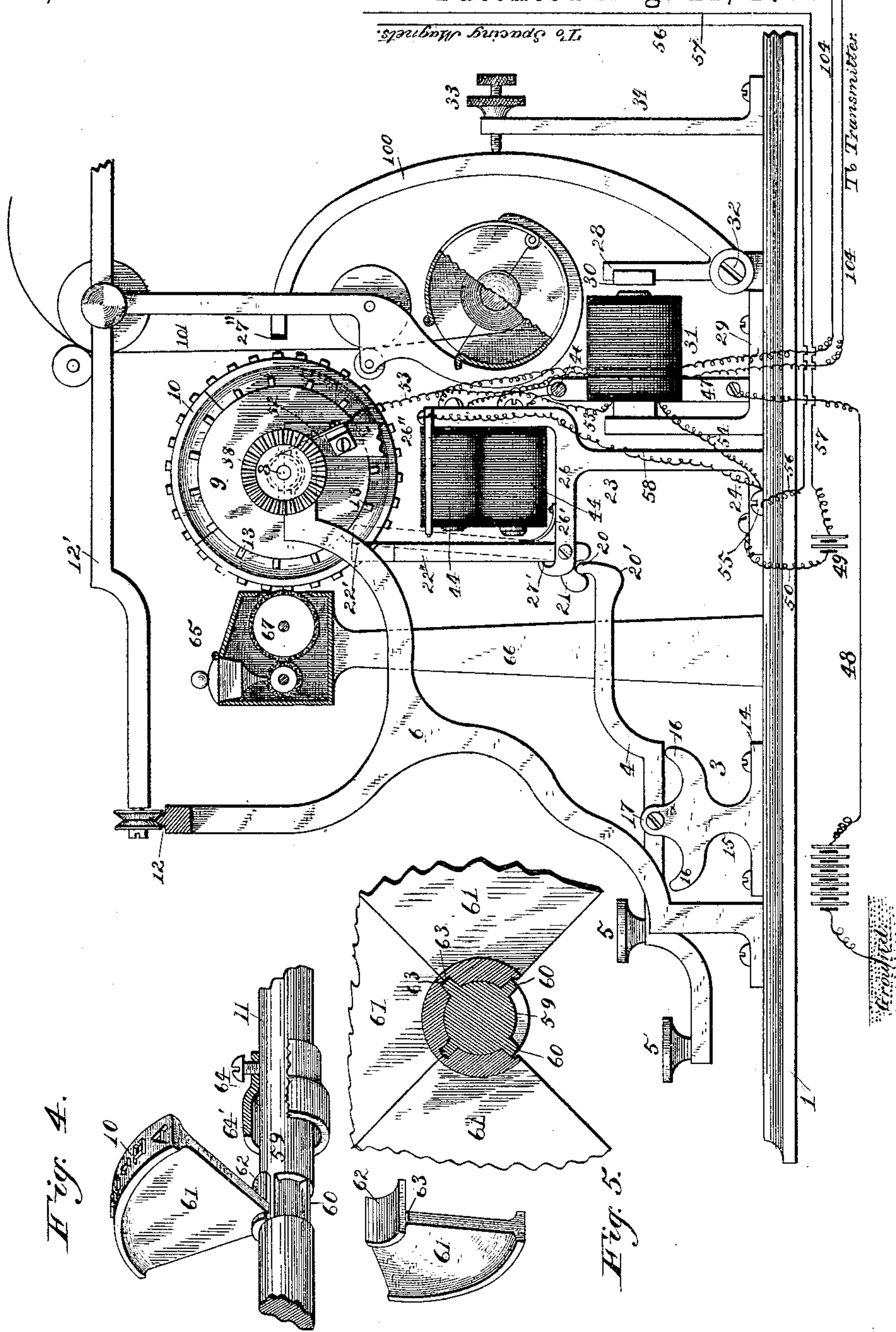


J. F. McLAUGHLIN.
ELECTRICAL TYPE WRITER.

No. 388,142.

Patented Aug. 21, 1888.

Fig. 1.



ATTEST:

Percy C. Bowen,
Carr B. Waller

INVENTOR:

James F. McLaughlin,
By Harding & Nichol,
his Attorneys.

(No Model.)

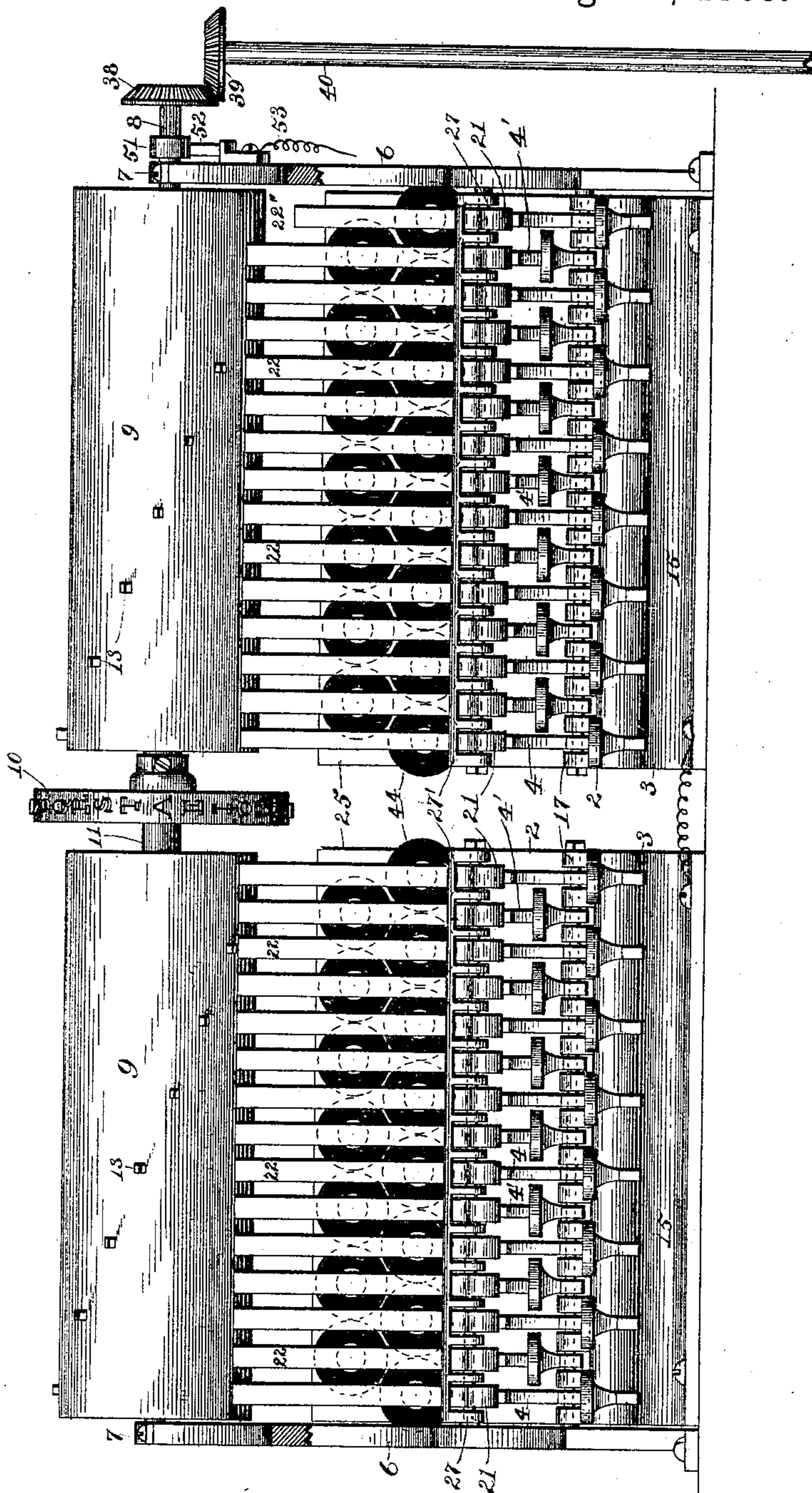
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J. F. McLAUGHLIN.
ELECTRICAL TYPE WRITER.

