmitting-strip, the perforations of which represent the characters to be transmitted, printed, and reproduced in type or type-bars at the distant station, which machine is more clearly described in another application for letters patent, a transmitter for sending the impulses required for sending the message, a synchronizer and distributer for receiving the impulses over a single wire and sending them to the different magnets in the printing and reproducing mechanism, a printing and reproducing mechanism for printing on paper, impressing a strip of fiber or other suitable material for a matrix, or perforating a strip of paper or other non-conducting material, which may then be used to operate a type-composing or type-bar-producing machine, a mechanism to operate said type-composing or type-bar-producing machine in connection with the perforated copy received from the transmitting-station, and the electric circuits and devices for controlling the same, all as will be hereinafter more fully described.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation, partly in section, of the transmitter. Fig. 2 is a partial plan view of the transmitter. Fig. 3 is a vertical transverse section, taken on line 3 3 in Fig. 4, of the synchronizer. Fig. 4 is a vertical longitudinal section, taken on line 4 4 in Fig. 3. Fig. 5 is a side elevation of the adjustable disk of the synchronizer, showing an annular contact-piece. Fig. 6 is a side elevation of the fixed disk of the synchronizer, showing the contact-points and their connections. Fig. 7 is an enlarged side elevation of one section of the printing apparatus. Fig. 7^a is a plan view thereof. Fig. 8 is a diagrammatic view of the instruments and circuits. Fig. 9 is a side elevation of a transmitter for use with a linotype or similar machine. Fig. 10 is a plan view of a receiver for both a printed and perforated copy of the message. Fig. 11 is a section on the line 11 11 of Fig. 10. Fig. 12 is an end elevation of the device shown in Fig. 10. Fig. 13 is a longitudinal section on the line 13 13 of Fig. 10, and Fig. 14 is a partial section and partial plan view on the line 14 14 of Fig. 12.

The transmitter represented in Figs. 1 and 2 is employed for transmitting the electrical impulses required for the operation of the printing-machine. The base A of this part of the instrument supports a metallic roller A′ upon standards 1 and also a roller A^2, upon which is wound the perforated paper strip A^3. The base also supports a curved stand A^4, carrying at its upper end a series of contact-springs 2, which are insulated from each other, and capable of forming an electrical contact with the roller A′. There are as many contact-springs 2 as there are characters represented by the machine, and each spring is connected with one of a series of wires forming a cable 3.

To the base A is attached an electromagnet 4 and a bell 5. The armature-lever 6, pivoted on a stud projecting from one of the standards supporting the roller A^2, carries an armature within the field of the magnet 4, also a bell-hammer 7, adapted to strike the bell 5 when the armature-lever 6 is moved on its pivot. The armature-lever carries a spring-pressed pawl 8, which engages a ratchet-wheel 9 on the shaft of the roller A^2. A retractile spring 10 tends to pull the armature-lever up when released by the magnet.

The synchronizer B is shown in detail in Figs. 3 to 6. To the base 11 are attached standards 12 13 14, which support the working parts of the synchronizer. The standard 12 is provided at its upper end with a horizontal stud 15, which is stationary. On this stud is fixed the disk 16 and the disk 17 of insulating material, which is capable of being turned on the stud 15. The disk 16 is provided at its periphery with series of metal blocks 18, which are insulated from each other. There are as many blocks 18 secured to the disk 16 as there are wires in the cable 3. To each of these blocks is attached a wire connected with one of the contact-springs 2 of the transmitter, the whole series of wires forming the cable 3.

In the disk 16 are inserted contact-pins 19 in a spiral line, so that said pins are located on radial lines at points intersected by equidistant concentric circles, and from each pin a wire 20 extends to one of the metal blocks 18 on the periphery of the disk 16. In the inner face of the disk 17 are inserted concentric metal rings 21, each one of which forms an electric contact with one of the pins 19, inserted in the disk 16. The said rings 21 are insulated from each other, and are connected by wires 22 with commutator-bars 23 on the periphery of the disk 17. The disk 17 is provided with a flange 24, in the periphery of which are inserted pins 25, the number of pins being double the number of commutator-bars and wires in the cable 3.

In the standards 13 14 is journaled the shaft 26, which carries the arm 27, to which is attached adjustably a brush-holder 28, which extends at right angles over the commutator and carries a brush 29, which bears on the commutator in such a way as to form an electrical contact with all of the commutator-bars 23 as the brush is revolved by turning the shaft 26. The shaft 26 carries a pulley 30, which receives a belt 31, running to a pulley on the armature-shaft of an electric motor 32, which drives the synchronizer. To insure regularity of motion, the shaft 26 is provided with a fly-wheel 10^a.

