No. 616,655. Patented Dec. 27, 1898.

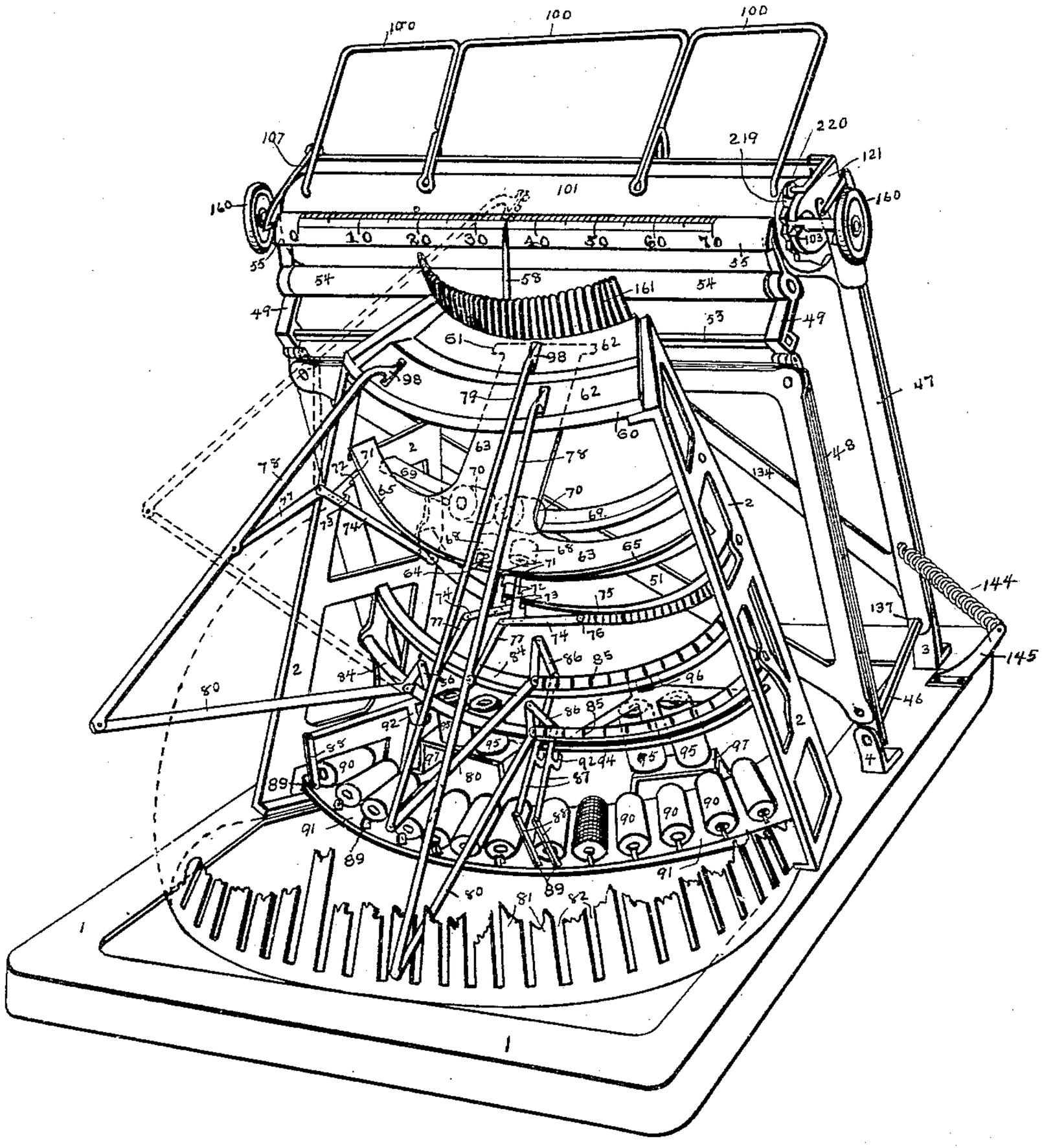
J. F. ENGLE & U. WEDGE.

CHARACTER RECORDING DEVICE.

(Application filed Aug. 17, 1895.)

(No Model.) 16 Sheets—Sheet 1.

Fig 1



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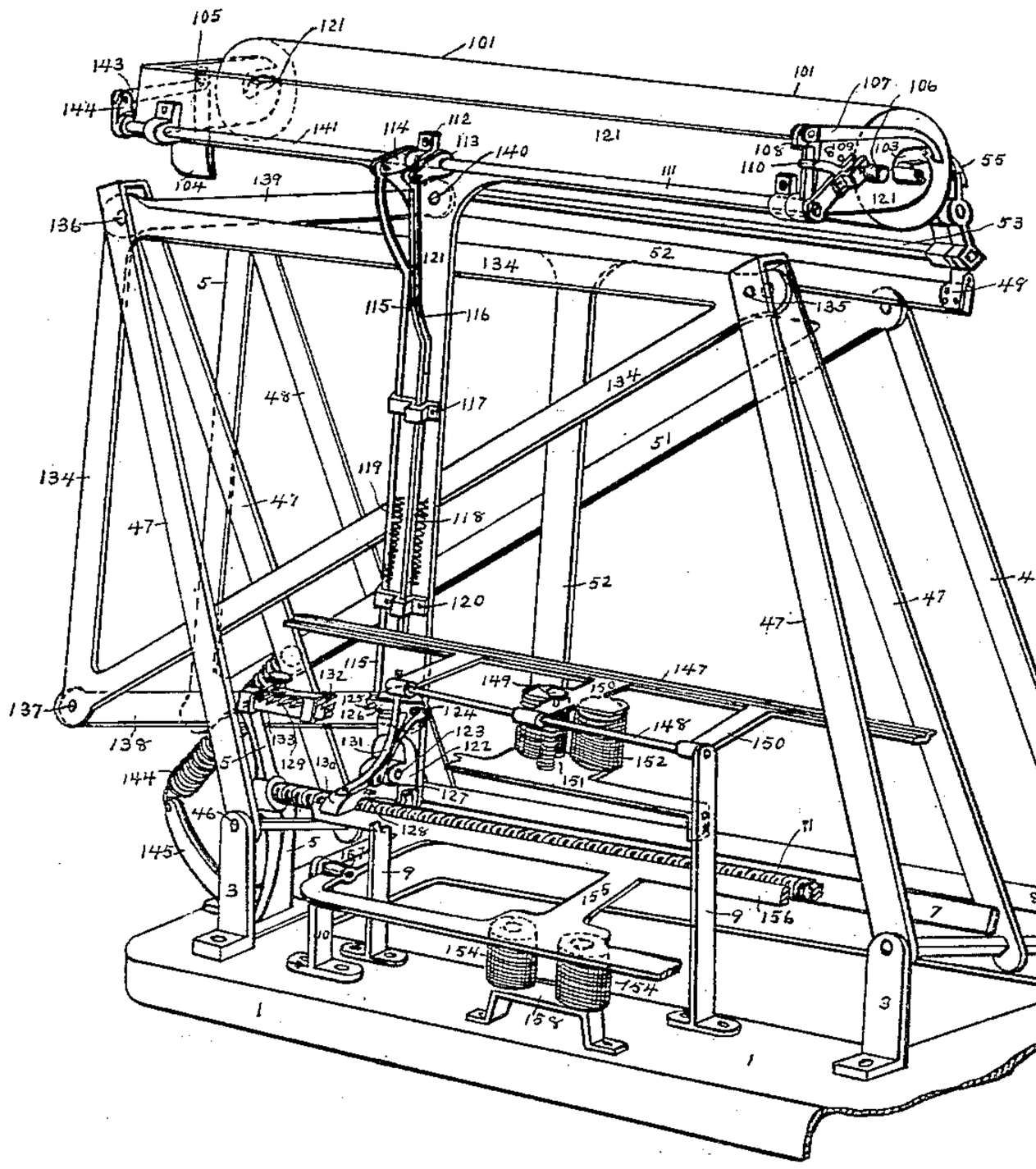