No. 388,142.

Patented Aug. 21, 1888.

Fig. 2.



ATTEST:

Rey C. Bowen.
Car B. Waller.

INVENTOR:

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his Attorneys.

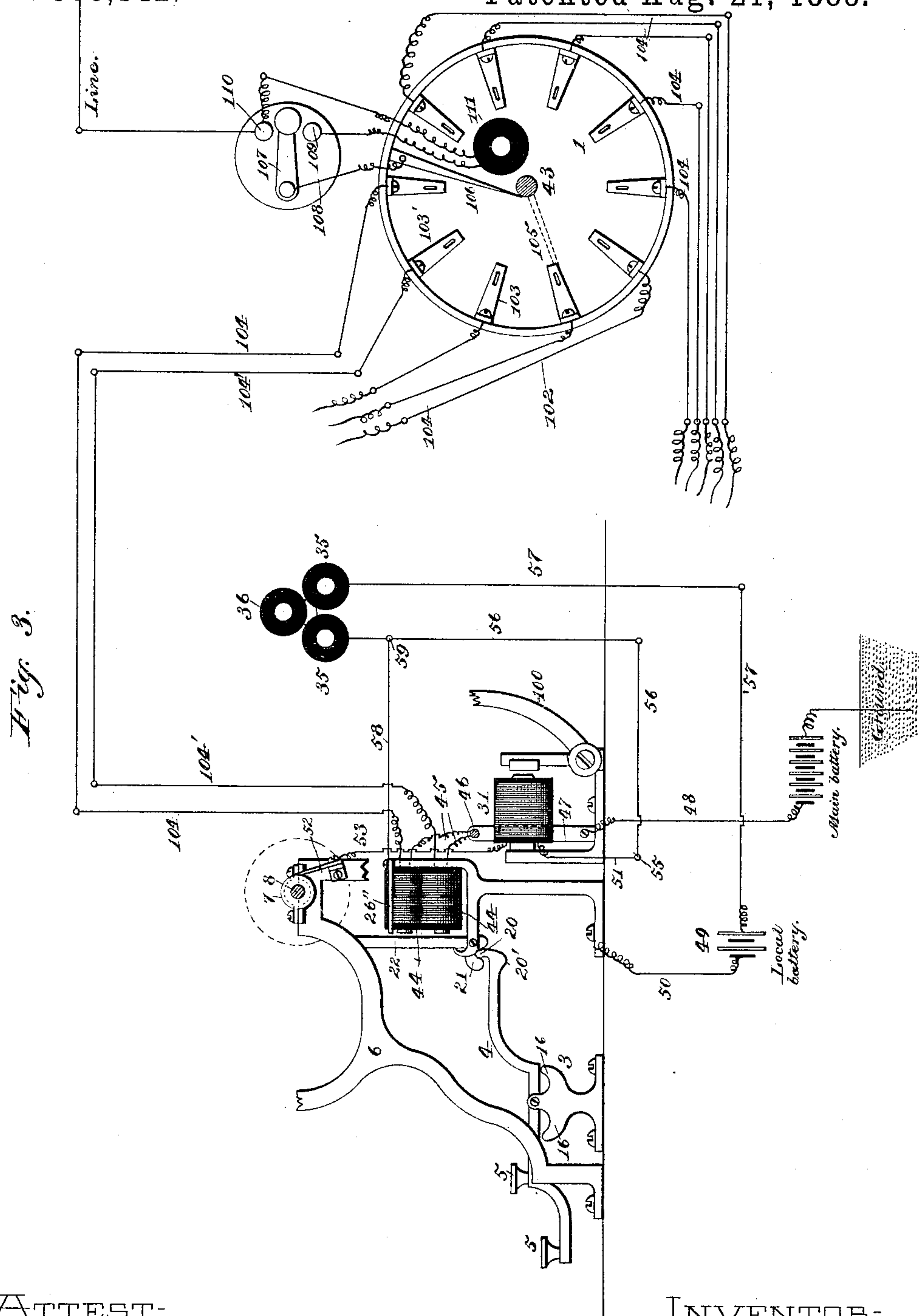
(No Model.)

4 Sheets—Sheet 3.

J. F. McLAUGHLIN.
ELECTRICAL TYPE WRITER.

No. 388,142.

Patented Aug. 21, 1888.



ATTEST:

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INVENTOR:-

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His Attorneys.

(No Model.)

4 Sheets—Sheet 4.

J. F. McLAUGHLIN.
ELECTRICAL TYPE WRITER.

No. 388,142.

Patented Aug. 21, 1888.

Fig. 6.