To the base 11 is secured a contact-spring 33, which bears against the end of the shaft 26, and is provided with a binding-post 34 for receiving the line-wire 35. To the base 11, on opposite sides of the standard 12, are secured electromagnets 36 36^a, as shown in Fig. 3, and on studs 37 37^a, projecting from supports 38 38^a, are placed the T-shaped armature-levers 39 39^a, the said armature-levers being slotted to allow them to slide up or down on the studs. The armatures 40, carried by the levers 39 39^a, are held within the field of the magnets 36 36^a. The upper ends of the armature-levers are hooked to enable them to engage with the pins 25, projecting from the periphery of the disk 17, and springs 41, attached to the supports 38 38^a, tend to pull the armatures 40 away from the magnets. Magnets 42 42^a are attached to the supports 38 38^a, and the armature-levers 39 39^a are provided with armatures 43, held within the fields of the magnets 42 42^a. Each magnet 36 36^a is provided with a pair of contacts 44, which are connected with the terminals of the magnet, and each armature-lever carries a contact-piece 45, capable of touching the contact 44.

The disk 17 is provided with three narrow commutator-plates 46 47 48, used in synchronizing. These narrow commutator-plates are insulated from each other, and each one is connected electrically with one of the concentric metal rings 21. The commutator-plate 46 is in electrical connection with the magnet 42, the circuit including the bell *g*, and the commutator-plate 48 communicates electrically with the magnet 42^a by a circuit which includes the bell *g'*, while the commutator-plate 47 is in direct electrical connection with the battery *d* (including the magnet 4) while transmitting, and with the ground if receiving a message. The magnets 42 42^a are both grounded at the other end of the line.

As will be seen by reference to Fig. 8, the current goes from the positive pole of the battery *d* to the magnet 4, thence through the wire *e* to the middle bar 47 of the synchronizer. From this bar the current passes through the arm 27, from this arm to the arm 27 of the receiver, and through the bar 47 of that instrument, thence through the bell *f*, and back to the battery *d*. By this construction should there be a variation in speed of the devices between the transmitting and receiving station, the same will be adjusted as follows: Should the speed be too great at the transmitting-station, the brush on the arm D at said station would close the circuit through the bell *g*, the electromagnet 42, which will throw the armature 39 into engagement with a pin or tooth on the disk 17, and at the same time close the circuit through the electromagnets 36, to draw the armature 39 downward to rotate the disk backward through the distance of one-half the length of a plate 18. Should the movement be too slow, the current will pass through the commutator-plate 48 to energize the electromagnets 42^a and 36^a, to move the disk in the opposite direction. Whenever the brush carried by the arm 27 of the transmitter passes the middle bar 47 the circuit is closed through the three bars 46 47 48 of the receiver. The shifting of the transmitter-strip and the synchronizing takes place

every time the brush carried by the arm 27 of the transmitting-synchronizer comes into electrical contact with the middle bar 47, and the arm 27 of the receiving-synchronizer comes in electrical contact with the bars 46, 47, or 48 synchronously with the first.

One printing mechanism for impressing a fiber strip or printing upon a long continuous strip of paper consists of a series of type-levers, magnets for operating the same, and an automatic feed for carrying forward the strip of material on which the impressions are to be made. One set of printing devices is shown in Fig. 7. There are to be as many such sets as there are characters to be transmitted. To the base B′ are attached standards 49 50 51 52 53 54. To the base B′, between the standards 49 and 54, is attached the series of magnets 55, arranged in a circle, and to standards 49 are pivoted the armature-levers 56, each carrying at one end an armature 57, within the field of a magnet 55. The other ends of the said armature-levers are pivotally connected with type-arms 58, pivoted in the standards 51. The armature-levers 56 are provided with retractile springs 59. To the base B′ and centrally of the row of magnets 55 is secured an electromagnet 60, the top of which forms a bed or support for the material being printed upon.

On a shaft 53^a, having bearings in the standards 53, is placed a roller 61, and a roller 62 has journals extending through boxes in intermediate standards 62^a, the boxes being adjustable vertically by means of a screw 63. The shaft 53^a is provided with ratchet-wheels 64, engaged by spring-pawls carried by swinging arms 65. To the standards 52 are pivoted armature-levers 66, each carrying an armature which is within the field of a magnet 67, comprised in the transverse row supported by the standards 68, secured to the base. Each armature-lever 66 carries at its free end a contact-piece 69, which is capable of forming an electrical connection between the contact-points 70 71. Each armature-lever 66 carries an adjusting-screw 72, and rods 73 are connected at one end with a transverse bar 73^a, which is in a position to be engaged by the screw 72, the opposite ends of the said rods 73 being pivotally connected with the arms 65.