Fig 2

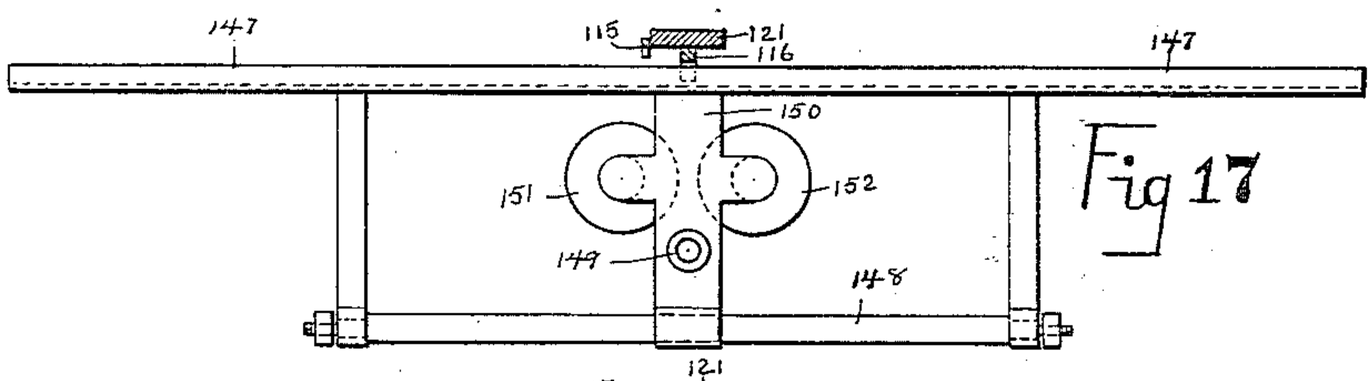

Fig 17

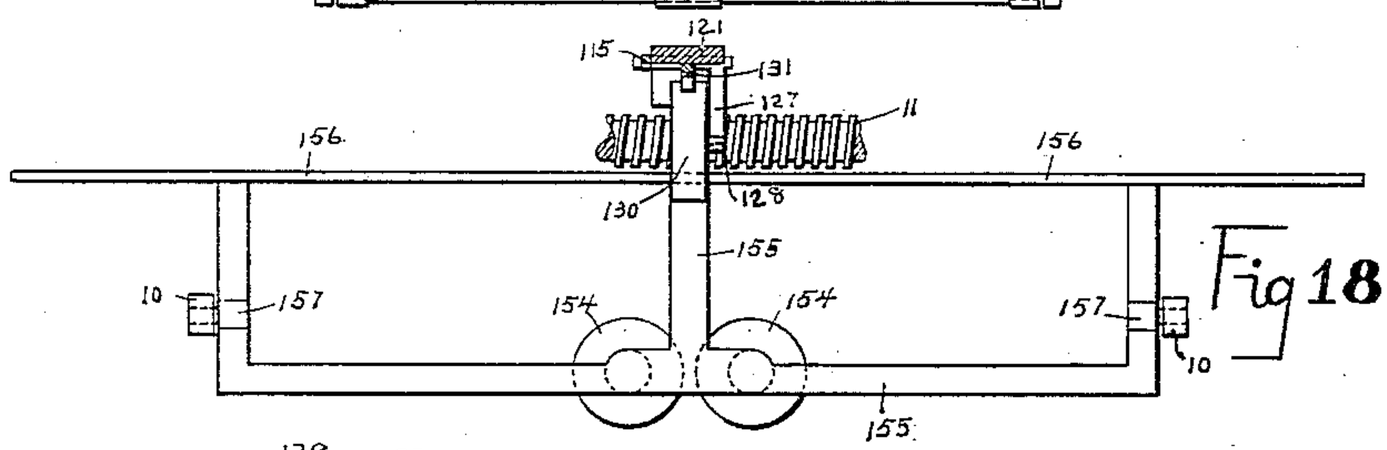

Fig 18

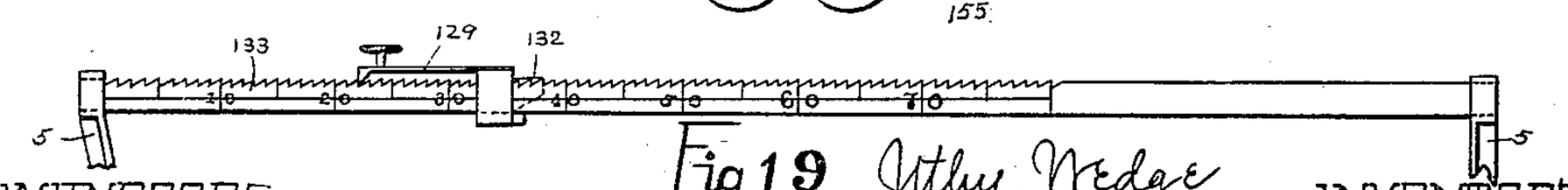

Fig 19

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Fig 3

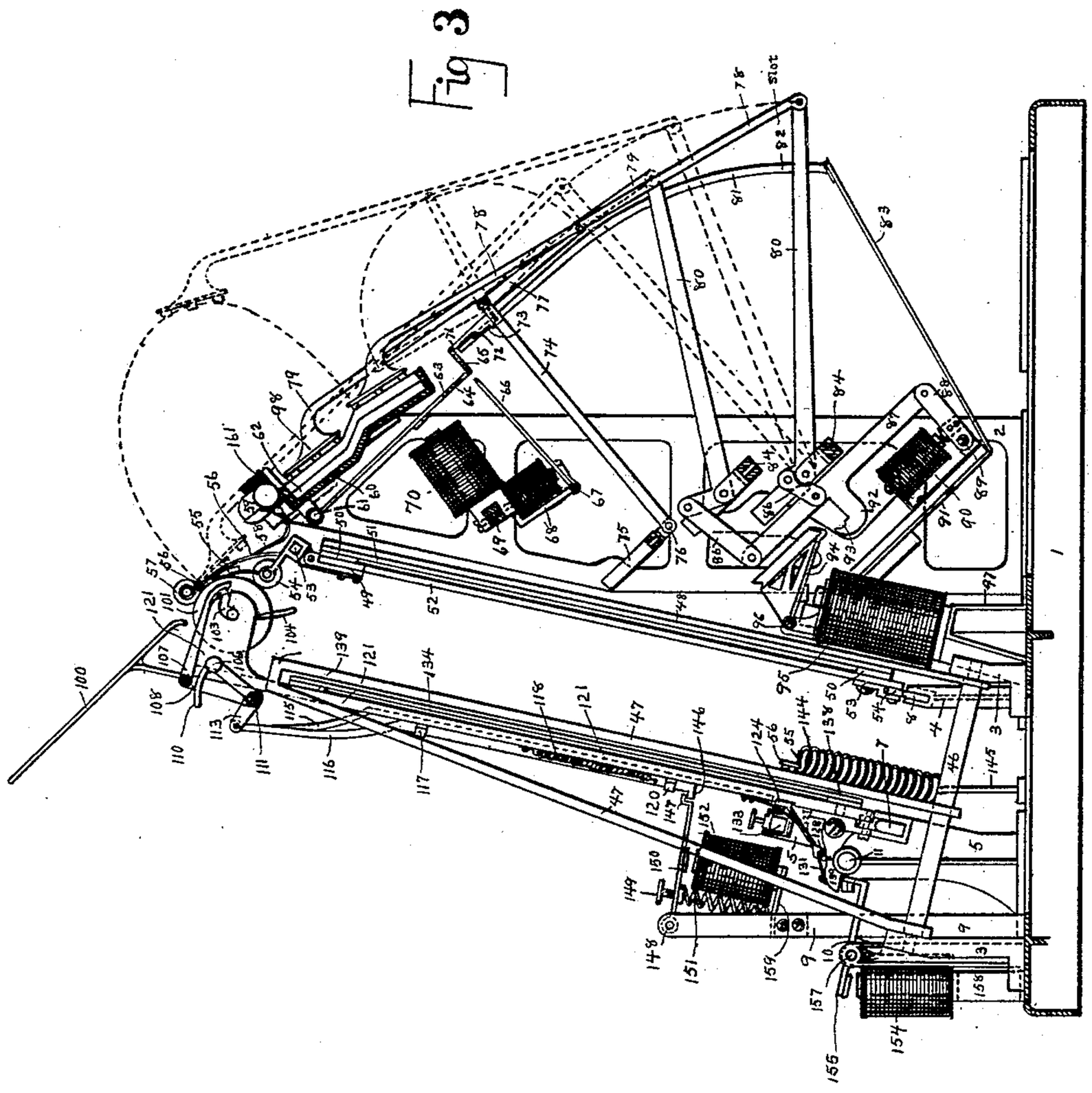

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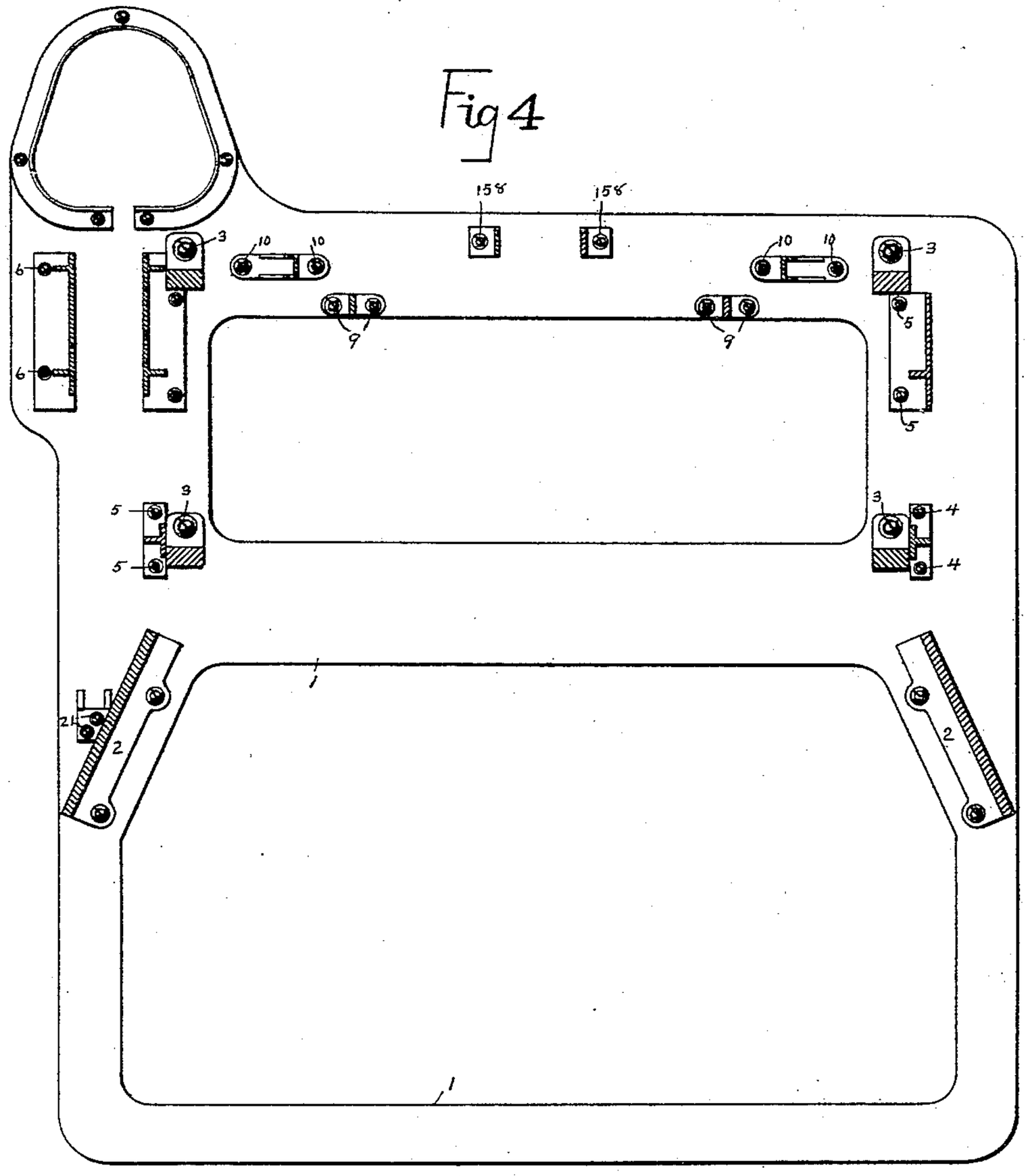
Fig 4



KEY BOARD

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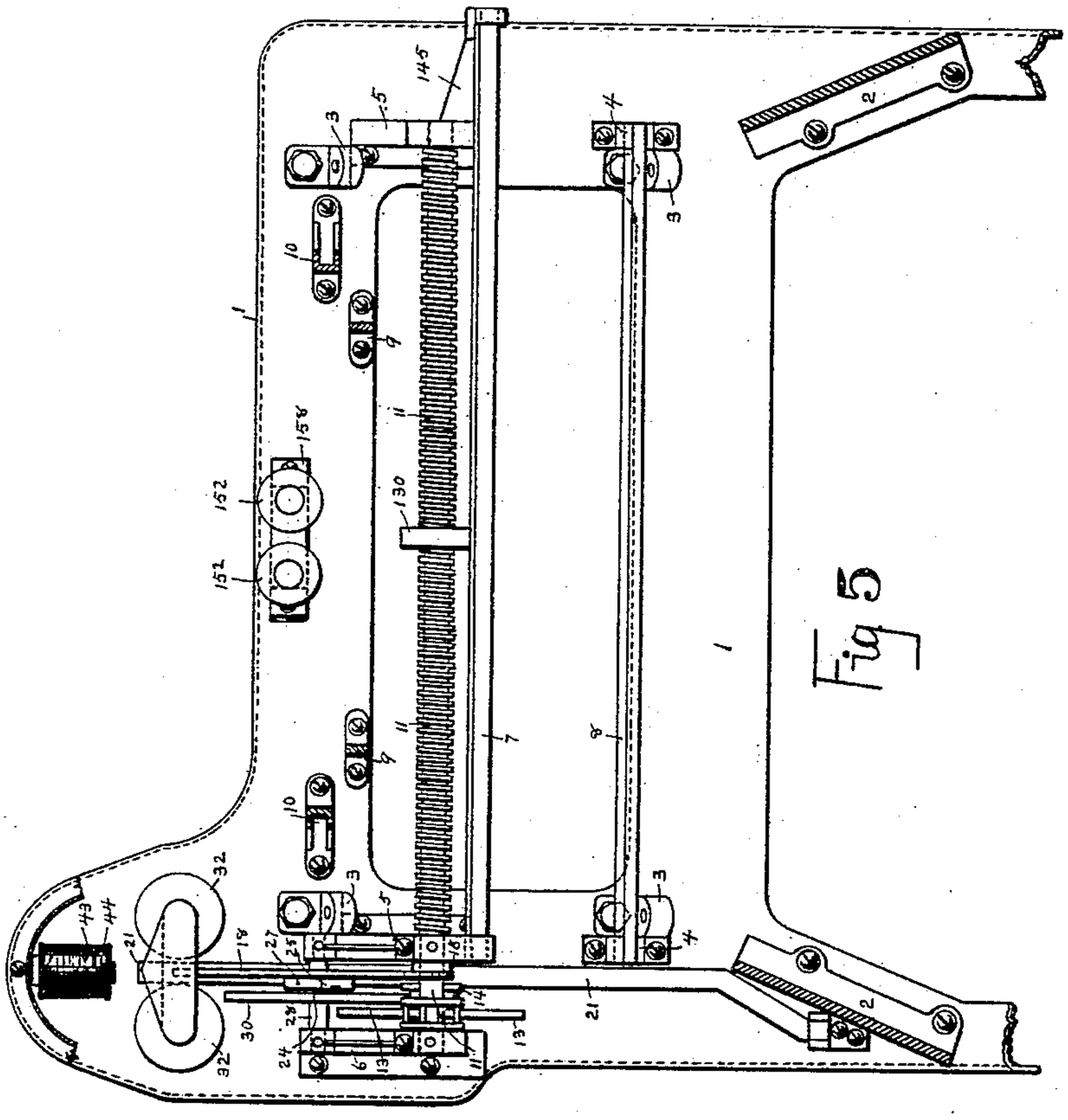

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(No Model.) 16 Sheets—Sheet 6.

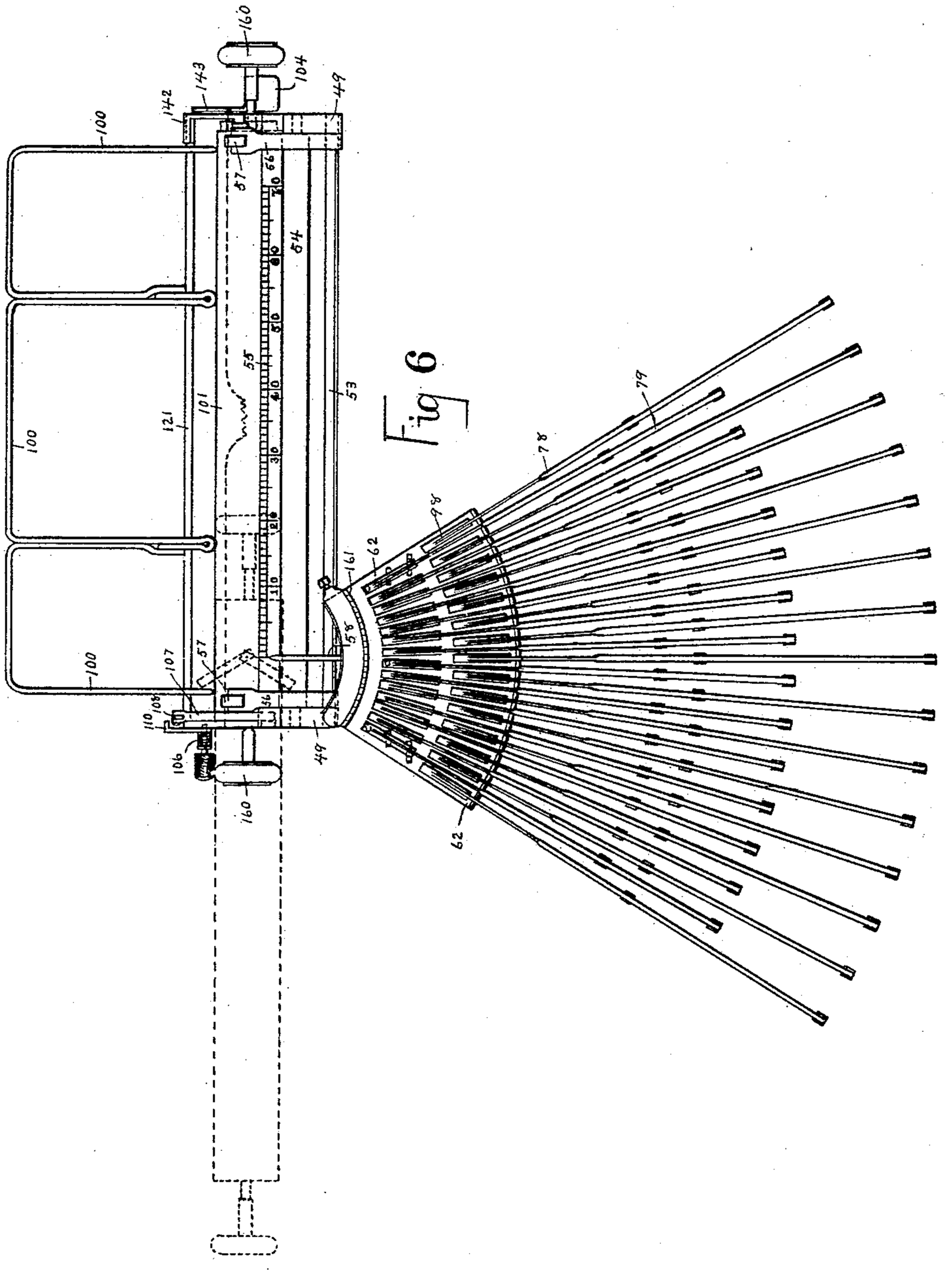

Fig 6

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(Application filed Aug. 17, 1895.)

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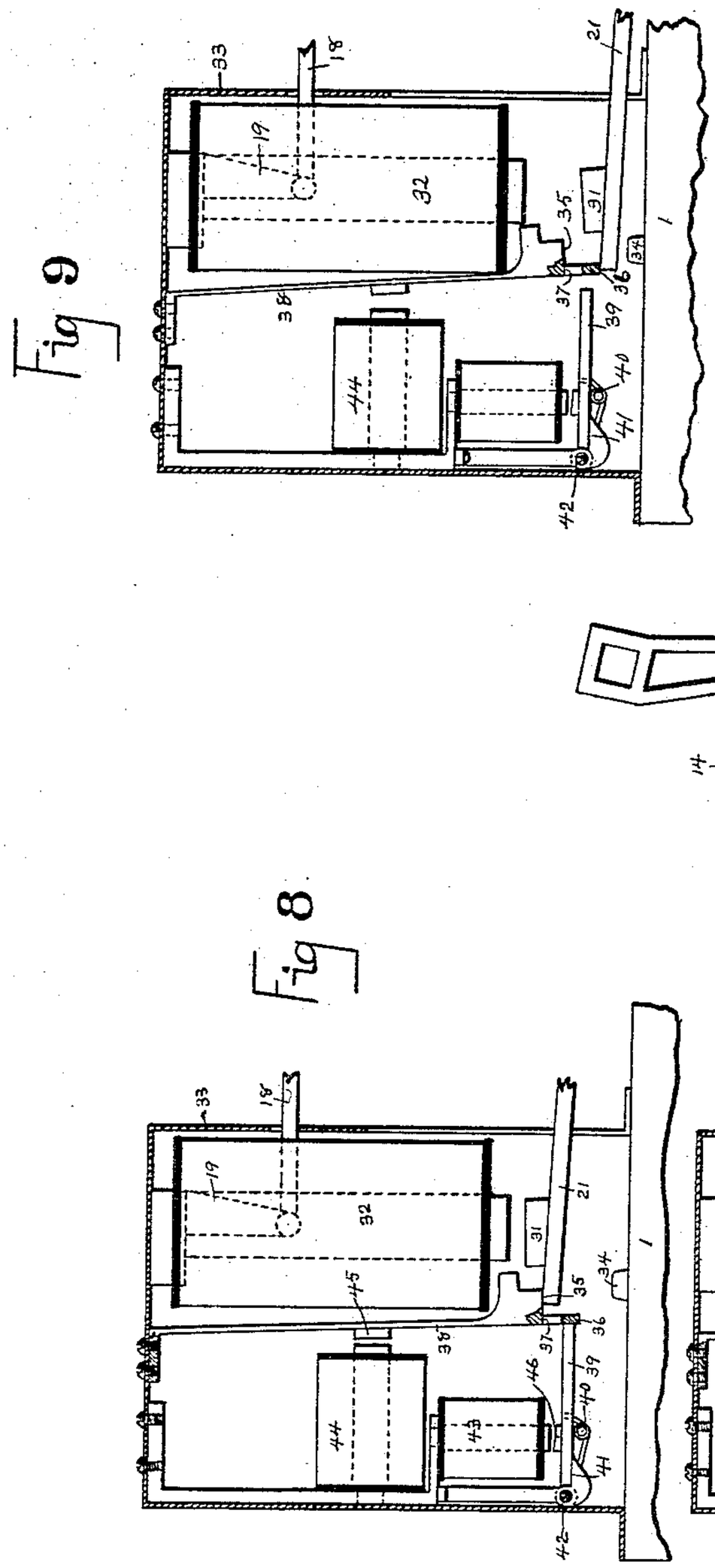