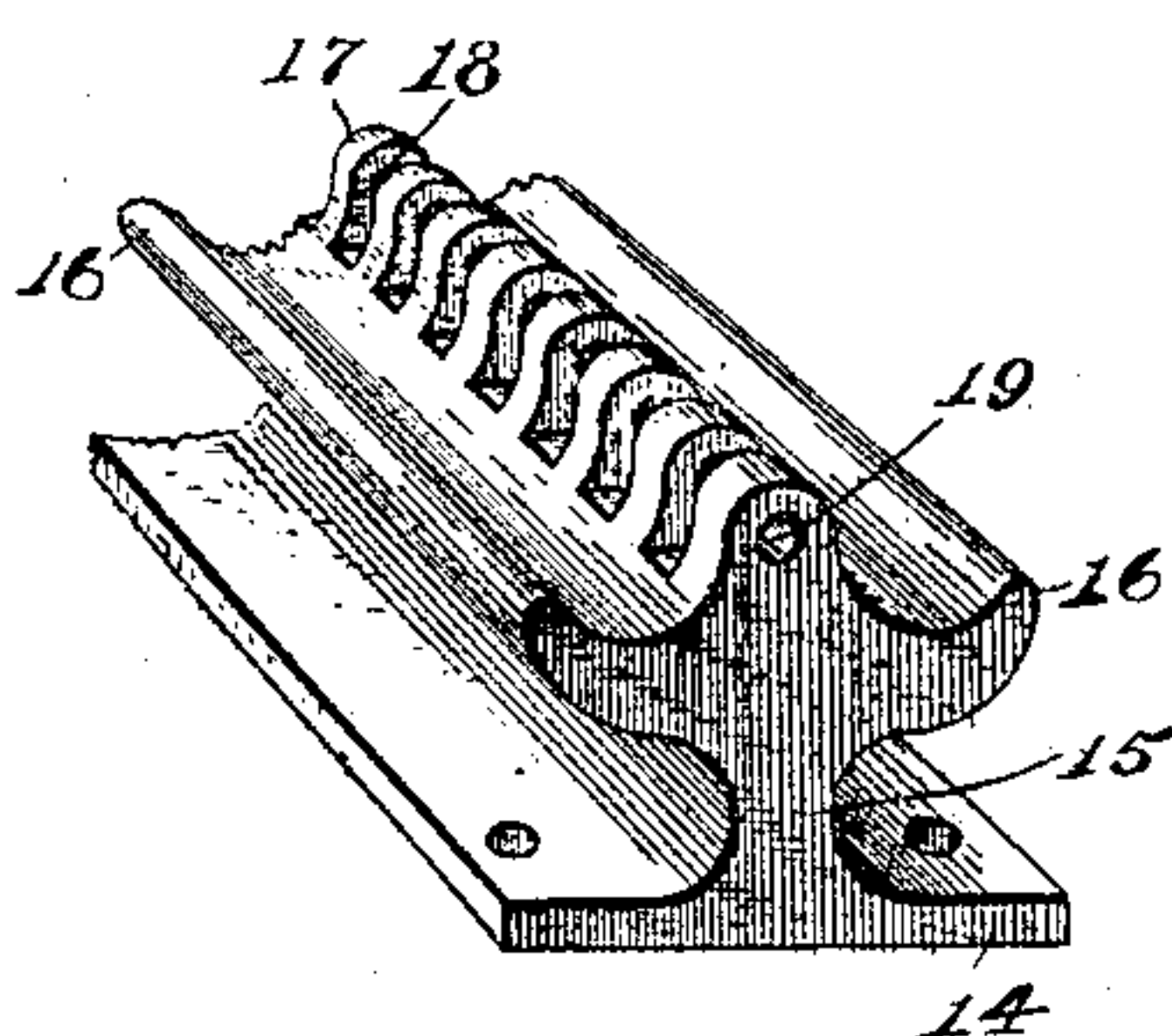


Fig. 7.

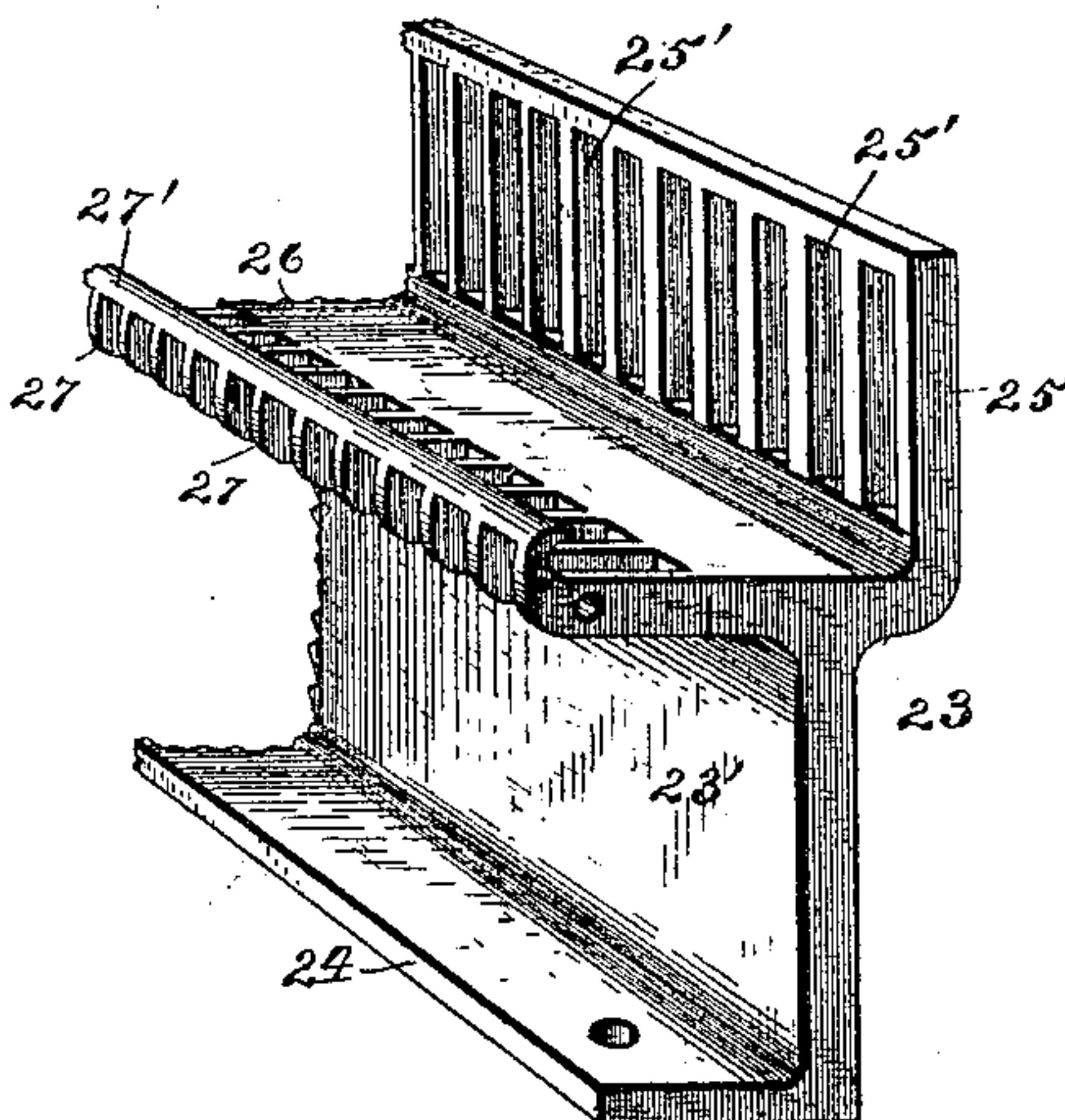
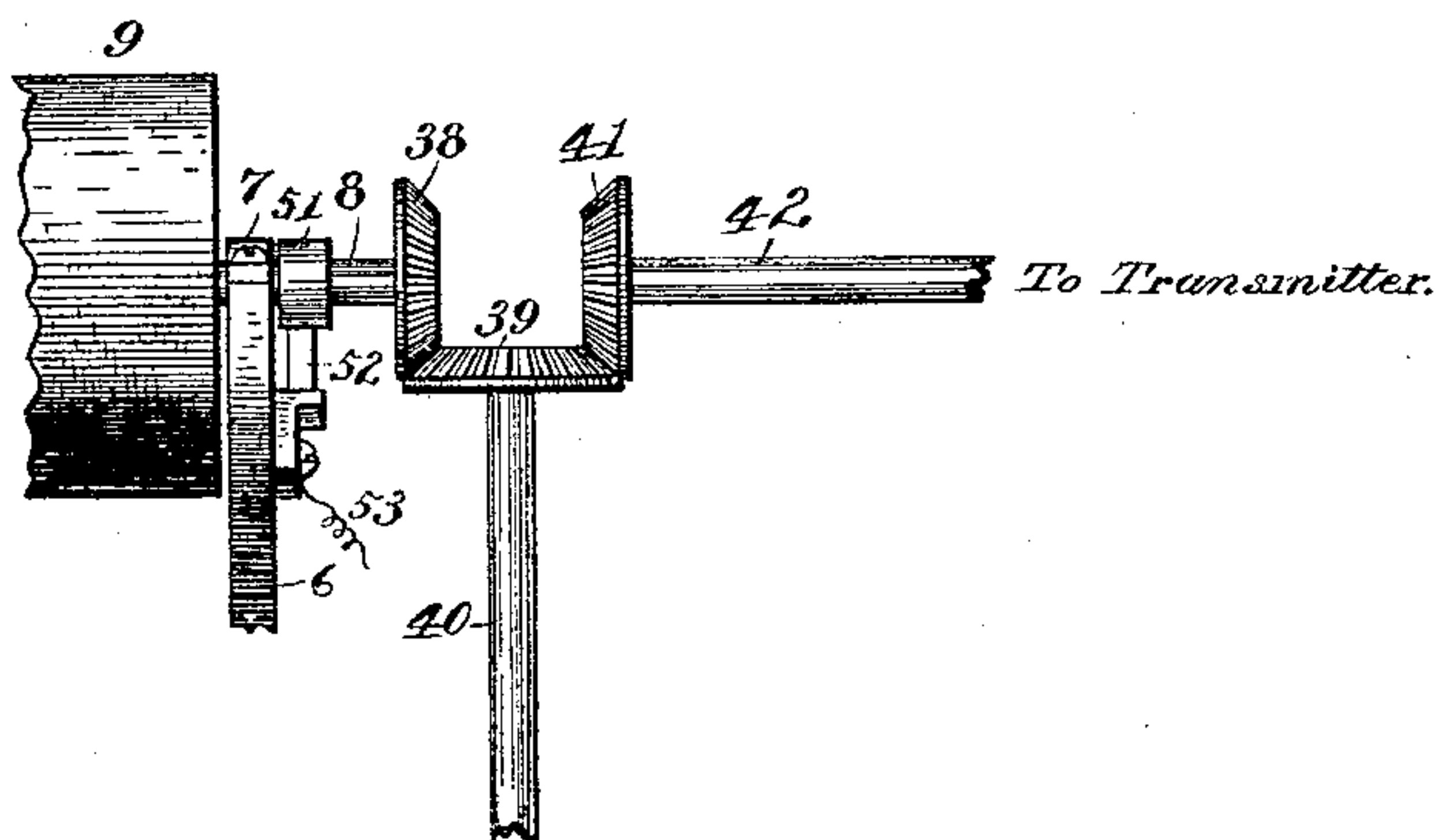