The armature-levers 66 are provided with retractile springs 74, and the arms 65 are provided with retractile springs 75. On a shaft extended between the standards 54 is placed a reel 76, on which is wound a strip 78, of vulcanized fiber or analogous material, in which the impression or matrix for the letter is formed. Where the machine is used merely for printing, the reel 76 carries a strip of paper and an ink-ribbon instead of a strip of fiber. The strip from the reel 76 passes underneath the roller 79, journaled in the standard 50, and passes over the pivot of the magnet 60, thence between the rollers 61 62, by by which it is moved forward.

It will thus be seen that when an electrical impulse goes through the line to a magnet 67 the magnet will attract the armature of the lever 66, thereby bringing the set-screw 72 in the said armature-lever into contact with the bar 73^a, connecting with the shifting-bar 73, thus causing the pawl on the arm 65 to engage the ratchet-wheel 64 and turn the rollers 61 and 62, between which the paper or fiber strip passes, moving the said strip forward. To regulate the shifting of the fiber or paper strip, the set-screw 72 is turned in or out. For example: This set-screw is screwed in and caused to project from the lever 66 as far as possible for a large letter like "W" or "M," thus causing the shifting-bar 73 to be pushed as far as possible, or imparting a long movement to said bar, thereby moving the rollers 61 and 62 enough to shift the paper or fiber sufficiently to give room for the character. The said screw in the proper lever is retracted when a small letter or character, such as "i" or "l," is to be printed, thus limiting the movement of the bar 73 and slightly moving forward the strip 78 through a small distance only, to regulate the shifting for every letter or character according to its size, in exact accordance with the spacing and justifying arrangements of the originator. A line is therefore closed out and justified on the originator before the transmitting-strip is perforated.

When a magnet 67 attracts its armature 66 and shifts the fiber or paper strip, it also at the same time closes the circuit of a magnet 55 through the forked connector 69, carried by the armature-lever 66. The magnet 55 attracts the armature 57, and through the armature-lever 56 acts upon the printing-lever 58, swinging down the type or character, causing it to make an impression upon the strip 78, after which the springs 59, 74, and 75 bring their respective levers to their original positions. As the paper strip passes forward under the contact-springs 2 the ends of the said springs drop through the perforations of the paper, and as the arms 27 of the two synchronizers move on the circuit of the transmitting mechanism is closed and opened when the brushes of the arm 27 pass the commutator-plate which is in electrical contact with the spring, which drops through the paper, and a current will flow from the battery 79 (see Fig. 8) to the magnet 67 of the printing and reproducing mechanism at the receiving-station, through one of the wires in the cable 3 to the specific contact-pin and concentric ring in the disks 16 and 17, through its commutator-plates into the brush of the arm 27, over the line to the receiving-station, into the arm 27, its brush, into the commutator-plate, concentric ring, and contact-pin in the disks 16 and 17, over the wires of the cable 3 into the contact-spring 2 of the transmitter, which fell through the perforation of the paper strip, into the roller A′, from there to the ground and back to the negative pole of the

battery 79 at the receiving-station. This current will energize the magnet 67, Fig. 7, attract the armature-lever 66, which will, through the set-screw 72, act upon the shifting-bars 73, thus causing the pawls on the arms 65 to engage the ratchet-wheels 64 and turn the rollers 61 and 62, between which the paper or fiber strip passes, moving the said strip forward.

When the magnet 67 attracts the armature 66 and shifts the fiber or paper strip, it also at the same time closes the circuits of the magnet 55 through the forked connector 69, carried by the armature-lever 66. Every time the brushes of the arms 27 pass over a commutator-plate 47 at the transmitting-bar 46, 47, or 48 of the receiving-station the synchronizing and transmitting strip-shifting circuit of the battery *d*, Fig. 8, is closed, and a current will flow from the battery *d* to the magnet 4 of the transmitter, from there over the wire *e* to the commutator-plate 47 of the transmitting-synchronizer, through the arm and brush 27 of said machine into the commutator-plate 47, (or 46 or 48, if the said arm of the receiving-machine should go a little faster or slower than does the arm 27 of the transmitting-machine,) from there to the respective concentric ring and contact-pin in the disks 16 17, from there through a bell and to the ground and back to the negative pole of the battery *d* at the transmitting-station. The magnet 4 attracts the armature-lever 6, moving the pawl 8 forward, thus moving the roller A^2 forward through the action of the pawl and ratchet-wheel, bringing another hole into position for engagement with the end of another contact-spring.