Fig 9

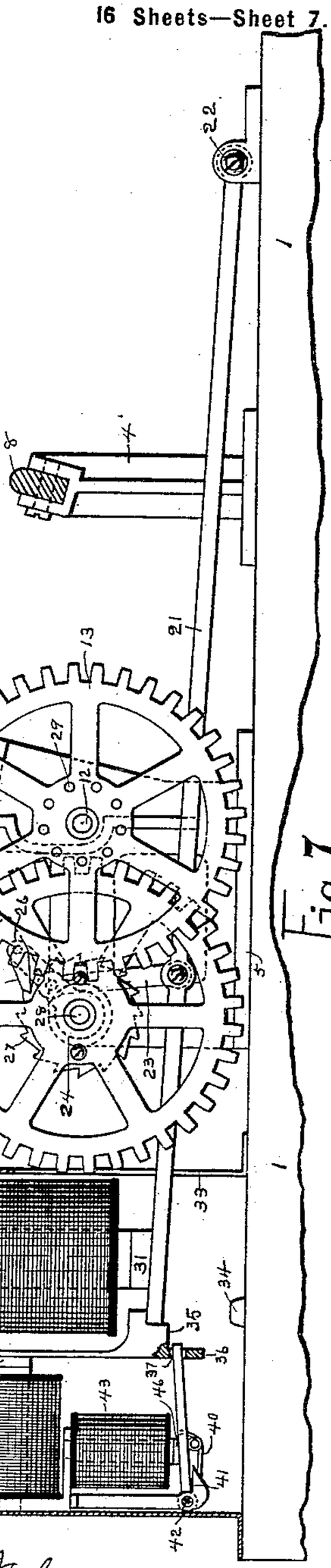

Fig 7

Fig 8

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Fig 11

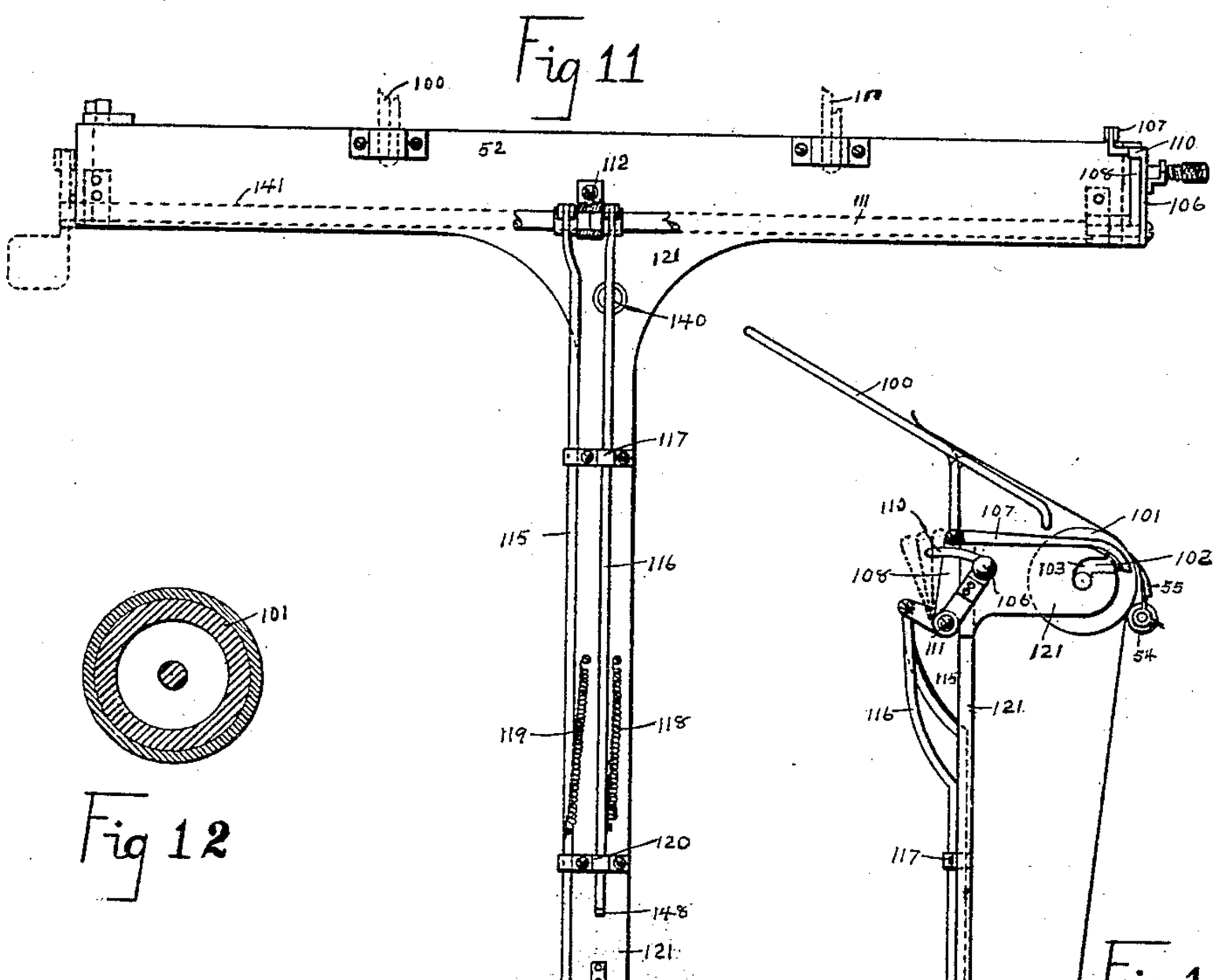

Fig 12

Fig 10

Fig 13

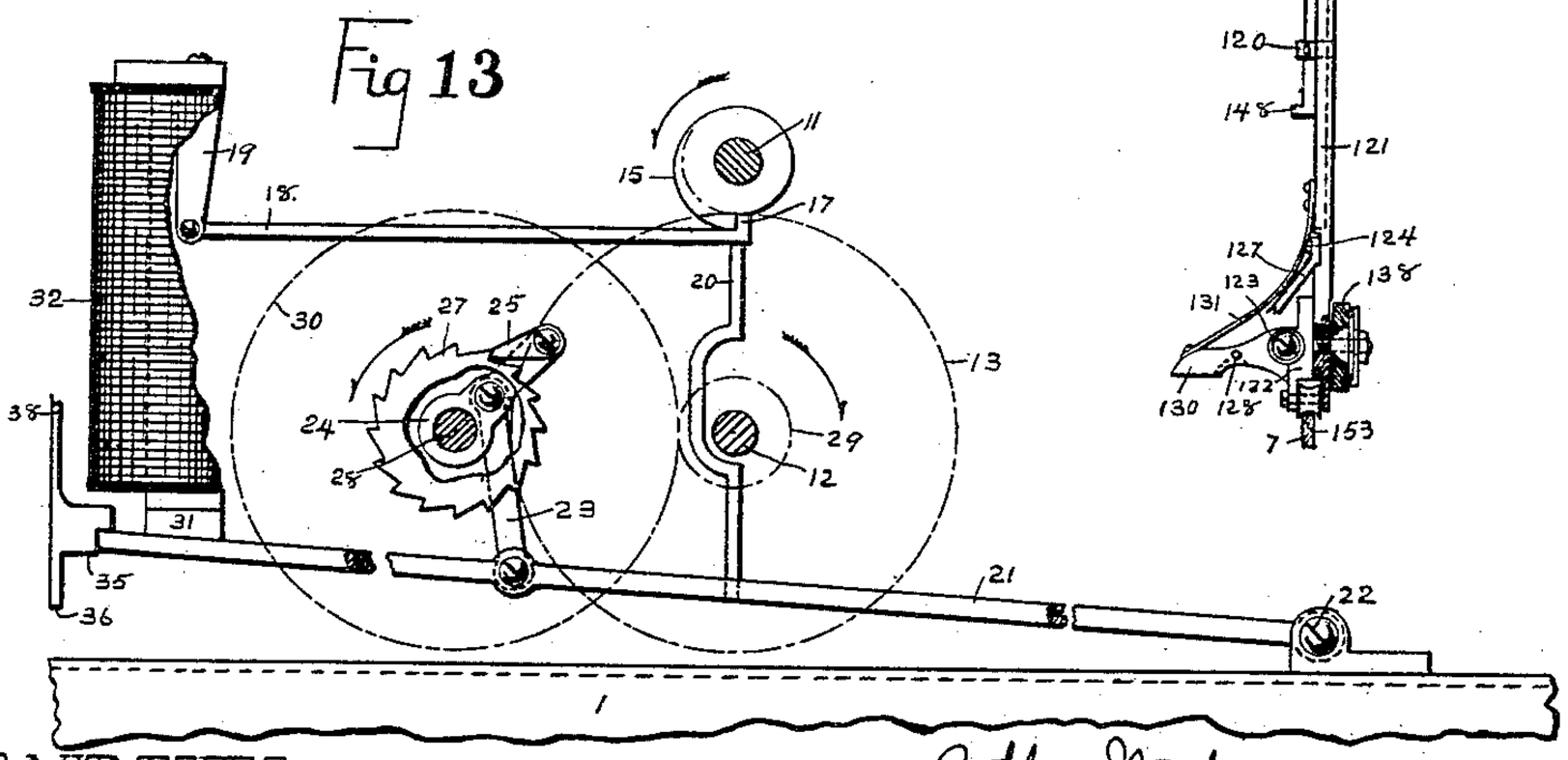

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Fig 20

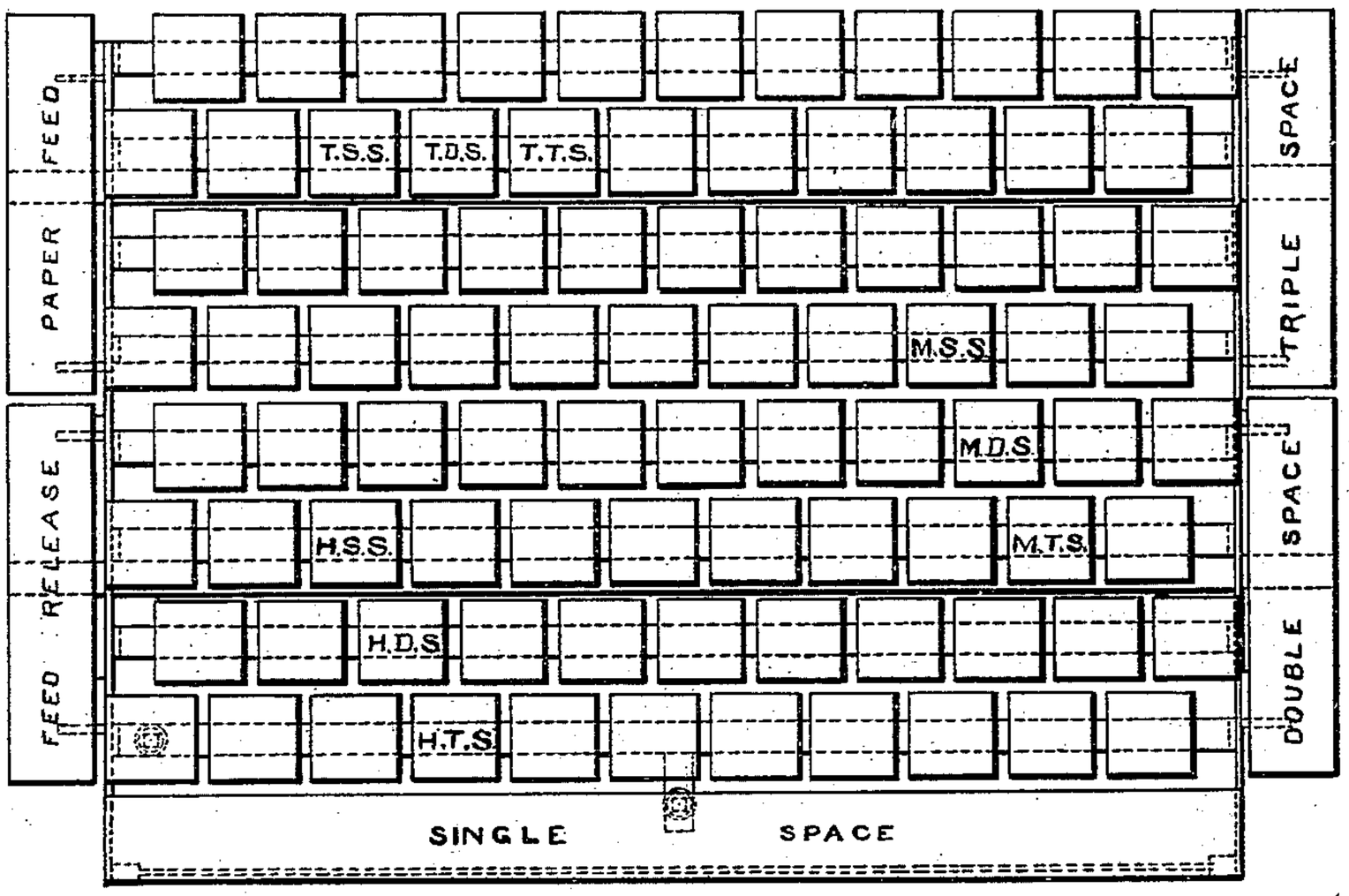

Fig 14