Fig. 8.



Synchronous Motor.

ATTEST:

Percy C. Bowen.
Clara B. Waller.

INVENTOR:

James F. McLaughlin.
By Harding & Tichenor.
his Attorneys.

UNITED STATES PATENT OFFICE.

JAMES F. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRICAL TYPE-WRITER.

SPECIFICATION forming part of Letters Patent No. 388,142, dated August 21, 1888.

Application filed October 18, 1887. Serial No. 252,727. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Type-Writers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention has reference to improvements in electrical type-writers which are adapted for use in connection with a suitable local transmitter as recorders of outgoing messages sent by said transmitter over a line to a distant station, and also as receivers for incoming messages sent to the home station by a suitable transmitter located at a distant station. In addition to this, my improved apparatus may be used for the same purposes as an ordinary mechanical type-writer; but its operation differs from the latter in that the printing is effected electrically.

The transmitter used in connection with my improved type-writer is preferably of the character described in Letters Patent granted to me May 17, 1887, and numbered 363,158; but other suitable transmitters operating upon the same principle may be used without departing from my invention.

In other pending applications filed by me I have shown and described the fundamental features thus briefly defined, and my present invention has reference to improvements in the construction of the more essential parts of the apparatus, whereby the functions of the same are performed with greater ease and certainty.

In the accompanying drawings, which form a part of this specification, I have illustrated my invention with special regard to clearness and have omitted such parts as are not necessarily parts of my present improvements, but the co-operation of which with the latter will be easily understood by those skilled in the art. Other parts of the whole apparatus I

have only indicated diagrammatically or by conventional signs, as will appear from the detailed description.

Figure 1 represents a side elevation, partly in section, of my improved type-writer. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation of a portion of my improved type-writer connected with the local transmitter. Fig. 4 is a perspective view of my improved type-wheel. Fig. 5 is a transverse section of the same. Fig. 6 is a perspective view of the type-key support. Fig. 7 is a like view of the casting serving as a support for the stop-levers and for the magnets actuating the same. Fig. 8 is an elevation of the gear connecting the synchroal motor with the transmitter and type-writer.

Upon the base-plate 1 of insulating material the various parts of the apparatus are assembled. They consist in the main of a key-board, a rotary type-wheel controlled thereby, a printing lever or mallet, type and line spacing mechanism, and electro-magnets actuating the several parts. The key-board is arranged in two sections, 2 2, each of which consists of a casting, 3, with type-levers 4 4' pivoted therein. Each type-lever corresponds to a letter, numeral, or punctuation-mark used in writing, and is provided with a button, 5, having such letters, &c., marked upon its face, as in ordinary mechanical type-writers. The two sections of the key-board are separated from each other by a space the width of which is adapted to the construction of the other parts of the apparatus, which are hereinafter described.

At the outer ends of the castings 3 3 are standards 6 6, which form the frame of the apparatus and support the bearings 7 7 of the shafts 8 8 of two cylinders or drums, 9 9. Each cylinder extends from one of the standards to about the inner end of its corresponding casting 3, and in the space between the inner ends of these cylinders is located a type-wheel, 10, which may be of any ordinary or improved construction, but which is preferably constructed as hereinafter more fully described.

As will be seen in Fig. 2, the type-wheel is mounted upon a short shaft, 11, which is in line with the main shafts of both cylinders,

and is secured to the inner ends of the latter. Thus when the drums are rotated the type-wheel will rotate with the same.

The standards 6 are of such height as to support the cylinders a suitable distance above the base plate, as shown, and they are also provided with V-shaped guide-bars 12 for supporting and guiding the carriage 12' of the type-writer by means of a grooved roller, as shown. The drums 9 9 are preferably made of metal, and they are provided with a series of lugs, 13, arranged helically upon the surface of the drums, and the position of each lug corresponds to the position of one of the levers of the two sections of the key-board, and it also corresponds to one of the types upon the type-wheel.