By the foregoing it will be seen that when the transmitting-circuit is closed a current comes from the receiving-station, while, when the synchronizing and transmitting strip-shifting circuit is closed, a current goes to the receiving-station, thus having a pro-and-con current over the line at every revolution of the arms 27 during the transmission of a message, one shifting the transmitting-strip and securing synchronism, the other transmitting a character at every revolution.

I will describe the modification shown in Fig. 9, which shows a transmitter particularly adapted for transferring a message or matter to be printed by electrical impulses to the keys of a type-setting or type-line-founding machine, such, for instance, as the Mergenthaler linotype-machine.

A^5 is a base for the transmitter having upwardly-extended standards 79, in which the journals of the metal roller A′ are seated, and 2 is a spring contact-finger coacting with the roller A′. The contact 2 and the roller A′ are substantially the same as those in the transmitter heretofore described, but in this case the perforated sheet is fed by the operation of the roller A′, as will appear hereinafter.

80 is a magnet supported on the base A^5 and acting through an armature on a lever 81, pivoted to the standard 79, and the rear end of this lever is adapted to engage and operate an automatic switch 82. Upon the end of the lever opposite that engaged by the switch 82 is a hammer 83, adapted to contact with a bell 84, supported on the base A^5, and a spring 85, engaging with the lever 81, is designed to retract the lever after its armature shall have been released from the magnet 80. From the lever 81 a pawl 86 extends upward and has a hooked end to engage with a ratchet-wheel 87 on the shaft of the roller A′, and it is held in engagement with said ratchet-wheel by means of a spring 88. Obviously, by a downward movement of the lever 81, the pawl 86 will be drawn downward and cause the roller A′ to rotate and thus feed the perforated strip between it and the small bearing-rollers 89.

90 is an electromagnet for operating an armature 91, which at its opposite end engages with a lever 92, adapted to operate a key-lever of a type-setting machine. (Indicated by the dotted lines 93.) A wire 92^a leads from the switch 82 to one pole of a battery 93^a, and from the contact-plate 94, adapted to be engaged by the switch 82, a wire 95 extends to the electromagnet 80 and thence to a contact-plate 96, thence to a contact-plate 97 back to the battery 93^a. From the spring-contact 2 a wire 98 extends to the electromagnet 90, thence to a connection with the wire 95, and from a contact-plate 99, adapted to be engaged by the automatic switch 82, a wire 100 extends to a spring contact-plate 101, bearing at its free end upon the journal of the roller A′.

In the operation of this transmitter the perforated sheet or strip A^3 is introduced between the contact-springs 2 and the metallic roller A′ and held in proper position by the two small rollers. The switch 102 in the wire 92^a is then closed, which will set the transmitter in motion. A current will flow from the battery 93^a to the automatic switch 82, from there into contact-plate 94, and from there through the magnet 80 to the contact-plate 96, through the matrix into the contact-plate 97, and back to the battery. This current will energize the magnet 80 and attract the armature-lever 81 to sound the bell 84 and pull down the pawl 86, thereby acting on the ratchet-wheel 87, thus turning the roller A′ to shift the perforated strip A^3 forward one step, bringing a new perforation in position for the entrance of the end of the contact-spring 2, which by passing through said perforation will come into electrical contact with the metallic roller A′, and at this time the armature-lever 81 will shift the automatic switch 82 from the contact-plate 94 to the contact-plate 99, opening the circuit of the magnet 80, and closing the circuit through the magnet 90, and then the current will flow from the battery 93^a to the switch 82, from there to the contact-plate 99, and thence to the metallic roller A′, and through

the contact-springs 2, which are in contact with said roller, through the wire 98 to the magnet 90, contact-plate 96, through the matrix into the contact-plate 97 and back to the battery 93ª. This current will energize the magnet 90, which will attract the armature-lever 91 and act on the lever 92, which through its connections will operate the lever of the machine 93.

It will be understood that there are as many magnets 90 as there are keys to the type-setting machine, and also that there is a spring-contact 2 for each character used in modern newspaper or other printing, and of course the operations of this transmitter, as above described, are continued by the making and breaking of the electric circuit through the medium of the spring-contacts 2.