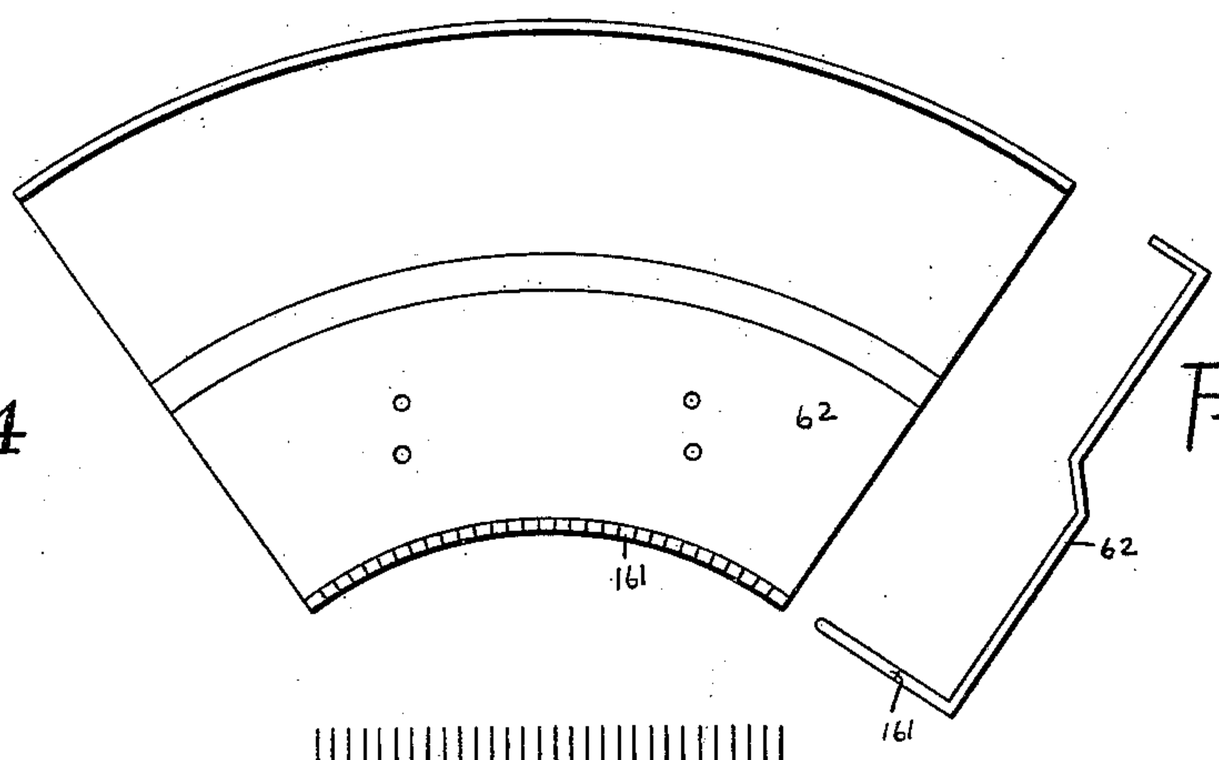

Fig 15

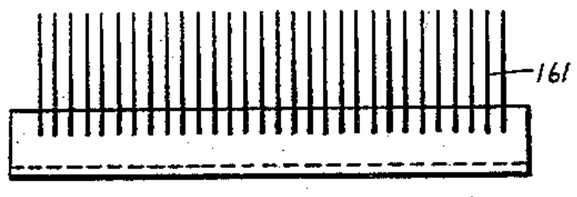

Fig 16

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Fig 21

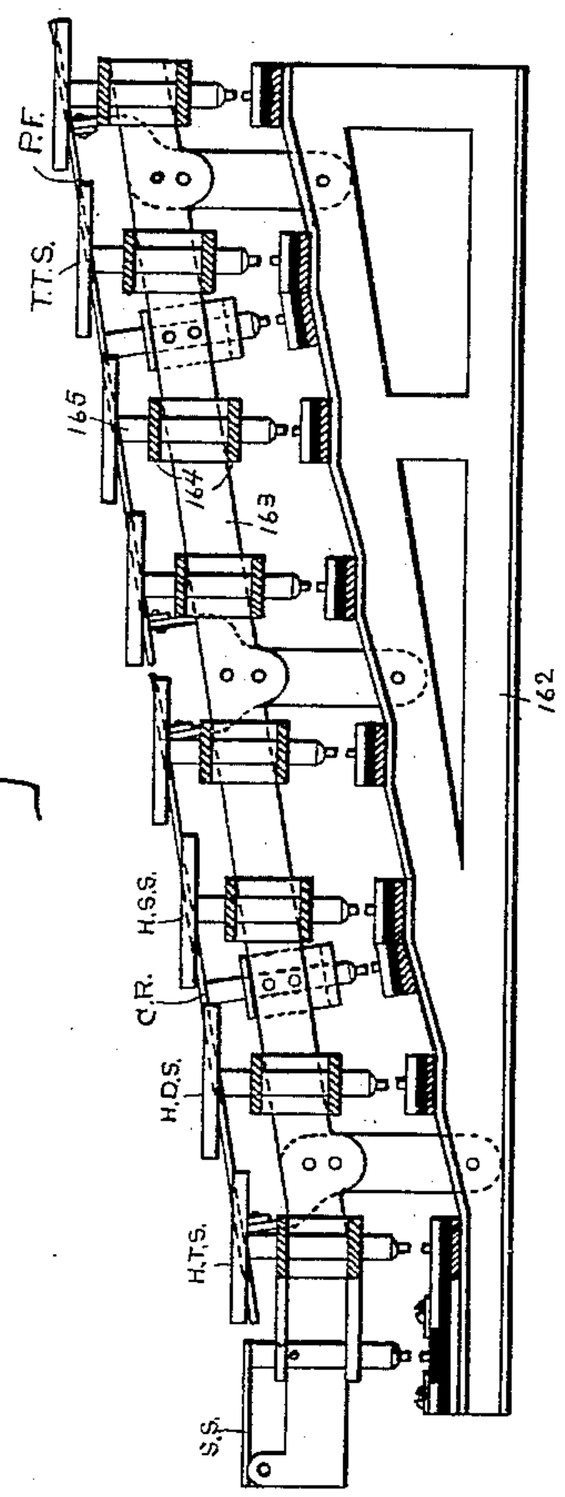
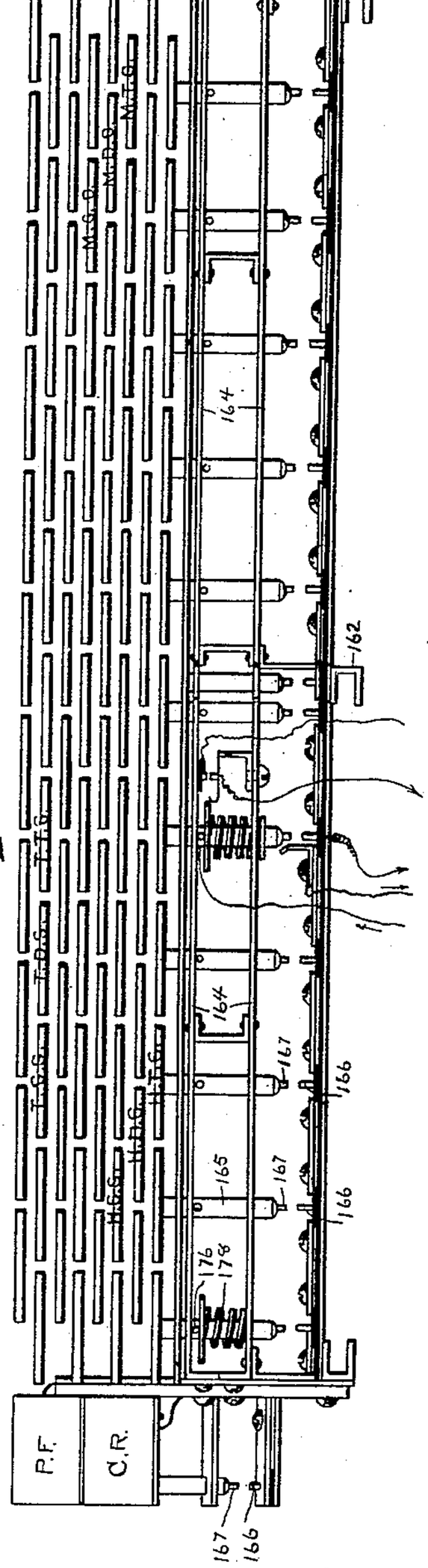


Fig 22



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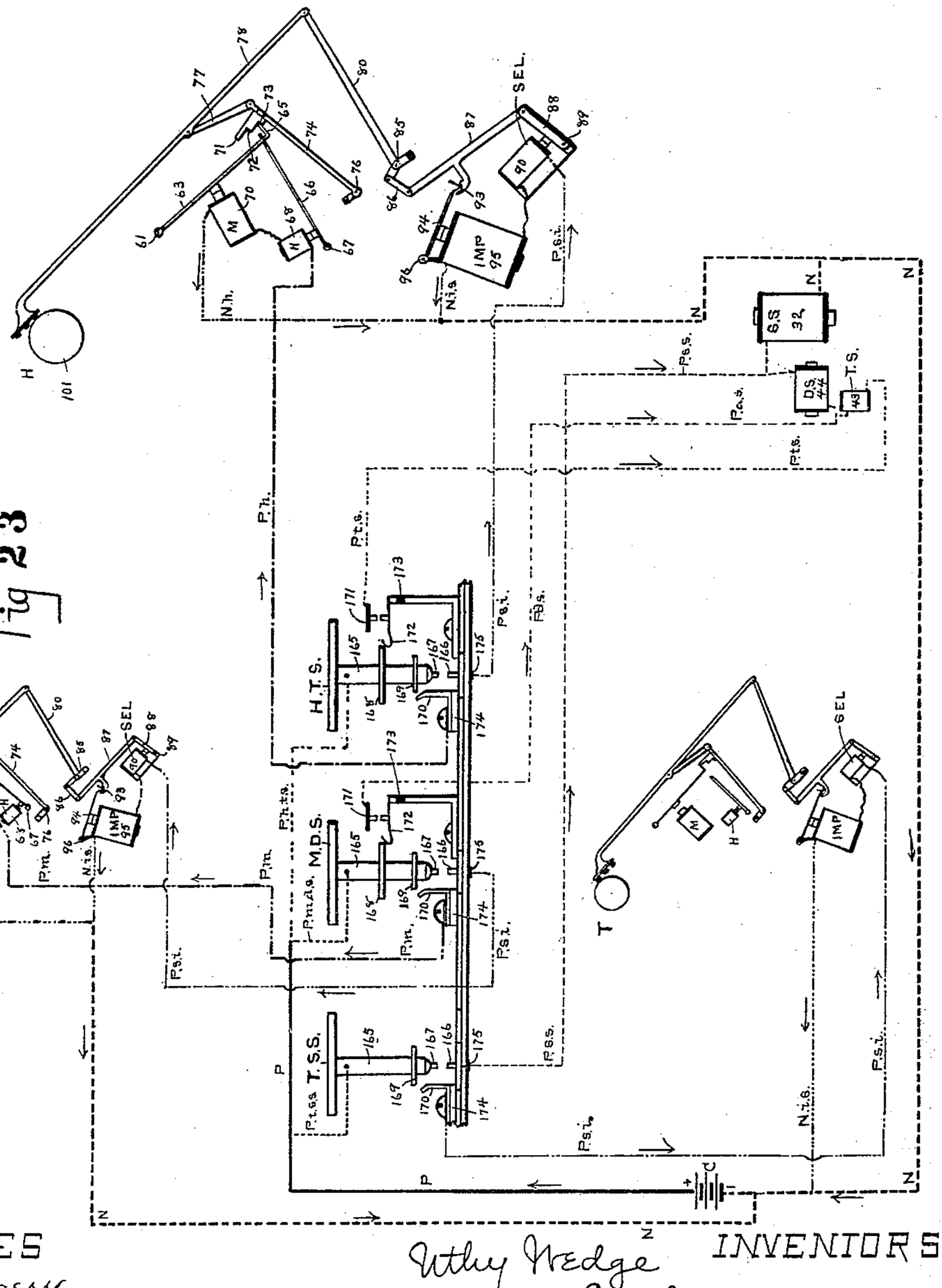