The castings 3 have the general shape of an I-rail. They are constructed with a base, 14, by which they are secured to the base-plate 1, a central stand, 15, two lateral branches, 16 16, and a central bearing branch, 17. The central bearing branch is divided by slots 18 into a number of lugs, and perforations 19, passing in a single line through the lugs, serve for the reception of a pivotal rod passing through all of them, and upon this rod are pivotally hung the levers 4 4', which are received in the slots 18. Each alternate key-lever is curved upwardly from its outer end. It then extends upon a straight line through and beyond one of the slots in the casting 3, and is then again curved upwardly and terminates in an upwardly-curved nose, 20, which engages with a downwardly-curved nose, 21, formed at the end of a corresponding stop-lever, 22, pivoted in a bracket, 23. Between these key-levers are others, the front arms of which terminate with the straight portions of said levers, to which the type-buttons are secured. Thus, while there is only a single row of key-levers in each section of the key-board, there are two parallel rows of type-buttons, as is clearly shown in the drawings.

From the construction so far described it follows that if a key-lever is depressed by hand one of the lateral branches 16 of casting 3 will form its front stop, and if the lever is rocked in the opposite direction the other lateral branch 16 of casting 3 will form its back stop. Each lever is normally held in contact with its back stop by a counterbalancing weight or swelling, 20', formed under the nose 20. Thus, if any one of the key-levers is first depressed in front and is then released, the overbalancing-weight 20' will return such lever automatically to its normal position in contact with its back stop. While I find this construction very convenient and preferable to others, it will be clear that in place of the weight 20' a retractile spring might be used.

There are two castings, 23, each corresponding to one of the castings 3 and parallel with the latter. Each casting 23 is fastened by screws passing through a flange, 24. The slots 25' are equal in number and correspond to the stop-levers 22 and serve as a means for secur-

ing electro-magnets for actuating the stop-lever to casting 23. This slotted plate 25 is joined to flange 24 by a web, 23', and at the juncture of the two extends a rib, 26, parallel with flange 24 and projecting from the main body of the casting. The outer edge of this rib 26 resembles in general outline the shape of an upwardly-curved hook, and is divided into lugs 27, which correspond each to one of the lugs on the central bearing branch, 17, of casting 3. These lugs, however, are joined at their upper edges by a web, 27', which is cast in one piece with the lugs, as is clearly shown in Fig. 7.

The stop-levers 22 are pivoted upon a rod passing through all the lugs of rib 26, and the parts are so proportioned that in its normal position the vertical arm of each lever 22 leans forward and is arrested by web 27'. When one of the key-levers is depressed in front, its nose 20, engaging nose 21 of its corresponding stop-lever, will tip the vertically-extending arm of lever 22 rearwardly until the same is arrested by contact with the surface of one of the cylinders 9, and if the key-lever is released, its nose 20 disengaging nose 21 of the stop-lever, the latter will be brought to its original position by the overbalancing action of nose 21, which for this purpose is made heavier and thicker than the vertical arm of lever 22. The normal position of lever 22 (shown in solid lines in Fig. 1) is insured by so distributing the weight of said lever that its center of gravity is at all times to the left-hand side of its fulcrum, (see Fig. 1,) and this may be effected either by making the nose 21 sufficiently heavy, as stated above, or in any other suitable manner.

Web 27' in each casting 23 constitutes the front stop for each lever 22 mounted in that casting, and the surface of one of the cylinders 9 9 constitutes the corresponding back stop; and it will now be seen that when a key-lever, 4 or 4', is upon its front stop the corresponding stop-lever will be upon its back stop, while when a key-lever is upon its back stop the corresponding stop-lever will be upon its front stop. The latter is the normal position, and in this position the vertical arms of the stop-levers are all in one plane, which plane slightly inclines from the vertical, and their upper ends are all in one straight line parallel to the axis of the cylinders. In addition to the overbalancing-weight of nose 21, a spring, 26', secured to a rib, 26, and bearing with its free end against lever 22, is faced upon its inner side, where it makes contact with the surface of the stop-lever 22, with a strip of insulating material, 22'.

The metallic lugs 13 upon each cylinder are arranged upon a helical line, and are so spaced longitudinally that whenever a key-lever is depressed the corresponding stop-lever will intercept with its metallic portion one of these lugs and will stop the cylinders and the type-wheel rotating with the same. There are, therefore, as many lugs upon each cylinder as

there are key-levers to the corresponding section of the key-board, and the number of types upon the type-wheel is equal to the total number of key-levers. In addition to this, there
 5 is a spacing-lever, which occupies the space of a key-lever. This spacing-lever is constructed exactly like a key-lever and has its corresponding lever, 22", which corresponds to one
 10 of the stop-levers, made shorter than any of the latter, so that when the spacing-lever is depressed lever 22" will not make contact with the cylinder, (being too short for that,) but will strike against the end of a metallic pin, 26", secured to but insulated from slotted plate 25 of
 15 casting 23, as is clearly shown in Figs. 1 and 3. There is, therefore, no lug 13 upon the cylinders 9 and no type upon the type-wheel corresponding to the spacing key. The function of the latter and its co-operation with pin 26" will be
 20 hereinafter more fully described.

A printing lever or mallet, 100, with its striking-head 27", of soft rubber or other elastic material, facing the edge of the type-wheel, is pivoted to the base of a frame, 29. One
 25 arm, 28, of this lever carries an armature, 30, of an electro-magnet, 31, so that when the latter is energized the armature will be attracted and the head of the mallet will strike upon the rim of the type-wheel, and if a sheet of paper,
 30 101, is interposed between the type-wheel and the head of the printing-lever the letter, numeral, or other character formed upon that part of the type-wheel which happens to face the printing-lever will be printed upon such
 35 paper. The types upon the type-wheel are so spaced and are in such sequence that if a key or key-lever marked with a certain letter or character is depressed and the rotating cylinders are stopped by the interception of one of
 40 the lugs upon the cylinder by the stop-lever corresponding to the depressed key the same letter or character upon the type-wheel will face the head of the printing-lever. This same letter or character upon the type-wheel will
 45 therefore be printed upon the paper if the magnet 31 be energized at the proper time, and if a word or sentence be spelled out by the successive depression of the proper keys this word or sentence will be printed upon the pa-
 50 per, as in ordinary mechanical type-writers.