I will now describe another form of printing mechanism or device for receiving and printing a message in two copies, one of which is in type-printing characters and the other in the form of perforations to be used as a transmitter-strip for the transmitter, such as hereinbefore described.

103 is a stationary base or bed of the machine, upon which is mounted a movable carriage 104, which is provided with a suitable number of rollers 105, which engage with suitable tracks on the base 103, so that the said carriage, with the mechanism supported thereby, may be easily removed or drawn outward from the stationary base A³, when required, for cleaning or other purposes.

On the carriage 104 standards 106 extend upward and support side frames 107, upon which a paper-carrier 108 is movably mounted. As shown, the side frames 107 are provided with longitudinal grooves, and the lower sides of the said frames of the paper-carrier 108 are shaped to conform to the grooves and slide therein.

Within the paper-carrier 108 are journaled a tubular impression-roller 109, of hard material, preferably metal, and rollers 110, of yielding material, such, for instance, as soft rubber. The latter rollers are adapted to hold the strip of paper 111 firmly against the impression-roller 109. From the roller 109 the paper 111 extends around the rollers 112, having journal-bearings in hangers 113, depending from the paper-carrier 108. Extended upward from the other end of the carriage 104 is a standard 114, in which is journaled one end of a screw-shaft 115, which has its screw-thread engaging with a longitudinally-screw-threaded boss 116 on the paper-carrier 108, and the screw passes from said boss through the roller 109 and through an opening in the rear end of this roller to a bearing 117 at the opposite end of the carriage 104. The portion of the screw-shaft 115 that passes through the opening in the rear end of the roller 109 is smooth on its periphery and has a substantially air-tight connection through the opening, and this smooth portion of the shaft has a piston 118 mounted on it and movable through the roller 109. Air is admitted and discharged to the interior of the roller 109 between the piston 118 and the rear end of the said roller through an opening 119 in the wall of the roller, and the air contained therein is designed to serve as a cushion to prevent jar in the movements of the paper-carrier.

Rigidly mounted on the screw-shaft 115 near the standard 114 is a grooved pulley 120, upon which a rope 121 is wound and extended to a weight 123, and the outer end of said screw-shaft 115 has a ratchet-wheel 124 rigidly secured to it.

On the rear end of the roller 109 is affixed a toothed wheel 125, the teeth of which extend at an angle across the periphery of said wheel, and are adapted to be engaged by a finger 126, secured to a fixed portion of the carriage 104, when the paper-carrier is moved to the extreme rear end of said carriage. By the engagement of the wheel 125 with the finger 126 the roller 109 will be rotated sufficiently to feed the paper 111 one step, or through the space from one line to another.

On the upper end of the standard 114 an arm 127 extends laterally and has pivoted to it a safety-pawl 128, adapted to engage with the ratchet-wheel 124. At the lower end of the standard 114 is pivoted an armature 129, coacting with a magnet 130, comprised in the circuit of a local battery 131. The lower side of the armature-lever 129 is provided with a series of notches 132, adapted to engage over or upon the upper end of an angled lever 133, pivoted to the base-frame of the machine, for a purpose hereinafter to be described. Pivoted to and extended upward from the armature-lever 129 is a pawl 134, adapted to engage with the ratchet-wheel 124, and at its upper end this pawl 134 bears an armature 135, designed to coact with a magnet 136, which is comprised in a local circuit having a battery 137 and the wires 138. From the horizontal arm 139 of the angled lever 133 a bar 140 extends the entire length of the carriage 104, and at its opposite end has an arm 141, extended to a bearing 142 in a line through the fulcrum-point of the lever 133.

143 indicates a series of armature-levers pivotally connected on a shaft 144, extended lengthwise of the base 103, as plainly indicated in Fig. 10. Each armature-lever 143 is provided with a set-screw 145 directly over the bar 140, so that by manipulating this screw 145 the position and range of movement of the upper end of the lever 133 may be regulated to engage into a desired notch 132 in the armature-lever 129, and thereby regulate the range of movement of said armature-lever 129, its pawl 134, and the rotation of the ratchet-wheel 124, which causes the movements of the screw-shaft 115, thus adapting the machine for different spacings to said letters to be printed. Each armature-lever 143 also has a set-screw 145ª, adapted to contact with a mercury-cup 146, having electrical