Fig 23

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Fig 24

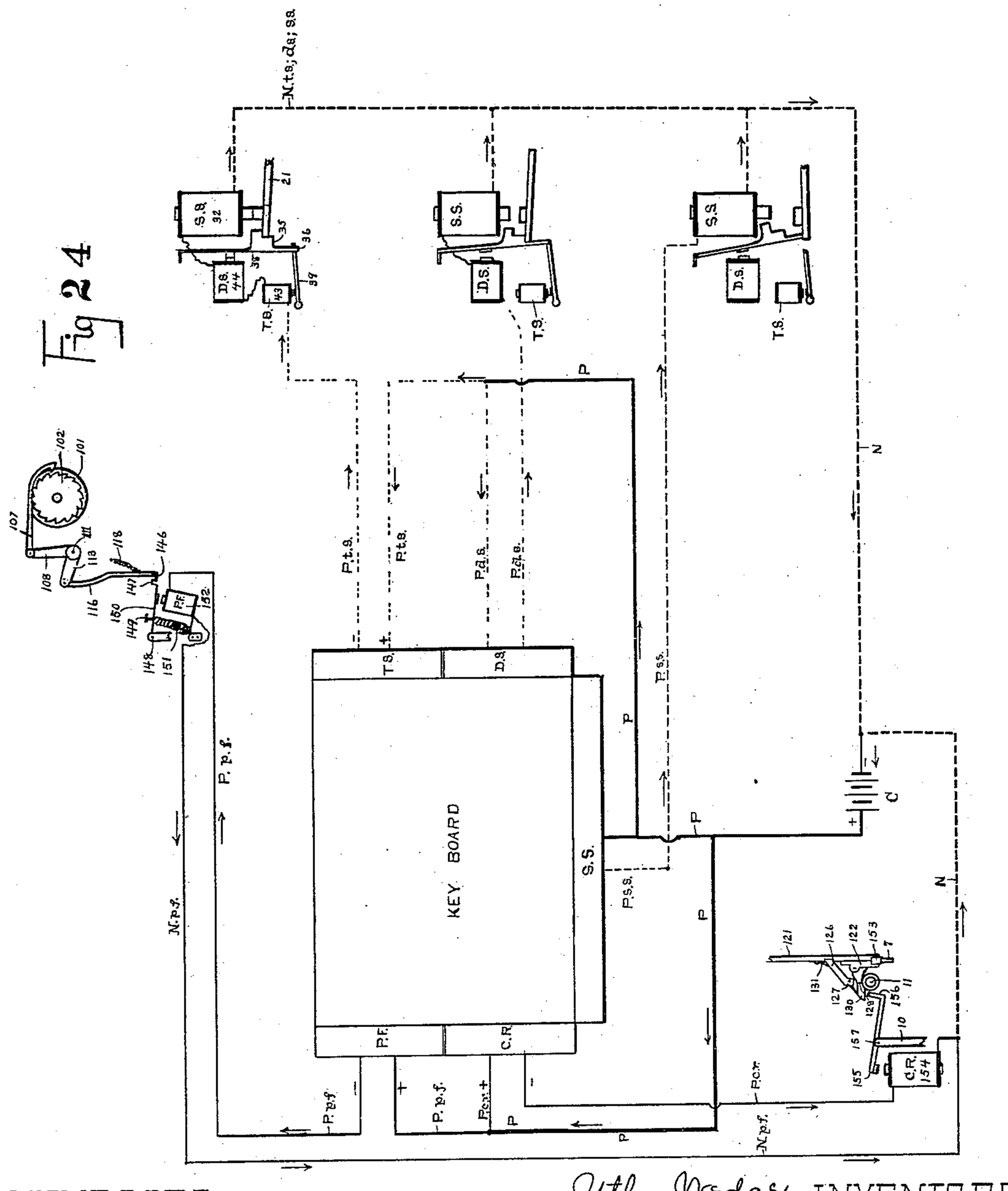

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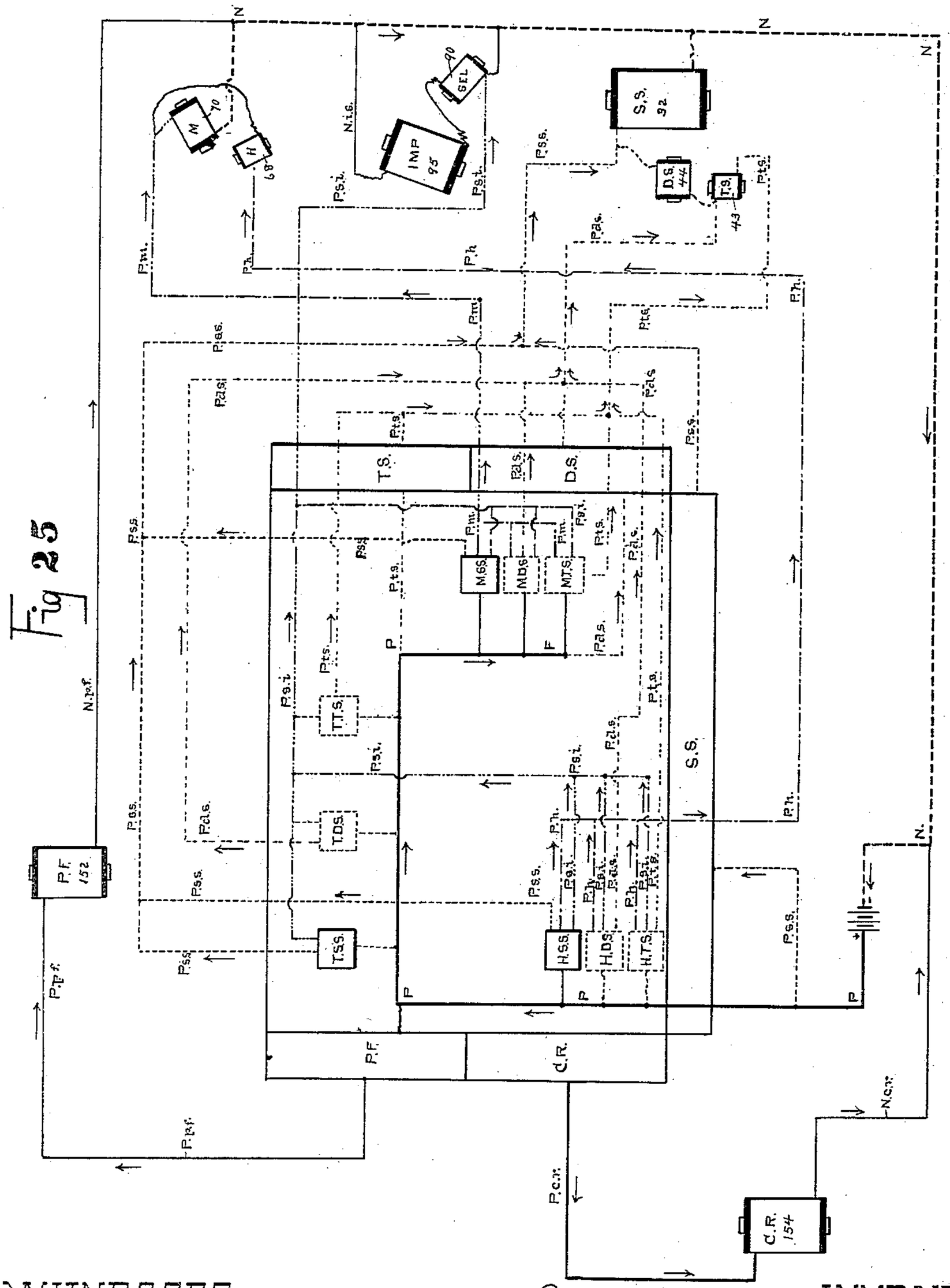
Fig 25



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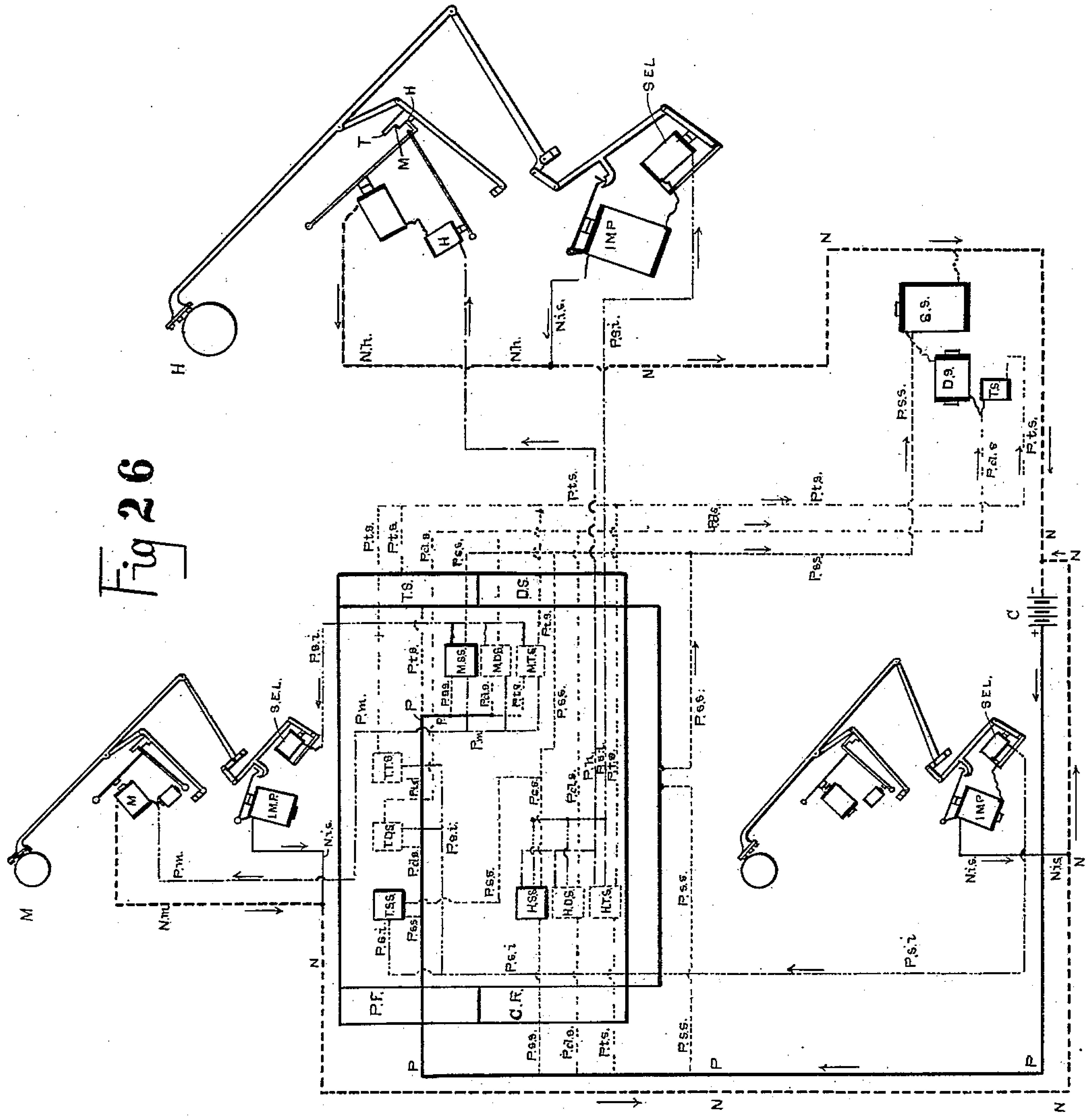

Fig 26

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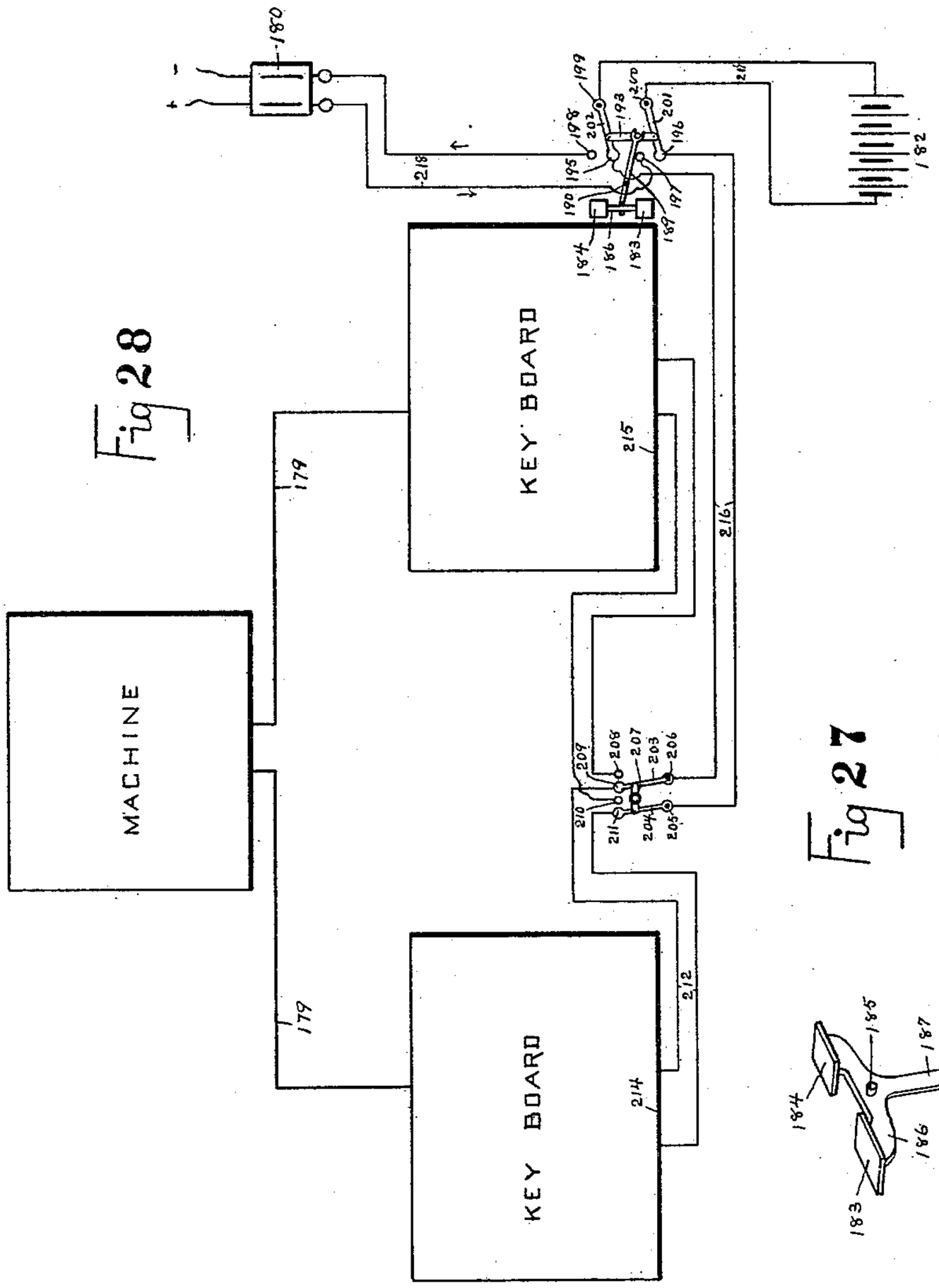

Fig 28

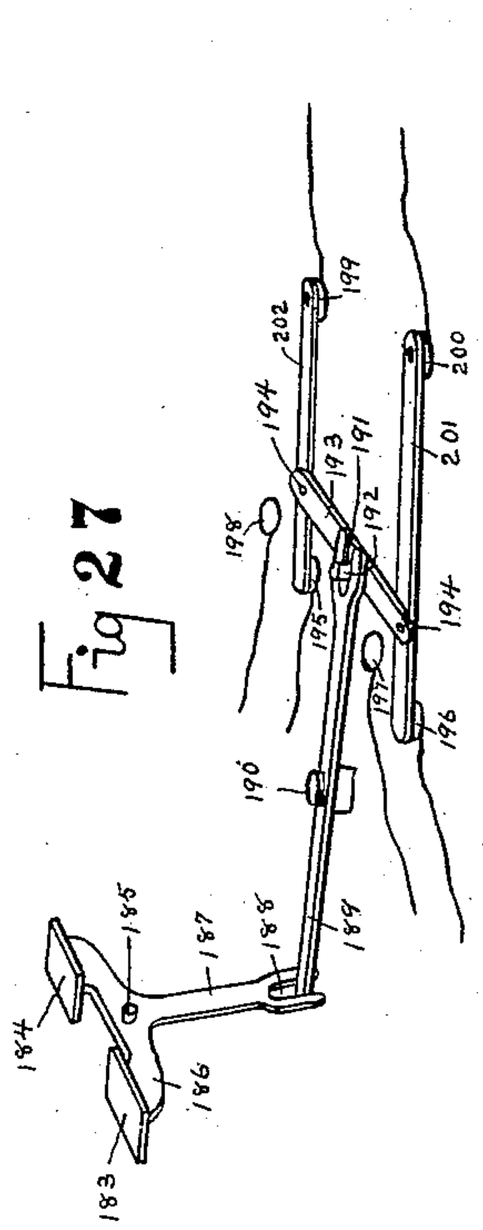

Fig 27

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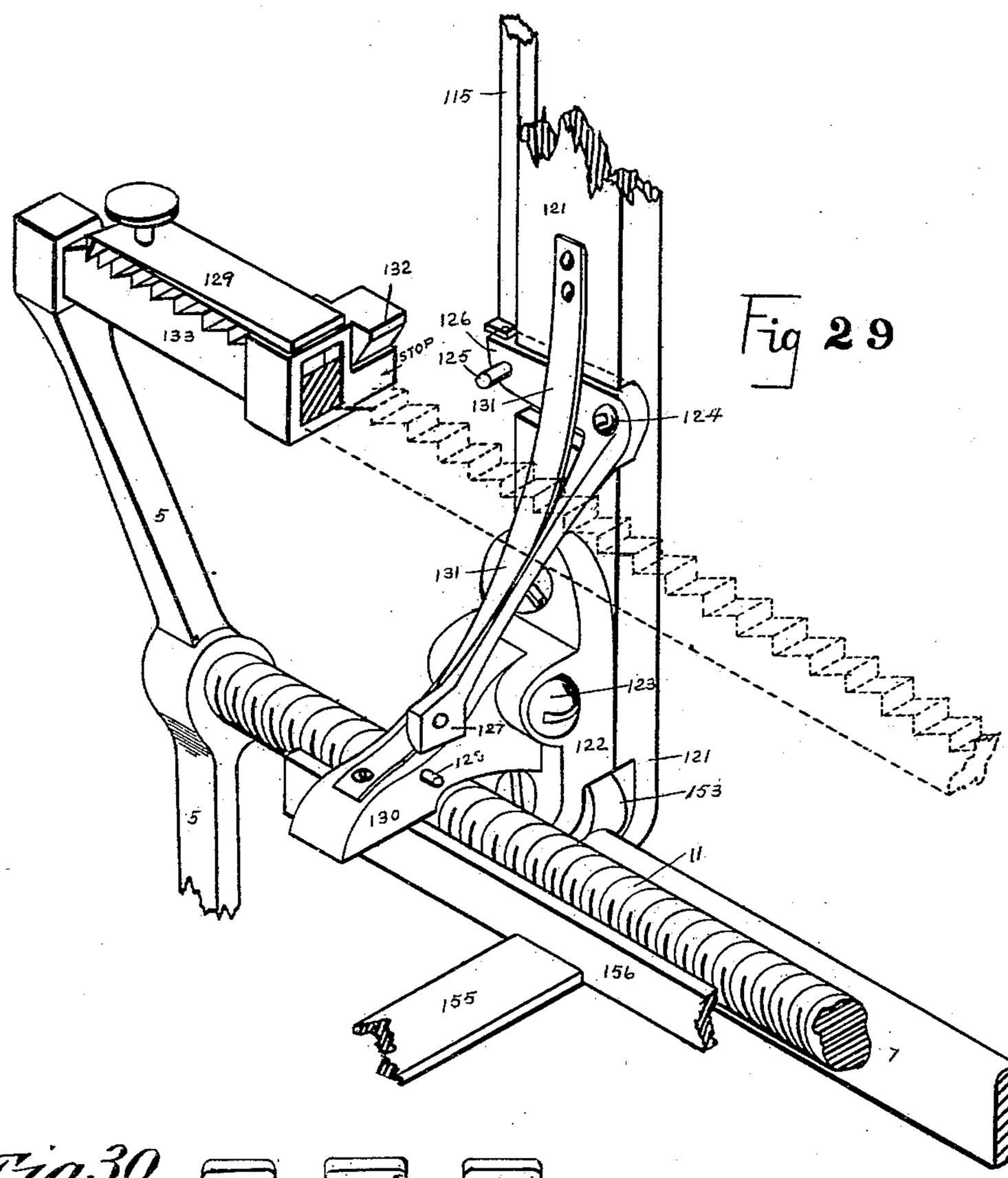
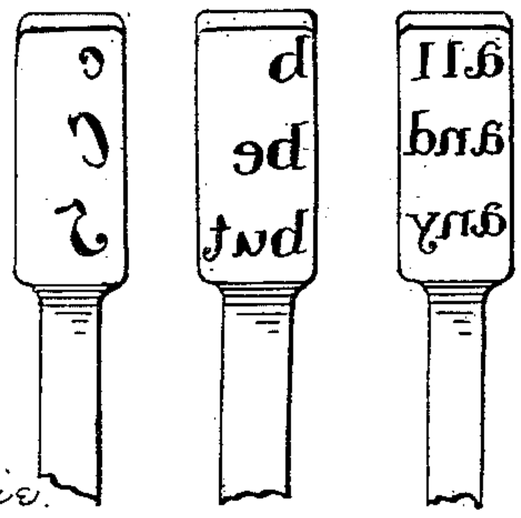


Fig 29

Fig. 30.