The arm 100 of the printing-lever is curved, as shown, to bring its center of gravity to one side of the fulcrum 32, and an adjustable stop-screw, 33, in a standard, 34, limits the outward
 55 movement of the printing lever and armature. It constitutes the back stop of the printing-lever. The carriage 12', which supports the paper, 101, is indicated in Fig. 1; but for the sake of clearness of illustration the letter and
 60 line spacing mechanism is not shown in the drawings. Electro-magnets 35 and 36, however, which actuate the letter and line spacing mechanism, are shown by conventional signs in Fig. 3. It is not necessary here to describe
 65 these magnets and their adjuncts any further than to say that they are designed to move the carriage after each imprint into a position for

the paper to receive the next imprint and to shift the paper after the completion of a line in position to receive another line of writing. 70

To one end of the common shaft, 8, of the cylinders 9 9 is secured a bevel gear, 38, meshing with another bevel-gear, 39, keyed to a vertical shaft, 40, which is driven by a suitable motor (not shown) in unison with a similar
 75 shaft in an apparatus constructed substantially like the one here described, located at a distant station. The synchronal motor is not here shown; but it will be understood that I may use any ordinary or improved motor of
 80 that kind, although I prefer to use the synchronal motor patented to me August 16, 1887, and numbered 368,411. Another beveled gear, 41, (see Fig. 8,) also meshes with bevel-gear 39 and drives the shaft 42, which in turn gives
 85 motion to shaft 43 of the transmitter 102, (see Fig. 3,) constructed substantially in accordance with my Letters Patent No. 363,158, dated May 17, 1887. Upon reference to said Letters Patent it will be seen that the central shaft, which
 90 corresponds to shaft 43 shown in this case, carries a trailing brush, which makes contact successively with a number of circularly-arranged contact-plates, and that a number of
 95 type-keys constituting the key-board are arranged above the contact-plates and are adapted upon being depressed to stop the trailing brush in contact with the corresponding contact-plate and to establish electrical
 100 connections with a line proceeding from each key, or from springs connected therewith.

In the diagrammatic representation of the transmitter (shown in Fig. 3 the lines 104) proceeding from the same are shown connected with the springs 103, which are sup-
 105 posed to establish connection with segmental contact-plates located below the same if depressed by the operation of a key arranged above said spring. The trailing brush is indicated in dotted lines at 105, and in addition
 110 thereto there is shown a brush, 106, bearing upon the shaft 43 and connected with switch-arm 107 by a conductor, 108. This switch-arm is adapted to make contact with two but-
 115 tons, 109 and 110, which constitute the terminals of an electro-magnet, 111, and button 110 is also connected with the line going to the distant station.

By reference to my said Letters Patent No. 363,158 it will also be seen that to the central
 120 shaft of the transmitter is secured a disk of soft iron, and that this disk, rotating with said central shaft, extends between the two poles of an electro-magnet which corresponds to an
 125 electro-magnet, 111, shown in this case, and this electro-magnet is energized by the passage of a current through its coils, and one side of the magnetic disk is suddenly surrounded by a dense magnetic field when said
 130 magnet is energized, and its motion will be ordinarily retarded by the resistance of said field, and if the electro-magnet is powerful enough the passage of the disk through the magnetic field of the same will be arrested.

In pursuance of the objects of my invention electro-magnet 111 is made strong enough to arrest the motion of the iron disk through its field of force whenever a suitable current is passed through the magnetizing coils, and the construction herein described is specially adapted to aid this operation.

In other pending applications heretofore filed I have shown electrical type-writers serving the same purpose as that herein shown, and among other features similar to those found in the present invention one has also the transmitter herein indicated, with a magnetic disk moving through a magnetic field; but in those other pending applications there is, in addition, a disk of large diameter driven by the shaft and provided with lugs corresponding to the lugs on cylinders 9 9 shown in this case and the momentum of a disk of such size as is necessary to provide room for the lugs would carry the same and the magnetic disk beyond the point where it is necessary to stop the type-wheel and cylinders, which move in unison with said magnetic disk, unless the brake-magnet (corresponding to magnet 111 in this case) were very powerful and the energizing-current very strong.

In the construction herein shown a cylinder or cylinders are employed in place of a disk, and this enables me to reduce the mass set in motion by the shaft to which the magnetic disk is secured, and to bring that mass closer to the mathematical axis of rotation. For both reasons the momentum is greatly reduced, and the electro-magnet 111 may be comparatively weak and will promptly arrest the motion of the cylinders, which are rotated by the shaft carrying the magnetic disk and the parts connected therewith. The reduction of the momentum of the rotating parts has also another beneficial effect in that the shock received by the ends of the stop levers is thereby lessened. In addition to this, the use of cylinders in place of a disk enables me to place the stop-levers in such position that the direction of the blow of the stop-lugs upon the same will pass through the fulcrums of these levers. The latter may therefore be made comparatively light without danger of bending, whereas in the construction with a disk the stop-levers must be arranged to receive the blow of the lugs on their sides, tending to bend these levers.

To plate 25 of casting 23 are secured a series of electro-magnets, 44—one for each stop-lever 22—and these stop levers, being made of magnetic material, constitute the armature of magnets 44, as shown. Each magnet is secured to plate 25, with its yoke, by screws passing through the slots 25', or otherwise, and one of the terminals of all of these magnets is united upon a rod, 46, passing through metallic standards 47, while the other terminals are connected with the local lines 104, connected with the springs 103 of the transmitter.

The electrical connections of the apparatus are as follows: A main battery is connected

with one pole to ground, the other pole of which is connected by a conductor, 48, to its standard 47. One pole of the local battery 49 is connected by a wire, 50, with a casting, 23, and if any one of the stop-levers intercepts its corresponding lug upon a cylinder the circuit proceeds from casting 23 by stop-lever 22, to the cylinders by stop 13, by a collar, 51, secured at one end of the common shaft of the cylinders, to a brush, 52, and by wire 53 to and through magnet 31, and by wire 54 to a screw, 55. (See Fig. 1.) From this point the circuit continues by wire 56 to the spacing-magnets 35 and 36, and returns by wire 57 to the other pole of the local battery. In addition to this, pin 26" is connected by a conductor, 58, with wire 56, which it joins at the screw 55, as shown, Fig. 1, or at some other point, 59, as shown in Fig. 3.

Before describing the operation of this apparatus it will be well to have a clear conception of the relation of the moving parts of the transmitter and the type-writer proper at one end of the line with the same parts in the similar apparatus at the other end of the line at the distant station. The apparatus at the two stations are supposed to be identical in every respect, except that the opposite poles of the two main batteries are connected with the ground and with the line, respectively, so that the two batteries are connected in series.

The synchronal motors at the two stations are supposed to rotate shafts 40 in unison, and the lugs upon the cylinders 9 9 and the types upon the two type-wheels are supposed to be at both stations in the same relations to the stop-levers and to the heads of the printing-levers, so that if a given letter—say the letter A—upon the type-wheel at one station faces the striking-head of the printing-lever the same letter upon the type-wheel at the other station will also face the head of its printing-lever. Besides this, the trailing brushes of the two transmitters will always pass simultaneously over conducting-segments corresponding to the same keys of said transmitters. It should also be remembered that the lugs upon the cylinders are so arranged that if any one of them is intercepted by a stop-lever corresponding to a key-lever the button of which is marked with a given letter—say the letter A—the same letter, A, upon the type-wheel will face the striking end of the printing-lever, and at the same time the trailing brushes in the transmitters at both stations will be upon the conducting-segments corresponding to the letter A.

The operation of the apparatus will now be easily understood.