connection with a wire 147, extended to the magnet 130. From the magnet 130 a wire 148 extends to one pole of the battery 131, and from the other pole of the battery a wire 149 extends to a connection with the angled lever 133. It will therefore be seen that when the set-screw 145^a is in contact with the mercury-cup 146 the current will be from the battery 131 through the wire 149, the arm 139 of the angled lever 133, the armature-lever 143, contact-plate 146, the wire 147, through the magnet 130, and thence through the wire 148 back to the battery. Each armature lever 143 carries adjustable contact-points 150 and 151, adapted to contact, respectively, with the mercury-cups 152 153, from which wires 154 and 155 extend to the printing-magnets 156, which operate armature-levers 157, having pivotal connection with the base-frame and having operative connection with the pivoted type-bearing arms 158, which are also pivoted to a fixed portion of the frame.

One of the main-line wires 3 passes through an electromagnet 159 and thence to a contact-piece 160, and from the adjacent contact-piece 161 the main-line wire 3 continues to the ground connection. The current through the main line is adapted to be opened and closed through the contact-plates 160 and 161 by means of a plate 162, carried by the pawl 134. When the pawl 134 is in its normal position or in engagement with the ratchet-wheel 124, the plate 162 on the said pawl closes the main circuit, but as soon as the magnet 136 attracts the pawl 134 the plate 162 is detached from the contact-plates 160 and 161, thus breaking the main-line circuit, and by moving into engagement with contact-plates 160^a 161^a will close the circuit through the magnet 136 in the local circuit 138, and the parts will be held in this position until the paper-carrier 108 reaches the rear end of the carriage 104, when a projection 163 will contact with and operate a switch 164, located in a local circuit comprising the wires 138, thus breaking the circuit of the magnet 136, which will allow the pawl 134 and the pawl 128 to move back into engagement with the ratchet-wheel 124 through the medium of the returning spring 165, and thus again close the current through the main circuit.

At opposite sides of the paper-carrier 108 arms 166 extend upward from the base-frame 103, and these arms are designed to support an inking-ribbon and to impart motion thereto across the roller 109. As the means are the same at both sides of the paper-carrier for moving the inking-ribbon, I will describe them both by the same reference-characters. From the arm 166 a yoke-frame 167 extends inward, and provides a bearing for a shaft 168, upon which are mounted bevel-gears 169 and 170, and also a shaft 171, upon which is mounted a bevel-gear 172, adapted to engage with either one of the bevel-gears 169 or 170, and the outer end of this shaft 171 has a pinion 173, adapted to engage with a rack 174, carried by the paper-carrier 108. The inking-ribbon 175 extends from one shaft 168 around an idler 176, having journal-bearings in arms 166 at one side of the machine, thence over an idler 177 at the upper portions of said arms, and thence around similar idlers supported by the arms 166 to the shaft 168 at the opposite end of the machine.

Obviously as the paper-carrier moves on the carriage 104, the racks 174 will rotate the gears 173 and these gears will rotate the bevel-gear mechanism, and the ribbon will be consequently drawn across the roller 109. Motion to the inking-ribbon in the opposite direction may be had by merely shifting the engagement of the bevel-gears 170. The pinion 173 has a clutch engagement 178 with the shaft 171, so that when the paper-carrier is moved back, the said pinion 173 may revolve without imparting motion to the ribbon mechanism.

Within the circuit comprising the printing-magnets 156 is a series of electromagnets 179, supported by the lower portion of the base-frame 103 and adapted to operate armature-levers 180, carrying puncturing-points 181 at their free ends. The puncturing-points 181 operate in connection with openings 182 in a platen 183, supported by the frame 103 and over which the strip of material 184 to be punctured is fed from a roller 185. A step-by-step feeding motion is imparted to the material 184 by means of feed-rollers 186 187, having journal-bearings in the frame 183. Rigidly attached to a journal of the roller 186 is a ratchet-wheel 188, adapted to be engaged by a spring-pressed pawl 189, carried by pivoted arms 190, the free ends of which are adapted to be engaged or forced downward by means of the downward movement of the armature-levers 180 in the process of puncturing the material 184.