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UNITED STATES PATENT OFFICE.

JOHN F. ENGLE AND UTLEY WEDGE, OF CLEVELAND, OHIO.

CHARACTER-RECORDING DEVICE.

SPECIFICATION forming part of Letters Patent No. 616,655, dated December 27, 1898.

Application filed August 17, 1895. Serial No. 559,671. (No model.)

To all whom it may concern:

Be it known that we, JOHN F. ENGLE and UTLEY WEDGE, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Character Recording or Impressing Devices; and we do hereby 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.

Our invention relates to improvements in character recording or impressing devices, and the special features of our device comprise electric operating mechanisms for performing the usual mechanical movements incident to the operation of type-writers, such as moving the type-bars from a position of rest into the active or "impression" position, moving the impression-carriage laterally into position for a new character or space, releasing the carriage-feeding device, moving the impression roller or platen into a new position for a new line, &c. These movements hitherto have been performed manually at the constant expenditure of energy, which soon created the utmost fatigue and became a waste of the most pronounced order. With our device we are enabled to conserve all of the energy hitherto wasted, and in consequence operators using our type-writer can attain a speed much in advance of that attained on mechanically-operated machines. Our keyboard may be placed directly adjacent the machine or be removed therefrom some distance, if desired, or two separate keyboards may control one machine. The keyboard is provided with any suitable arrangement of keys, &c. In the instance embodied in the accompanying drawings keys are shown for a "font" of letters and characters and connected therewith the shift mechanism which directs the type-bar to form three different impressions, according to the position it is allowed to occupy when making its record. This position is determined by certain character-keys, some for a forward end impression, others for a central, and certain ones for a "heel" or rear end record, thus utilizing each type-bar for three characters or combinations without the necessity of shifting the platen-carriage. Other keys are provided for moving the carriage into a new position when forming a new character or a "space" and separate keys for moving the carriage a normal space, as stated, or twice the normal space, or three times this distance. There are also keys for rotating the impression or platen roller either one line or "single space," two, or three, as desired.

We provide a carriage-feed release which is operated manually or in an automatic manner by a stop which may be adjusted and placed into any predetermined position, so as to stop the movement of the carriage in one direction, this stop enabling the operator to execute the work with any desired width of margin. In order that a maximum speed may be attained, we move the impression or platen carriage into its "starting position" from the left-hand side of the machine by a spring, which automatically returns the carriage so soon as the end of the line is reached without any manual effort on the part of the operator.

The usual scale-plate, paper guide and holders, index-finger, and inking-pads are provided, as well as the means for holding the type-bars in alinement at their front and rear ends, and a pneumatic cushion is also provided for the type-bars to strike on at about the time they engage the paper upon the impression-roller.

Our writer makes possible visible writing in the fullest sense of the word in that the entire page is visible at all times. Neither are we limited to any special length or width of paper which can be used. This latter statement is especially true in respect to the extra width of margin which can be allowed on extra wide paper, in addressing envelops, filling in insurance and other blanks, &c.

The accompanying drawings illustrate such instances of adaptation as apply to specific type-writer functions, though some of our features are equally applicable to type setting, forming, or matrix-making machines without departing from the spirit of our invention as instanced in the adaptation shown and described.

The illustrations referred to comprise the following figures, of which—

Figure 1 is a diagrammatic perspective view of the forward portion of our device with

the keyboard omitted, portions being broken away to disclose the arrangement of parts. Fig. 2 is a diagrammatic perspective view of the rear portion of the machine. Fig. 3 is an end elevation, partly in section, with the "carriage-feed" portions removed. Fig. 4 is a plan view of the base-plate and supporting-brackets. Fig. 5 is a plan view of the base-plate, with the "feed-actuating" devices in their respective positions. Fig. 6 is a top plan view of the impression roller or platen and the arrangement of the type-bars in relation thereto. Fig. 7 is a side elevation of the "feed" mechanism, showing the parts in their relation when the greatest movement is imparted to the feed-screw. Fig. 8 shows the parts illustrated in Fig. 7 at their intermediate position. Fig. 9 shows the portions of Fig. 7 at the minimum position. Fig. 10 is an end elevation of the impression-carriage and attachments. Fig. 11 is a rear elevation of the impression-carriage. Fig. 12 is a cross-sectional view of the impression-roller. Fig. 13 is a side elevation, partly in section, of the ratchet and stop motions for the feed-screw. Fig. 14 is a top plan view of the ink-pads. Fig. 15 is a side elevation of the ink-pads. Fig. 16 is a front elevation of the forward alining-plate. Fig. 17 is a top plan view of the paper-feed mechanism. Fig. 18 is a top plan view of the carriage-feed-release mechanism. Fig. 19 is an elevation of the marginal stop. Fig. 20 is a top plan view of the keyboard. Fig. 21 is a side elevation in section of the keyboard. Fig. 22 is a front elevation of the keyboard. Fig. 23 is a diagrammatic view showing the relation of the different keys of the keyboard and the respective functions which they are to perform. Fig. 24 is a diagrammatic view of the keyboard, showing the functions controlled thereby which are not shown in Fig. 23. Fig. 25 is a diagrammatic view of the keys of the keyboard and the circuit connections therefrom. Fig. 26 is a diagrammatic view amplifying the circuit connections shown in Fig. 25, the same being connected with the respective portions of the device which are to be controlled thereby. Fig. 27 is a perspective view of the key-controlling switch which controls the charging-circuit of the storage-cells. Fig. 28 is a diagrammatic plan view of a single machine controlled by two separate keyboards and the electrical connections for the same. Fig. 29 is an enlarged rear view perspective. Fig. 30 is a detail view showing the face or impression-forming surface of the type-bars and the characters borne thereon.

Our type-bar actuating, alining, inking, and shifting details are as follows:

The base 1 of the machine at its forward side is provided with two frames 2, which rise in pyramidal form and are joined together at their upper ends by a support 60 for the inking-pads 62. At the base two semicircular supports 97 are provided, which hold the pairs of magnets 95 (or "imp") for imparting the impression movement to the type-bars 78 and 79. In front of the magnets 95, at a slightly-higher elevation, is another semicircular support 91 for a series of single magnets 90 (or "sel") and their armatures 88, which are pivoted at 89. One magnet is provided for each type-bar.

Above the type-bar magnets 90 are two similarly-shaped supports 84, which serve to hold the bell-crank type-bar "impression-arms" 80 in two banks. The type-bar toggle-directing arms 74 and 77 are supported above the upper bank just referred to, and between their support 75 and the inking-pads 62 is placed the support 69 for the type-bar-shifting magnets 68 and 70.

In front and below the inking-pads 62 we place a segmental shell 81, which is provided with as many slots 82 as there are type-bars 78 and 79. The type-bar bell-cranks 80 move in the slots 82. This shell 81 serves to keep the rear ends of the type-bars 78 and 79 in perfect lateral alinement. The front or impression ends 98 of the bars 78 and 79 are kept in lateral alinement by a "comb-plate" 161, which is placed to the rear of the inking-pads 62. Each type-bar moves into its own "comb-slot" as it makes its impression on the paper.

The vertical alinement upon the written sheet is secured by forming an adjustable stop 65 in front of a stepped projection of the type-bar toggle-arms 74, so as to limit the forward movement of the type-bars 78 and 79. This adjustable stop 65 comprises two pairs of electromagnets 68 and 70, one pair, 70, being larger than the other, 68. Above the larger set is placed an armature-plate 63, having a semicircular flange 65 formed thereon, which forms the stop against which the type-bar toggle-arm projection abuts. This "stepped" projection has steps 71, 72, and 73, and it is rigidly secured to the toggle-arm 74. This toggle-arm is connected to its corresponding type-bar by a link 77. The arm itself is pivoted at 76 in the support 75.

The armature-plate 63 is held up in its "toe" or T position by a suitable spring placed on the pivot 61. (See T, Fig. 26.) When the armature-plate is in its second or "middle" or M position the large magnets 70 are energized, but the smaller ones, 68, are not. (See M, Fig. 26.) If it is desired to move the armature-plate 63 into its third or "heel" or H position, both magnets 68 and 70 are energized, the smaller one, 68, drawing up its armature-plate 63 of the large magnets 70. (See H, Fig. 26.) The "limit-armature" 66, as stated, is drawn up until its free end registers with an opening 64 in the large armature-plate 63, when the full attraction of the large magnets 70 becomes effective in moving this armature into its third or heel (H) position.

There are as many "stepped" type-bar toggle-arm projections as there are type-bars 78 and 79, and the one armature-plate 63 serves for all of them. All of the type-bars 78 and 79

cushion upon the pneumatic cushion 59, placed directly to the rear of the ink-pads 62, and these bars are arranged radially, (see Fig. 6,) so as to make their impressions at the same location, all of them successively striking the cushion 59, thus entirely obviating the noise inherently present in other machines. This pneumatic cushion can be inflated more or less, according to the different requirements of service under which the type-writer may be operated, the inflation usually being the greatest when the most rapid speed is to be attained. It is of course obvious that we do not limit ourselves to the use of a pneumatic cushion in connection with an electrically-operated type-writer, using the same in connection with any kind of machine being no departure from the merits of the invention.

A suitable index-finger 58 projects from behind the ink-pad support 60 toward the front of the impression-roller 101, and it serves to point on the carriage-scale 55, where a succeeding impression will be made. This finger 58 passes above the scale 55, which is fastened to the portion 49 of the carriage-frame, so as not to interfere with the free movement of the carriage adjacent the ink-pads 62.

As the shifting-magnets 68 and 70 are operated the type-bars 78 and 79 are either impressed upon the paper at the toe (T) point, middle (M,) or heel (H,) according to the position of the shifting-magnet armatures 63 and 66, and so long as these armatures are maintained in any one of the three positions the vertical alinement will be absolutely positive.

The type-bars 78 and 79 at their ends opposite to the character-dies 98 are pivoted to bell-cranks 80, one bell-crank being provided for each type-bar. These bell-cranks are arranged in two simicircular groups, being pivoted at 85 in curved castings 84, which are fastened to the pyramidal frames 2. About midway of the length of the type-bars 78 and 79 there are placed links 77, which are pivoted to the other portion 74 of the toggle-arms. This portion 74 is pivoted at 76 in a semicircular casting 75, which extends between the side frames 2 of the machine.

The type-bar bell-cranks 80 have their short arm connected by links 86 to equalizing-bars 87, which have depending projections 92, having hook ends 93 formed thereon, which are engaged by the "impression-magnets" 95 through their curved armature-plates 94, and thus the type-bars 78 and 79 are successively delivered to a common location and their impressions are recorded by the same movement that delivers them to the impression position. There are two sets of impression-magnets 95 and two armature-plates 94, (see Fig. 1,) one set serving one half of all the type-bars and the other set serving the other half.

The force of the impact of the type upon the impression-roller is a constant factor on account of the electromagnets 95 exerting a constant tractive force for all characters. Hence uniformity and speed of operation are attained which is impossible where the impact is an unknown variable factor, as in manually-operated machines. The uniformity of effect does not depend upon the skill of the operator, and a novice would be able to execute work having as uniform impression as the most skilled expert.

In order that the impression-magnets 95 may serve a large number of type-bars in common, we provide a series of selecting-magnets 90, one for each type-bar, that attract their armature-arms 88, which are pivoted at 89, when the corresponding key of the keyboard makes active the electric circuit which includes the magnet that is to select the type-bar containing the desired character. The selecting-armature levers 88 are pivotally connected to their respective equalizing-bars 87, and as these armatures are attracted the equalizing-bars 87 are moved endwise, carrying their depending hook-ended projections 92 into the path of the impression-magnet armature 94. A single key controls the magnets 95 and the selecting-magnet 90, which is being used. The small magnet has less self-induction than the large one. Hence it acts quicker, so as to draw the equalizing-bars into position before the impressing-magnets actuate their armatures.

If desired, the keys might be so arranged as to first make connection to the selecting-magnet and upon being moved to the end of its stroke make another connection for the impression, thus preceding the impressing movements by the selecting.

The carriage is open in the center (see Fig. 3) between its forward or scale support 52 and the rear or impression-roller support 121, so as to allow the free insertion of the desired length or width of paper. Each of these supports is substantially T-shaped, the lower end of the stems being provided with antifriction-rollers 54 on stem 52 and 153 on stem 121. They travel upon suitable tracks 7 and 8, which are placed parallel to the path of travel of the impression or platen roller 101. Track 8 is the forward one and 7 is the rear one.

In order that the platen-roller 101 may be carried in absolute parallelism in a horizontal plane with the carriage-tracks 7 and 8, we provide an inserted skeleton U-shaped frame 47 at each end of the rear T-support 121 and plain pivoted standards 48 for the forward or "scale" support 52. The pair of U-frames 47, serving the rear support 121, are pivoted together at points 135 and 136 near their upper ends by the base of an inverted right-angled triangle 134. Links 139 connect from near the upper ends of these supports 47 to the intersection 137 of the hypotenuse and the "vertical lines" of the angle. The U-shaped frames 47 and plain standards 48 are pivoted at their lower ends in suitable bearings through their respective pivotal shafts 46, which are supported upon brackets 3 and 4. It will thus be seen that as the T-supports 52 and 121 are moved laterally the impres-

sion-roller 101 will be maintained parallel with the tracks 7 and 8.

In order that the impression-roller 101 may be moved along on its supporting-tracks 7 and 8 without the expenditure of manual energy, we place at the bottom of the rear T-support 121 a half-nut 130, pivoted at 123, and directly beneath the same we place a worm-screw 11, which extends the full width of the machine parallel with the carriage-tracks 7 and 8. This screw 11 at one end contains either a pinion or a trundle wheel 14, as shown in Fig. 7. A cam 15 is also placed at this end of the shaft. The cam 15, through its notch 16, serves to limit the rotation of the feed-screw 11, and thus positively stops and holds the carriage and roller 101 in its impression position.