If the apparatus is to be used as a transmitter, switch-arm 107 is turned upon contact-button 110 and the message is spelled out by the successive depression of the type-keys of the transmitter. Suppose the key bearing the letter A upon its face to be the one which corresponds to the spring marked 103' and that

this key be depressed. By the depression of this key spring 103' is put into electrical connection with one of the segments placed below the same and the trailing arm 105 is stopped mechanically when the brush carried by the same is in contact with the segment with which spring 103' is now in electrical connection. All this is supposed to be understood, and is clearly set forth in my before-mentioned Letters Patent No. 363,158, dated May 17, 1887.

By the operation thus far described the circuit from the main battery is closed as follows: From one pole of said battery by wire 48 to standard 47, and from rod 46, mounted in standard 47, by one of the wires, 45, to that magnet 44 which is connected by a local line, 104', with spring 103', and to the transmitter. After passing through the coils of this magnet 44, the current proceeds by a local line, 104', to spring 103', trailing brush and arm 105, shaft 43, contact-brush 106, connections 108, switch-arm 107, contact-button 110 to the line and distant station, where it traverses the apparatus there located and returns by ground to the other pole of the battery in a manner presently to be described. By the passage of the current through the coils of electro-magnet 44 said magnet is energized and attracts its armature, which is one of the stop-levers 22—namely, that stop-lever which corresponds to a lug upon one of the cylinders 99 corresponding to the letter A upon the type-wheel. Stop-lever 22 will now be in position to intercept its corresponding lug upon one of the cylinders; but this interception will not be necessary for stopping the cylinder with the letter A on the type-wheel facing the printing-lever and type-wheel, for the same have already been stopped by the interception and stopping of trailing arm 105, connected with shaft 43, which, as has been shown, is geared to the cylinders; but by contact of stop-lever 22 with its corresponding lug a local circuit, including battery 49, is closed as follows: From one pole of said battery by wire 50, through casting 23, stop-lever 22, the cylinders 9, collar 51, brush 52, wire 53 to and through electro-magnet 31, and then by wires 54 and 56 to the spacing-magnets 35 36, from which the current returns by wire 57 to the other pole of the battery. Magnet 31 being thus energized, the printing-lever 100 is actuated and the letter A is printed upon the paper. This printing-lever is somewhat elastic and rebounds from contact with the paper and type. Spacing-magnets 35 and 36 are constructed with a heavy solid core, so as to be sluggish in their action and acquire their maximum strength some little time after magnet 31 has been energized. The spacing-magnets will therefore move the carriage only after the imprint has been made upon the paper. If, now, the type-key which had been depressed at the transmitter is released, the line-circuit will be broken, magnet 44 will be de-energized, stop-lever 22 will be returned to its front stop by

the combined action of the overbalancing-weight of nose 21 and by spring 26', and the local circuit will be broken, whereby the printing-lever will be allowed to resume its normal position against back stop, 33. If it is desired to make a space between one word of a message and the next, a key in the transmitter is depressed which is connected by one of the local lines 104 with such magnet 44 as is in operative relation with the short lever 22', and which in turn is in operative relation with pin 26". The circuit from the main battery is then completed through that particular magnet 44, in the manner hereinbefore described, and the short lever constituting the armature at said magnet is attracted, and, making contact with its back stop, 26", it closes a local circuit through battery 49, as follows: From one pole of said battery by wire 50 and casting 23 to lever 22', pin 26", wire 58, either to clamp-screw 55, as shown in Fig. 1, or to a point, 59, in wire 56, as shown in Fig. 3, and by wire 56 through the spacing-magnet, and by wire 57 back to the other pole of the battery. Thus it will be seen the printing-magnet 31 is cut out, while the spacing-magnet is energized. The carriage will therefore be moved, making a clear space upon the paper. If the apparatus is to be used as a receiver, switch-arm 107 is turned upon contact 109, and the incoming electrical impulse will pass from the line switch-button 110 to and through the coil 111, and by switch-button 109 and switch-arm by connection 108 to brush 106, shaft 43, trailing arm 105, and by the brush connected with the said arm to the segment which at that time is in contact. Now, it will be understood that the brush of the trailing arm at the home station is at all times in contact with that segment which corresponds to the segment in the transmitter at the distant station which at that moment is in contact with its trailing brush. Consequently if the incoming electrical impulse has been produced by the depression at the distant station of the type-key A of the transmitter, said impulse will pass at the home station to the segment corresponding to the type-key A in the home transmitter, and at the same moment the letter A upon the type-wheel will face the striking-head of the printing-lever. The incoming electrical impulse will therefore find the trailing brush upon the segment corresponding to the spring 103', and the current will continue over local line 104' to its corresponding magnet, 44, and then by terminal 45 of said magnet to rod 46, standard 47, wire 48 to the main battery at the home station and to ground. The printing at the home station is then done precisely in the same manner as in transmitting; but an additional action takes place by reason of the incoming current passing through magnet 111, for said magnet being energized the magnetic disk which passes through its field of force will be arrested and will relieve lever 22 of a part, at

least, of the shock which it would otherwise receive by the impact therewith of its corresponding lug upon one of its cylinders.

If the apparatus is to be used for the purposes of an ordinary type-writer—that is, without transmitting electrical impulses over a line—the switch 107 is opened, as shown in Fig. 3, and the key-board 22 is manipulated similar to the key-board of an ordinary mechanical type-writer. The depression of any one of these keys will bring its respective stop-lever into position to intercept a lug upon one of the cylinders, and will thereby close a local circuit including the printing-magnet 31 and spacing-magnet 35 36, as now can be traced without difficulty.

It will be noticed that by the construction shown the shock received at the free end of a stop-lever when a lug of one of the cylinders is intercepted by the same passes through the fulcrum of such lever, and is consequently not transmitted to the type-lever. The finger of the operator resting upon the button of the key-lever does not therefore receive a shock, which greatly adds to the ease and comfort of operation and also prevents the bending of the type-levers and the loosening of their pivots.

The type-wheel which I prefer to use in my improved apparatus is illustrated in Figs. 4 and 5.

The shaft 11, upon which the type-wheel is mounted, has a number of segmental recesses, 59, separated from each other by ridges 60. The type-wheel itself is composed of a number of sectors, 61, each sector composed of a part of the rim of the wheel and a segmental part, 62, of the hub of the same. The hub portion of each sector fits exactly into one of the recesses 59, and the projecting inner ends, 63, of the web of the sector overlap each one-half of a ridge 60. When the sectors of the type-wheel are assembled, as indicated in Fig. 4, a sleeve, 64, having a longitudinal slit, is passed over the hub-segments, and is tightened about the same by clamp-screws, as shown. The type-wheels have then the appearance as if they were made of one piece, but may be removed from the shaft without removing the cylinders 9 9.

As shown in the drawings, each segmental part 62 of the hub, while it fits exactly into one of the recesses, is thicker than the depth of such recess, and therefore projects above the surface of the shaft 11. The sleeve 64 is formed to pass with one half, 64', over the assembled segments 62, while the other half is made smaller in diameter, so as to fit the body of the shaft.