The operation of this printing and puncturing device may be described as follows: An electric impulse coming over the line will energize the magnet 159; said magnet will attract the armature-lever 143, and the set-screw 145, engaging with the contact-plate 146, will close the circuit through the magnet 130, which magnet will attract the armature 129 until it rests upon the upper end of the angle-lever 133, and thereby pulls down the pawl 134 and revolves the ratchet-wheel 124 to rotate the screw 115 and move the paper-carrier one step forward. During the step-by-step movement of the paper-carrier the weight 123 is drawn upward and the pawl 128 will hold the ratchet-wheel 124 and prevent a reverse rotation thereof. At the same time the contact-points 150 151 will enter the mercury-cups 152 153 and close the circuit through the printing-magnet 156 to operate its armature-lever to throw the printing-bar 158 downward upon the inking-ribbon and transfer the character to the paper on the paper-carrier, and at this time the electromagnet 179 operates the armature-lever 180

to force its puncturing-point through the paper traveling over the bar 183. Of course it is to be understood that there is a puncturing-point for each character employed, as well as a printing-character for each character designed to be transmitted.

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

1. In a synchronizer for printing telegraphy, the combination of an electric cable, a fixed disk of insulating material carrying as many contact-points as there are wires in the electric cable, a movable disk provided with a series of insulating concentric rings, each ring being in contact with one of the electric contact-points of the fixed disk, the said movable disk being provided in its periphery with commutator-bars, each pair being connected electrically with one of the insulated rings, and a rotating brush constructed to revolve in contact with the commutator-bars, substantially as specified.

2. In a synchronizer for printing telegraphy, the combination of an electric cable, a fixed disk of insulating material carrying as many contact-points as there are wires in the electric cable, a movable disk provided with a series of insulating concentric rings, each ring being in contact with one of the electric contact-points of the fixed disk, the said movable disk being provided in its periphery with commutator-bars, each pair being connected electrically with one of the insulated rings, a rotating drum constructed to revolve in contact with the commutator-bars, and electromagnetic disk-adjusting mechanism, substantially as specified.

3. In printing telegraphy, the combination with a movable disk, of the synchronizing mechanism, a series of pins inserted in the periphery of the disk, two armature-levers on opposite sides of the disk and adapted to engage the radial pins, two magnets for engaging the armature-levers, magnets for holding the armature-levers in engagement with the synchronizing-disk, and the electric circuits, substantially as specified.

4. In printing telegraphy, the combination of a synchronizer for taking electrical impulses from the wires of a cable and transmitting them over a single wire, and a similar synchronizer placed in a reversed position for receiving impulses sent over a single wire and distributing them to the separate wires of another cable, the said synchronizers each comprising a rotary disk having radial pins, and electromagnetic-controlled armatures on opposite sides of the disk, for operating it by engaging the pins, substantially as specified.

5. The combination, with a synchronizer for transmitting the electric impulses of a cable to a single wire, of a transmitter for sending separate impulses over a separate wire of the cable extending to the synchronizer, the said synchronizer comprising a rotary disk having radial pins, and electromagnetic-controlled armatures on opposite sides of the disk, for operating it by engaging the pins, substantially as specified.

6. In an electric writing and printing machine, a transmitter comprising a metallic roller, a series of contact-fingers adapted to form an electric contact with the metal roller, electromagnetic mechanism for moving a perforated strip of material over said roller and under the contact-fingers, an electromagnet, an armature coacting therewith, a switch carried by said armature, an electromagnet in the circuit comprising the first-named electromagnet, and an armature coacting therewith and adapted to operate a key of a type setting or forming machine, substantially as described.

7. In printing telegraphy, a metallic roller over which a sheet of perforated material is adapted to pass, electromagnetic means for feeding said strip of material, spring-fingers coacting with said metallic roller, an electromagnet, an armature coacting therewith, another electromagnet in the circuit of the first-named electromagnet, and in circuit with the spring-fingers, an armature operated by said electromagnets for operating the keys of a type setting or forming machine, and an automatic switch for alternately changing the current through said electromagnets, substantially as specified.

8. The combination of the metallic roller, the spring-fingers coacting therewith, an electric circuit, an electromagnet in said circuit, an armature coacting with said electromagnet, a pawl extended from said armature, a ratchet-wheel on a journal of the roller with which said pawl engages, another electromagnet for operating printing-keys and a switch-section carried by the armature of the first-named electromagnet, for alternating the current through the electromagnets, substantially as specified.

9. The combination with a source of electricity, of an electromagnet in the circuit thereof, an armature coacting with said electromagnet, a wire extended from the source of electricity to a switch-section carried by said armature, a contact-plate, a wire leading from the contact-plate to the electromagnet and back to the source of electricity, a metallic roller, a contact-plate in electrical connection with said roller, the said two contact-plates being adapted to be engaged alternately by the switch-section carried by the armature, a spring-contact adapted to engage with the metallic roller, a wire extended from said spring-contact to an electromagnet and thence to the source of electricity, and an armature operated by said last-named electromagnet for operating the key of a type setting or forming machine, substantially as specified.