The feed-screw pinion 14 meshes with an idling spur-gear 13, having another pinion 29 upon its hub which meshes with a second spur-gear 30. The spur-gear 30 has secured thereto a ratchet 27, which is engaged by a suitably-arranged pawl 25 whenever the electromagnet 32, controlling the same, is energized. The train of gears 14, 13, 29, and 30 are so timed in relation to the stop portion 16 of the cam 15 on the feed-screw shaft 11 and the number of teeth on the "ratchet" gear 27 that one revolution of the feed-screw 11 is made for each tooth of the ratchet 27.

The movement of the ratchet-wheel 27 is effected as follows: A long arm 21 is placed at the left-hand side of the machine, having its one end pivoted at 22 toward the front of the machine base-frame 1 and its free end terminating in an armature 31 adjacent the actuating-electromagnet 32, (S S.) This arm 21 carries a link 23, which is pivotally connected to a pawl-support 26, which in turn is capable of being rocked upon the hub of the ratchet 27. The outer end of this support carries the pawl 25, which engages the ratchet 27, and thus imparts motion to the feed-screw 11. The armature-arm 21 also carries a rigid stop 20, which projects therefrom upward to within a short distance of the feed-screw cam 14. Above this stop is placed the free end of a second arm 18, having a suitable pivot at its other end to a bracket 19, depending from the keeper of the magnet 32, the keeper being supported by the casing 33. The free end of arm 18 is provided with a hook 17, which engages the stop 16 of the feed-screw cam 15, thus stopping and holding the feed-screw 11 from rotation at the proper point. This hook-ended lever 18 rests upon the stop 20, referred to, by gravity, or it may be spring-pressed, if desired. The stop projection 20 of the armature-arm 21 moves up and down with the armature, and its action is coincident with the movement of the pawl 25 and ratchet 27, the parts, however, being proportioned so that the hook-ended lever 18 is in position within the path of the stop 16 of the feed-screw cam 14 before the pawl 25 has moved the full length of its throw.

As previously referred to, the carriage can be moved one, two, or three times its normal movement at one time through the operation of a single or separate key, if desired. This is accomplished as follows: The armature-arm 21 at its free end engages a supplementary armature-lever 38, whose free end is stepped into divisions 35 and 36. The distance the lever 38 can be attracted by its magnet 44 (D S) depends upon the position of the auxiliary armature 39, which is controlled by a third magnet 43, (T S.) These two sets of magnets 43 and 44 as their movements are combined or are used independently determine whether the "feeding-magnets" 32 shall move the feed-screw 11 two or three spaces, and when the feeding-magnet 32 alone is used the feed-screw 11 is invariably moved one space only.

The gradation of the feeding is accomplished as follows: The stepped armature 38 is drawn against the auxiliary armature 39, and the feed will be two spaces. When the auxiliary armature 39 is attracted by magnet 43, its free end passes through an opening 37 in the stepped armature 38, which then allows armature 38 to move its entire distance, in which position it will allow the feeding-magnet 32 to attract its armature 31 the entire distance, thus moving the impression carriage and roller 101 three spaces. The variable feed is utilized in forming triple spaces, or when using such characters as "the," &c., the two-space phase being used for combinations like "to," &c., while the single-space feed is utilized in all single characters. The armature 38 is made in spring form, while armature 39 is pivoted at 42 in the casing 33, and spring 40 serves to move it away from the magnet 38 when it is not magnetized. The spring 40 also serves to hold the armature against stop 41 when it is inactive.

Our arrangements for feeding the paper across the impression or platen roller 101 are as follows: The rear T roller-support 121 has two forwardly-projecting bearings wherein the roller 101 revolves. These plates have slots 103 cut therein, so that the roller may be readily removed when desired. The roller at both ends is provided with ratchet-wheels 102 and 219 and is engaged by a pawl 107, that is pivoted to a rock-arm 108, secured to a rear shaft 111, which leads along the one-half of the upper portion of the T-support 121, and at its center the shaft 111 terminates in a short crank-arm 113, which is connected by a trip-rod 116, that is supported in suitable bearings 117 and 120 on the center stem of the T-support 121. A spring 118 is secured to the trip-rod 116 to keep it in a raised position. The bottom end of the rod 116 terminates in a foot 146, which is engaged by a tripping-armature 150, extending the full width of the machine and pivoted at 148 to standards 9. This "trip-armature" 150 is actuated by suitable magnets 152, held upon support 159 in one direction, and by a spring

151, subject to adjusting-screw 149 in the opposite direction. The magnet 152, which actuates the trip-rod 116, is operated by a suitable key P F (paper feed) on the keyboard. The distance of movement, as well as the resulting line-space, is determined by finger-piece 106 at the left-hand end of the impression-roller support 121. The finger-piece 106 carries a stop 110, which limits the movement of the pawl 107 and short crank 108 when rotating the roller 101. This is accomplished by causing the finger-piece 106 to snub into successive depressions 109, formed in the roller-support 121. The roller 101 is kept from accidental displacement by a spring-pressed wheel 220, which engages the ratchet 219 at the right end of the roller 101.

We utilize the mechanism comprised in the following description for establishing the marginal spacing and regulating the length of lines. A toothed bar 133, supported upon standards 5, extends from side to side of the machine. A short distance above the feed-screw 11 upon the bar 133 is placed an adjustable trip 129, having a beveled projection 132 and a stop contiguous thereto, which projection releases the half-nut 130 into engagement with the feed-screw 11. The feed-screw 11 is engaged by the half-nut, as just recited, and it is under spring tension due to spring 131, the nut 130 being pivoted at 123 in a bearing-plate 122, near the bottom end of the impression-roller T-support 121. This half-nut has a projecting pin 128, which as the nut is raised snubs into an opening in the end 127 of the spring-arm portion of a "release" bell-crank 126, which is pivoted at 124 above the half-nut 130. The other arm of the bell-crank 126 contains a pin 125, whereby it may be caused to release the half-nut into engagement with the feed-screw.

When it is desired to cause the half-nut 130 to engage the feed-screw 11 at any other point than at the beginning of a line, the "three-space" feeding-key may be actuated until the desired location is reached, or the carriage may be moved by hand without the use of the feed-screw and the half-nut 130 dropped into engagement by the operation of the thumb-lever 104, pivoted to support 121, and 105 to link 143 at the right-hand end of the impression-roller 101. This lever is connected by a link 143 to a short crank 142, attached to a shaft 141, terminating in an another crank 114, near the center of the rear T-support 121, at its upper end. A trip-rod 115 connects from the crank 114 to the release bell-crank 126, so as to enable the operator to drop the half-nut 130 by pressing the thumb-lever 104. The trip-rod 115 is held in a raised position by a spring 119. Shafts 111 and 141 have a bearing in common at 112.

In order that the half-nut 130 may be quickly removed from the feed-screw 11 and the carriage allowed to automatically return to the starting position, we provide "feed-release" magnets 154, supported by bracket 158, which actuate an armature 155, extending the entire width of the machine and pivoted at 157 in standards 10. This armature engages the half-nut 130, so that its projecting pin 128 snubs into the release bell-crank 126, whereby the nut is held out of engagement until the carriage-spring 144 has drawn the carriage to the starting-point, and the margin-stop 129 again releases the half-nut 130 into engagement with the feed-screw 11, ready for a new line. If desired, we may make the necessary electrical connections with the marginal stop 129, which will automatically energize the impression-roller line-spacing magnets 152, so as to move the roller into a new line position without the necessity of manipulating the key for this purpose upon the keyboard.

When it is desired to move the roller 101 by hand, the axial extension-disk 160 may be used. These disks are placed at each end of the roller, so that either hand may be used. The paper is placed upon the roller by raising the scale 55 and small roller 54, as well as the paper-guide rollers 57, which are supported by arms 56. These parts are all spring-pressed, so as to hold the paper in position, the rollers 57 serving more especially to hold the paper firm on the same plane that the impressions are made. The cross-bar 53 is secured to the forward T-support by end brackets 49, which at one end have links 50, connecting the standards 48 and the forward triangle 51, which is similar to the rear triangle 134. To the rear of the roller 101 is placed a paper-support 100, upon which the paper passes, thus leaving all the writing visible.

Our keyboard, as shown, comprises upper and lower case keys, one key being provided for each character or combination of characters, as "a," "b," "*c*," "to," and "the," and one for single spaces S S, one for double spaces D S, one for triple spaces T S, one for paper feeding P F, and one for releasing the carriage-feed C R. These keys are connected to the respective magnets as is deemed the most expedient. Whether the connection is in series or in parallel is immaterial.

With our keyboard the rapidity of operation is not hampered or reduced, because our keys move but a maximum distance, thus enabling the operator to attain the maximum speed with a minimum expenditure of time and energy.

In the case of the single element characters the key-stem 165 is supported in ways 164, which are held by cross-supports 163 and 162, and has provided a pin 176 and spring 178 for keeping the key in a raised position. The single-space key S S extends along the front of the keyboard and it is held in position by lateral supports 164, the same as the ways 164 for the key-stems 165. The keys-stems have contacts 167, that register with contacts 166.

The paper-feed key P F, the carriage or feed release key C R, the single-space key S S, the

double-space key D S, and the triple-space key T S are provided only with contacts 167 and 166, while all the other keys have more than one set of contacts—as, for instance, the keys which utilize the toe of the type-bars T, the ones using the middle M, and those using the heel portion H. (See Fig. 23, where the three styles of connections are shown.)

In the case of any of the S S character-keys where the T impression is made the connections are substantially the same. The stem 165 receives the positive side of the circuit, and from it connection is made through collar 169 to contact 170, which is insulated by 174. This connection leads to magnets 90 ("sel") and 95 ("imp") over the positive wire, designated as P *s i* (positive selecting and impressing) from the magnets. The negative wire is designated as N *i s*, (negative impressing and selecting.) The outgoing wire from the source of current, which may be a primary or storage battery or a dynamo current, is designated as P and the return-wire as N. For the T or toe impressions magnets 68 and 70 are not used. The other connection from the S S character-keys is made through contacts 167 and 166, the latter being insulated by 175. From 166 the circuit leads over positive wire P *s s*, (meaning a toe impression under single-space movement of the carriage.) The wire P *s s* leads to magnet S S 32 and from there by return-wire N to source of current.

The connections for the M or middle impression are as follows: The stem 165, as before, receives the positive P side of the circuit. As the key is first moved the collar 168 carries contact-spring 172 downward sufficiently far to snub by the collar. Its retractile force, however, is not enough to cause it to make contact with 171. The spring 172 is insulated at 173 or at any other suitable point. The first contact made is effected by collar 169 and spring 170, which is similar in all three styles of connection—S S, D S, and T S—except in the case of T impressions, when 170 leads to magnets 90 and 95, ("sel and "imp,") and in M impressions 170 leads to magnet 70 (M, middle) over wire P *m*, the return being made over wire N *m* to N, and in H impressions 170 leads to both magnets 68 and 70 over wire P *h* and return over N *h* to N. The second contact is make by 167, and 166 in the case of the character-keys 166 leads to magnets 90 and 95, whether the key is for T, M, or H impressions or for S S, D S, or T S carriage-feeds. The third contact is made as the key-stem 165 returns in its upstroke, when collar 168 moves spring 172 into contact with 171 for but a moment of time, since the stem continues its upward movement, thus allowing the spring 172 to snub by when it breaks the circuit with 171, remaining in this position until the next upstroke of the stem 165. 171 leads to the carriage-feeding magnets, and it is the same for all keys requiring the D S or T S movements, excepting that the D S requirements connect 171 to magnets 44 and 32 in series over wire P *t s*, the return being over N.

Fig. 23 shows all the circuit connections (three kinds) from the keys to the following functions, which are diagrammatically drawn in their respective positions, viz: toe impressions, (marked T,) middle impressions, (marked M,) and heel impressions, (marked H,) and the spacing connections simply show the magnets without any of the corresponding mechanism actuated thereby.

Fig. 24 shows the connections from the keyboard diagrammatically to the paper-feed P F and carriage-release mechanisms and also shows the connections to the three carriage-feeds with the elements controlled thereby in their respective positions.

Fig. 25 shows the circuit connections from the three different keys for each order of impression, there being nine different changes on account of the three gradations of feed and the three kinds of impressions, thus making toe T single space S S, double space D S, and triple space T S, and variations of the spacing connections on account of middle M and heel H impressions. All the various magnets are shown in connection with this figure.

Fig. 26 represents, diagrammatically, all the functions shown in Fig. 23, excepting that the nine different character-keys and the three spacing-keys are shown in connection in plan view, while in Fig. 23 only three keys are shown.

In order that we may utilize storage-cells for our electrical equipment, we provide the arrangement of parts shown in Figs. 27 and 28, it being immaterial whether the connections are for single keyboard or two, as shown. The detail arrangements consist in the adaptation shown of connections to a lighting or power circuit 218, protected by a fuse 180, and a main-circuit switch, if desired. This circuit leads to terminals 198 and 197, and it is controlled by the keys 183 and 184, which are united by bar 186, having a pivot 185 provided therefor. The bar 186 has a depending projection 187, which terminates in a slotted end 188. This end engages the shifting-arm 189, having its pivotal point at 190 and the other end slotted at 191. The shifting-arm 189 serves to control the switches 202 and 201 simultaneously through the insulating-connector 193 and pin 192, which engages the slot 191. Switches 202 and 201 are pivoted to points 199 and 200, and the bar 193 is also pivoted to them at points 194. These switches make connection with terminal points 196 and 195, which connect the battery 182 to the keyboards 214 or 215, and also points 197 and 198, which connect from the lighting-circuit 218 over the switches and circuit 217 to battery 182. If desired, an artificial resistance can be used in the circuit 217 to compensate for any differences of voltage between the battery and the lighting-circuit. Circuit 216 leads from the switches 201 and 202 when

they are on points 195 and 196 to the selecting-switches 203 and 204, which are only used when two keyboards are used to control one machine. This circuit terminates in the pivotal points 205 and 206 of the switches 203 and 204. These switches are united by insulated connector 207, and they connect through points 208 and 210 and circuit 213 to keyboard 215 and points 209 and 211 through circuit 212 to keyboard 214. The right-hand position is for the right-hand keyboard, and vice versa.

When the operator leaves the machine, key 190 is depressed, thus connecting the battery 182 to the charging-circuit and also breaking the keyboard-circuit. When key 183 is depressed, the charging-circuit is broken and the battery is connected to the keyboard ready for operation.

If desired, the selecting and impressing magnets may be operated by a key which would first engage a contact to energize the type-bar-selecting magnet and immediately following another connection energizing the impression-magnet, or these magnets can be connected in series, as shown, the selecting-magnets having less self-induction than the impressing-magnet, consequently less retardation, and on account of this difference in the time element the selecting-magnet will operate first and the other immediately following.

It should be understood that we do not limit ourselves to the operation of any of the mechanical features or of the combined electrical and mechanical features of our machine by the precise construction of keyboard shown, but that our mechanical and electrical devices may be operated by any keyboard or plurality of keyboards adapted to put in operation the electrical means for operating our type-bars and determining the amount of their throw, &c.

What we claim is—

1. In a character-impressing apparatus, the combination of an impression-receiving surface, means for moving the same by determinably-variable steps to form a line of impressions, character-bearing bars having characters arranged thereon in groups of varying numbers in a line transverse to the movement of the receiving-surface, means for moving said bars to impress the receiving-surface, means for moving the type-bars individually into coactive relation with the impressing mechanism, and means for shifting said bars a variable extent to select the particular character or group of characters to be impressed, substantially as described.