The rim of each sector is enlarged to extend on each side beyond the face of the web. Upon each segmental section of the rim are formed letters of the alphabet, numerals, and other characters corresponding to the like characters represented by the key-board of the type-writer proper and of the transmitter. When the sectors are united and clamped together by sleeve 64, the rim of the whole wheel has

upon its surface a full complement of all the letters of the alphabet, numerals, punctuation-marks, &c., in types raised above the surface of the rim.

An inking apparatus, 65, is mounted upon a post or pillar, 66, close to the type-wheel, and with the inking-roller 67 in light contact with the raised type any suitable form of inking apparatus may be used.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An electrical type-writer comprising an electric main-line circuit, electro-magnets severally included in said main-line circuit, circuit-controlling mechanism for directing current through a particular electro-magnet, stop-levers severally controlled by said electro-magnets, and mechanical key-levers, also for severally controlling said stop-levers.

2. An electrical type-writer comprising an electric main-line circuit, electro-magnets severally included in said main-line circuit, stop-levers controlled severally by said electro-magnets, mechanical key-levers, also for severally controlling said stop-levers, and a local circuit operated by a movement of any stop-lever.

3. An electrical type-writer comprising a series of armature stop-levers, electro-magnets for severally actuating said stop-levers, a main-line circuit including said electro-magnets, circuit-controlling mechanism for said main-line circuit, a series of mechanical key-levers, also for severally controlling said stop-levers, and a local circuit controlled by the movement of any stop-lever.

4. An electrical type-writer comprising a series of pivoted armature stop-levers, electro-magnets for severally attracting said stop-levers, a series of mechanical key-levers for severally actuating said stop-levers, and a revolving cylinder provided with stops arrested by the movement of any stop-lever.

5. An electrical type-writer comprising a series of pivoted armature stop-levers, electro-magnets for severally attracting said stop-levers, circuit-controlling mechanism for directing current through a particular magnet, a series of mechanical key-levers severally controlling said stop-levers, and a revolving cylinder provided with stops arrested by the movement of any stop-lever.

6. An electrical type-writer comprising a series of armature stop-levers, electro-magnets for severally actuating said stop-levers and included in a main-line circuit, and a series of mechanical key-levers, also for severally actuating said stop-levers, in combination with a transmitter provided with circuit-controlling keys for directing current through a particular electro-magnet and a local circuit operated by the movement of any stop-lever.

7. An electrical type-writer comprising a series of armature stop-levers, electro-magnets for severally actuating said stop-levers, a mechanical key-board, also for severally actu-

ating said stop-levers, and a revolving stop-cylinder arrested by the actuation of any stop-lever, in combination with a series of circuit-closing keys for directing the current through
5 a particular electro-magnet.

8. An electrical type-writer comprising a series of armature stop-levers, electro-magnets for severally actuating said stop-levers, a series of mechanical key-levers, also for severally actuating said stop-levers, a revolving stop-cylinder arrested by the actuation of any stop-lever, and a local circuit operated also by a movement of any stop-lever.

9. An electrical type-writer comprising a series of circuit-controlling armature stop-levers, electro-magnets for severally attracting said stop-levers, circuit-controlling mechanism and an electric circuit for directing current through a particular electro-magnet, a series of mechanical key-levers for severally actuating said stop-levers, a rotary type-wheel and rotary cylinders in fixed relation to each other, contact-lugs upon said cylinders corresponding to types upon the said type-wheel, and a local circuit including a printing-magnet and controlled by said stop-levers and lugs, as specified.

10. In an electrical type-writer, the combination, with a rotary type-wheel and metallic cylinders rotating with the same provided with metallic contact-lugs corresponding with the types upon said type-wheel, of a circuit-controlling stop-lever for each lug, pivoted to move in the plane of rotation of and to intercept the lug, an electro magnet controlling each stop-lever, a mechanical key-lever controlling each stop-lever, and a local circuit including a printing electro-magnet and controlled by said stop-levers and lugs.

11. In an electrical type-writer, the combination, with a local circuit including electro-magnetic printing mechanism, a series of circuit-controlling stop-levers therefor, and rotary cylinders provided with contact lugs in operative relation and corresponding to said stop-levers, of a system of levers controlling the action of said stop-levers electro-magnetically and a system of levers for mechanically actuating said stop-levers.

12. In an electrical type-writer, the combination of a rotary type-wheel and cylinders rotating with the same, provided with lugs corresponding with the types upon the type-wheel, with an independent gravity stop-lever for each lug, pivoted to move in the plane of rotation of the lug, but normally out of contact with the same, and an electro-magnet for each stop-lever in operative relation to the latter for moving the same into the path of its corresponding lug, and a mechanical key-lever also controlling each stop-lever, substantially as described.

13. In an electrical type-writer, the combination of a type-wheel and cylinders rotating with the same about a common axis and provided upon their surfaces with lugs corresponding

to the types upon the wheel, with an independent stop-lever movable about a pivot to intercept the lug at a definite point, said pivot being located in the line of impact of the lug with the lever, and an electro-magnet for each stop-lever for actuating the same, and a mechanical key-lever also controlling each stop-lever, substantially as described.

14. In an electrical type-writer, the combination of a type-wheel and cylinders rotating with the same about a common axis and provided with stop-lugs corresponding to the types upon the wheel with a stop-lever for each lug, an electro-magnet for each stop-lever for controlling the same electrically, and a key-lever for each stop-lever for controlling the same mechanically, substantially as described.

15. An electrical type-writer comprising a series of armature stop-levers, electro-magnets for severally actuating said stop-levers, a series of mechanical key-levers, also for severally actuating said stop-levers, a revolving stop-cylinder arrested by the actuation of any stop-lever, and a local circuit operated also by a movement of any stop-lever.

16. In a type-writer, the combination of a rotary shaft having a series of segmental recesses with separating-ribs between the same, with the sectorial parts of the type-wheel having their hub portions seated in the segmental recesses and with their edges in contact with each other, and a clamp for securing the sectors together and to the shaft, substantially as described.

17. In an electrical type-writer, the combination of a rotary shaft with segmental recesses and ribs between the same all around the portion of the shaft, with sectorial sections of the type-wheel seated in the recesses with their radial edges in contact with each other, and a sleeve fitting over the shaft and over the hub-sections of the type-wheel for clamping the same, substantially as described.

18. In an electrical type-writer, the combination of the shaft of a rotating type-wheel and the shaft of the transmitter with a rotary shaft geared and imparting motion to both the type-wheel shaft and transmitter-shaft, and a synchroal motor for actuating said rotary shaft.

19. In an electrical type-writer, the combination, with a transmitting-instrument having a circuit-controlling spacing-key, of a receiving-instrument provided with a circuit-controlling spacing stop-lever, a magnet for actuating said stop-lever and controlled by the transmitter spacing-key, a fixed contact for said spacing stop-lever, a local circuit including said stop-lever and fixed contact, and spacing-magnets in said local circuit.

In testimony whereof I affix my signature in presence of two witnesses.

J. F. McLAUGHLIN.

Witnesses:

THOS. J. HUNT,

GEO. H. TICHENOR.