10. The combination with a fixed support, of a paper-carrier, a roller supported by said carrier, a screw-shaft for moving said paper-carrier, a ratchet-wheel on said screw-shaft, a pawl engaging the said ratchet-wheel, an ar-

mature to which said pawl is pivoted, an electromagnet, a local circuit in which said electromagnet is placed, a switch in said local circuit operated by the carrier, a main circuit, electromagnets comprised in said main circuit, printing-type operated by said last-named electromagnets, and means carried by said pawl for making and breaking the main-circuit current, substantially as specified.

11. The combination with a stationary support, of a paper-carrier movable thereon, a screw-shaft for causing the movements of said paper-carrier, a ratchet-wheel on the said screw-shaft, a pawl adapted to engage with the ratchet-wheel for rotating the same, an armature to which said pawl is pivoted, an electromagnet for operating the said armature, a local battery having one pole connected with said electromagnet, an angle-lever having connection with the other pole of said battery and adapted to limit the movements of the armature and consequently the feed of the paper-carrier, an electromagnet for detaching the pawl from the ratchet-wheel, a local circuit in which said electromagnet is located, a switch in said local circuit operated by the paper-carrier, a series of printing-type, and electromagnets in a main circuit for operating said printing-type, substantially as specified.

12. The combination of a paper-carrier, a tubular impression-roller carried thereby, a screw-shaft for causing the movement of said paper-carrier, the said screw-shaft having a portion thereof extended through the said impression-roller, a piston on said portion within the impression-roller the said roller having an end wall through which the shaft passes and also having an air-vent, means for imparting a rotary motion to said impression-roller when it shall have reached one end of its movement, and electromagnetic means for causing the movement of the paper-carrier in one direction, substantially as specified.

13. The combination with a movable paper-carrier, electromagnetic means for causing a movement thereof, an impression-roller supported by said carrier, an inking-ribbon extended across said roller, means for causing a step-by-step movement of said inking-ribbon, a series of printing-type, a source of electricity, and electromagnets comprised in said source of electricity for operating the printing-type, and an independent circuit for moving the carriage and controlled by the carriage, substantially as specified.

14. The combination of the paper-carrier, electromagnetic means for causing the movements thereof, an impression-roller supported by the carrier, bearing-rollers supported by the carrier and adapted to engage the outer side of the paper extended over the impression-roller, an inking-ribbon movable transversely over the impression-roller, and means comprising gearing operated by a rack on the paper-carrier for causing the movements of said inking-ribbon, substantially as specified.

15. In a reproducing or printing device, the combination of the main source of electricity, electromagnets comprised therein, printing-type operated by said electromagnets, a paper-carrier, a screw-shaft for moving said paper-carrier, a ratchet-wheel on said screw-shaft, a pawl adapted to engage the said ratchet-wheel, an armature with which said pawl is connected, an electromagnet for operating said armature, a local circuit in which said electromagnet is located, an angle-lever in said local circuit and having one arm adapted to engage the said armature, and a lever having an adjustable electrical connection with the other arm of said angle-lever, and having contact-points for closing said local circuit and also closing said main source of electricity, substantially as specified.

16. The combination with a stationary support, of a paper-carrier, a screw-shaft for moving the same on a stationary support, a ratchet-wheel on said screw-shaft, a weight having a flexible connection with said screw-shaft, a safety-pawl adapted to engage with the ratchet-wheel, a pawl having a hook end to engage with said ratchet-wheel, electromagnetic means for causing a downward movement of said pawl, and electromagnets for disengaging both of said pawls from the ratchet-wheel, substantially as specified.

17. The combination with a fixed support, of a carriage removable therefrom, a paper-carrier movable on said carriage, an impression-roller supported by said paper-carrier, means for causing a step-by-step rotary movement of the said impression-roller, electromagnetic means for causing the movements of said paper-carrier, an inking-ribbon movable over the paper-carrier, means, having connection with the carrier, for causing the movements of said ribbon, printing-type, electromagnets for operating said printing-type upon the ribbon, a main circuit in which the electromagnets are located, a local circuit for causing the operations of the parts for moving the paper-carrier, automatic means for making and breaking the main circuit, and puncturing devices operated simultaneously with the printing-type, substantially as specified.

JOSEPH JOACHIM REIFGRABER.

Witnesses:
J. HANDELMAN,
J. MARGOLUS.