2. In a character-impressing apparatus, the combination of an impression-receiving surface, means for moving the same by determinably-variable steps to form a line of impressions, character-bearing bars having characters arranged thereon in groups of varying numbers in a line transverse to the movement of the receiving-surface, means for moving said bars to impress the receiving-surface, means for moving the type-bars individually into coactive relation with the impressing mechanism, and magnetic means for shifting said bars a variable extent to select the particular character or group of characters to be impressed, substantially as described.

3. In a character-impressing apparatus, the combination of an impression-receiving surface, means for moving the same by determinably-variable steps to form a line of impressions, character-bearing bars having characters arranged thereon in groups of varying numbers in a line transverse to the movement of the receiving-surface, said bars being maintained normally out of coactive relation with the impression mechanism, means for moving said bars to impress the receiving-surface, magnetic means for moving the character-bars individually into coactive relation with the impressing mechanism, and means for shifting said bars a variable extent to select the particular character or group of characters to be impressed, substantially as described.

4. In a character-impressing apparatus, the combination of an impression-receiving surface, means for moving the same by determinably-variable steps to form a line of impressions, character-bearing bars having characters arranged thereon in groups of varying numbers in a line transverse to the movement of the receiving-surface, said bars being maintained normally out of coactive relation with the impression mechanism, means common to a number of the bars for moving them when engaged therewith to form their impression, magnetic means for moving the character-bars individually into coactive relation with the impressing mechanism, and magnetic means for governing the movement of said bars to select the character to be impressed substantially as described.

5. In a character-impressing apparatus, the combination of an impression-receiving surface, keys connected thereto and acting to move the same a determinably-variable distance to form a line of impressions, type-bars having a plurality of characters arranged thereon in lines transverse to the movement of the receiving-surface and having a varying number of characters on different bars, a connection from said keys to said bars for moving the bars individually to impress the receiving-surface, and means connected to said keys for moving said bars in the direction of their character-line for selecting the particular characters to be impressed, substantially as described.

6. In a character-impressing apparatus, the combination of a carriage supported on ways and carrying an impression-receiving surface, a worm engaging said carriage and acting to move the same along its ways, a spring acting upon said carriage in a direction opposite to that of said worm, means for disengaging said carriage from the worm to allow said

spring to retract the same independent of said worm, type-bars having a plurality of characters arranged thereon in lines transverse to the movement of the carriage, keys connected to said type-bars and to said worm and acting to move the type-bars to impress the characters and to move the carriage a determinably-variable space on its ways, substantially as described.

7. In character-impressing apparatus, the combination of a carriage supported on ways and carrying a receiving-surface, a worm engaging said carriage and acting to move the same along its ways, a spring acting upon said carriage in a direction opposite to the action of said worm, means for disconnecting said carriage from the worm to allow the spring to retract the carriage, a margin-stop fixed in the path of the carriage and adapted to reëngage the carriage with the worm, type-bars having a plurality of characters arranged thereon in lines transverse to the movement of the carriage, and keys connected to said type-bars and to said worm and acting to move the type-bars to impress the characters and to move the carriage a determinably-variable space on its ways, substantially as described.

8. In a character-impressing apparatus, the combination of a carriage supported on ways and carrying an impression-receiving surface, a worm engaging said carriage and acting to move the same along its ways, a pawl-actuated train of gears adapted to rotate said worm, type-bars having a plurality of characters arranged thereon, means for shifting said type-bars in lines transverse to the movement of the carriage, an electromagnet having an armature adapted to move said bars to impress the receiving-surface, an electromagnet arranged in proximity to each of said bars and adapted when energized to bring the corresponding type-bar into position to be operatively engaged by the armature of the impressing-magnet, an electromagnet having its armature connected to the pawl actuating said gears, and keys electrically connected to said magnets for energizing the same, substantially as described.

9. In a type-writing machine the combination of a carriage supported on ways and carrying a platen-roller journaled therein, means for moving said carriage by determinably-variable steps to form a line of impressions, a series of type-bars having a plurality of characters arranged thereon in groups of varying numbers in a line transverse to the movement of said carriage, an inking-pad on which said characters normally rest, electrically-operated means for moving said bars to impress the receiving-surface, electrically-operated means for moving said type-bars individually into coactive relation with the impressing mechanism, electrically-operated means for regulating the movement of said type-bars to select the character to be impressed, and keys connected to the selecting, regulating, impressing and carriage-actuating mechanism, substantially as described.

10. In a type-writing machine the combination of a carriage supported on ways and having a platen-roller journaled therein, a worm engaging said carriage and acting to move the same along its ways, a pawl-actuated train of gears adapted to rotate said worm, a series of type-bars each having a plurality of characters arranged thereon in a line transverse to the movement of said carriage, an inking-pad on which said characters normally rest, an electromagnet arranged in proximity to each type-bar and acting when energized to move the same into position to be operatively engaged by the armature of the impressing-magnet, an electromagnet having an armature adapted to engage and move the type-bars to impress the paper, an electromagnet having its armature connected to said pawl, and keys electrically connected to said magnets, for energizing the same, substantially as described.

11. In a type-writing machine the carriage-feed mechanism, comprising in combination a worm, means connected to the type-actuating keys for intermittently rotating said worm, a nut attached to the carriage and movable to engage said worm, a detent adapted to engage said nut in its disengaged position and hold it out of engagement, and means for disengaging the detent from the nut and allowing the latter to reëngage the worm, substantially as described.

12. The combination in a type-writer carriage-feed, of a worm, means for actuating same by the type-actuating keys, a nut attached to the carriage and spring-actuated to engage said worm, a detent adapted to engage said nut and hold it out of engagement with said worm, an electromagnet having its armature movable to force said nut into engagement with said detent, and a key electrically connected to said magnet to energize the same, substantially as described.

13. The combination in a type-writer carriage-feed, of a worm, means for actuating the same by the type-actuating keys, a nut attached to the carriage and spring-actuated to engage said worm, a detent adapted to engage said nut and hold it out of engagement with said worm, an electromagnet having its armature movable to force said nut into engagement with said detent, a key electrically connected to said magnet to energize the same, and a lever attached to said carriage and adapted to disengage the detent from said nut and allow the latter to reëngage said worm, substantially as described.

14. The combination in a type-writer carriage-feed, of a worm, means for actuating same by the type-actuating keys, a half-nut pivoted to the carriage and spring-actuated to engage said worm, a detent adapted to engage said nut and hold the same out of engagement with said worm, and a stop arranged adjacent to the path of said carriage

and adapted to engage said detent and cause it to release said nut, substantially as described.

15. The combination of the carriage supported on ways, a worm parallel and in proximity to the path of said carriage, means substantially such as described for rotating said worm by the action of the type-bar keys, a half-nut pivoted to the carriage and spring-actuated to engage said worm, a detent attached to the carriage and adapted to engage said nut in its disengaged position, an electromagnet having its armature adapted to force said nut into engagement with said detent, an adjustable stop placed in proximity to the path of said carriage and adapted to disengage said detent from said nut, a key electrically connected to said magnet for energizing the same, and a lever pivoted to the carriage and adapted to release said nut from said detent, substantially as described.

16. In a carriage-feed mechanism the combination of a worm engaging a threaded part on the carriage, a pawl-actuated train of gears acting to rotate said worm, an electromagnet having its armature connected to said pawl, a key electrically connected to said magnet to energize the same and cause it to actuate said pawl, and a second magnet energized by the same key and having an armature adapted to limit the play of the pawl-actuating armature, substantially as described.

17. In a type-writer the combination with the impression-receiving surface and means for moving the same in the direction of the lines to be written, of type-bars pivoted to one end of a crank-lever and having a plurality of characters arranged in line transverse to the movement of the paper-carriage, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impression, a link connecting the shifting-bar to the other end of said crank-lever, and means for energizing said magnet, substantially as set forth.

18. In a type-writer the combination with the receiving-surface and means for moving the same in the direction of the line to be written, of type-bars pivoted at one end to one arm of a crank-lever and having a plurality of characters arranged in lines transverse to the movement of the paper-carriage, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impression, a link connecting the shifting-bar to the other end of said crank-lever, a toggle connected to the type-bar, means for limiting the play of said toggle, and means for energizing said magnets, substantially as set forth.

19. In a type-writer the combination with the receiving-surface and means for moving the same in the direction of the line to be written, of type-bars pivoted to one end of a crank-lever and having a plurality of characters arranged in lines transverse to the movement of the paper-carriage, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impression, a link connecting the shifting-bar to the other end of said crank-lever, a toggle connected to the type-bar, a stepped projection on said toggle, an electromagnet having an armature adapted to engage said projection and limit the throw of said toggle, and means for energizing said magnets, substantially as described.

20. In a type-writer the combination with the receiving-surface and means for moving the same in the direction of the line to be written, of type-bars pivoted to one end of a crank-lever and having a plurality of characters arranged in lines transverse to the movement of the paper-carriage, guides in which said crank-levers move, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impression, a link connecting the shifting-bar to the other end of said crank-lever, a toggle connected to the type-bar, means for limiting the play of said toggle, and means for energizing said magnets, substantially as described.

21. In a type-writer the combination with the receiving-surface and means for moving the same in the direction of the line to be written, of type-bars pivoted to one end of a crank-lever and having a plurality of characters arranged in lines transverse to the movement of the paper-carriage, an inking-pad on which said characters normally rest, guiding-slots in which said levers move, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impression, a link connecting the shifting-bar to the other end of the crank-lever, a toggle connected to the type-bar, means for limiting the play of said toggle, a comb-shaped plate adapted to receive the free end of the type-bar at the moment of impression, and means for energizing said magnets substantially as set forth.

22. In a type-writer the combination with the receiving-surface and means for moving the same in the direction of the line to be written, of type-bars pivoted to one end of a crank-lever and having a plurality of characters arranged in lines transverse to the movement of the paper-carriage, an inking-pad on which said characters normally rest, guiding-slots in which said levers move, a shifting-bar pivoted at one end to the armature of an electromagnet and having a projecting lug adapted to be engaged by the armature of a second electromagnet for making the impres-

sion, a link connecting the shifting-bar to the other end of the crank-lever, a toggle connected to the type-bar, means for limiting the play of said toggle, a comb-shaped plate adapted to receive the free ends of the type-bar at the moment of impression, a pneumatic cushion upon which the type-bars strike when making the impression, and means for energizing said magnets, substantially as described.

23. In a type-writer the paper-carriage comprising in combination a frame having forward-extending lugs in which the platen-roller is journaled and a depending arm carrying a roller traveling on the carriage-ways, a front frame with similar depending arm and roller, end frames each secured at their bottom to a bar pivoted to the machine-base, front and rear triangles having their upper corners pivoted to the tops of the end frames, links connecting the upper portions of the platen-roller frame and front frame to one of the upper corners of the end frame, and links connecting the bottoms of the depending arms with the lower corner of their corresponding triangles, substantially as described.

24. In a type-writer paper-carriage the combination of a frame having forward-extending lugs in which the platen-roller is journaled and a depending arm carrying a roller traveling on the carriage-ways, a separate front frame with similar depending arm and roller, end frames comprising a single front bar and a double rear bar having their lower ends pivotally attached to the machine-base, front and rear triangles having their upper corners pivoted to the top of the end frames, links connecting the upper portion of the roller-frame and front frame to one of the upper corners of the end frame, and links connecting the bottoms of the depending arms with the lower corner of their corresponding triangles, substantially as described.

25. The combination in a type-writer paper-carriage of a roller-frame having forward-extending lugs in which the platen-roller is journaled and a depending arm carrying a roller traveling on the carriage-ways, a front plate with similar depending arm and roller, a spring-pressed paper-guiding roller secured to the front frame, end frames comprising a single front bar and double back bar having their bottom ends secured to a bar pivotally attached to the machine-base, front and rear triangles each having an upper corner pivoted to the top of one of the end frames, links connecting the upper part of the roller-frame and front frame to one of the upper corners of the end frame, and links connecting the bottoms of the depending arms with a lower corner of their corresponding triangles, substantially as described.

26. In a type-writer carriage the combination with the platen-roller and a ratchet rigid therewith, of a rock-shaft journaled on the roller-frame, a pawl pivoted to one arm of said rock-shaft and engaging said ratchet, an adjustable stop for limiting the movement of said pawl-carrying arm, a connecting-rod pivoted to the other arm of the rock-shaft and having a projecting toe or hook, a pivoted plate extending adjacent to and above said hook, an electromagnet acting to depress said plate and feed the paper, and a key in the keyboard electrically connected to said magnet for energizing the same, substantially as described.

27. In an electrical type-writing machine the combination of type-bars maintained normally out of coactive relation with the impression mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with said impressing-magnet, keys having a plurality of contacts adapted to successively engage with fixed contacts and by a single movement to successively energize a shifting-magnet and the impressing-magnet, and electric circuits in which said magnets and contacts are connected, substantially as described.

28. In an electrical type-writing machine the combination of type-bars maintained normally out of coactive relation with the impression mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with said impressing-magnet, a magnet actuating the carriage-feed, keys having a plurality of contacts adapted to successively engage with fixed contacts and by a single movement to successively energize a shifting-magnet, the impressing-magnet and the carriage-feeding magnet, and electric circuits in which said magnets and contacts are connected, substantially as described.

29. In an electrical type-writing machine the combination of a series of type-bars having a plurality of characters, said bars being maintained normally out of coactive relation with the impressing mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with the impressing-magnet, a magnet having an armature adapted to regulate the throw of the type-bar to select the character to be impressed, keys having contacts adapted to engage successively with fixed contacts when depressed and successively energize a shifting-magnet, the selecting-magnet and the impressing-magnet, and an electric circuit in which said magnets and contacts are connected, substantially as described.

30. In an electrical type-writing machine the combination of a series of type-bars hav-

ing a plurality of characters, said bars being maintained normally out of coactive relation with the impressing mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with the impressing-magnet, a magnet having an armature adapted to regulate the throw of the type-bar to select the character to be impressed, a magnet actuating the carriage-feed, keys having contacts adapted to engage successively with fixed contacts when depressed and successively energize a shifting-magnet, the selecting-magnet, the impressing-magnet and the carriage-feeding magnet, and an electric circuit in which said magnets and contacts are connected, substantially as described.

31. In an electrical type-writing machine the combination of a series of type-bars having a plurality of characters, said bars being maintained normally out of coactive relation with the impressing mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with the impressing-magnet, a magnet having an armature adapted to abut against a stepped stop on the type-bar and regulate the throw of the bar to select the character to be impressed, a magnet having an armature extending into proximity to that of the magnet which regulates the throw of the type-bars and adapted to limit the motion thereof, keys having contacts adapted to engage successively with fixed contacts and successively energize the armature-limiting magnet, and the type-bar regulating, shifting and impressing magnets, and an electric circuit in which said magnets and contacts are connected, substantially as described.

32. In an electrical type-writing machine the combination of a series of type-bars having a plurality of characters, said bars being maintained normally out of coactive relation with the impressing mechanism, a magnet having an armature adapted to engage and actuate the type-bars when brought into coactive relation therewith and cause them to impress the receiving-surface, a series of magnets each acting to shift a type-bar into coactive relation with the impressing-magnet, a magnet having an armature adapted to abut against a stepped stop on the type-bar and regulate the throw of the bar to select the character to be impressed, a magnet having an armature extending into proximity to that of the magnet which regulates the throw of the type-bars and adapted to limit the motion thereof, a group of magnets acting in variable series to actuate the carriage-feed by determinably-variable steps, keys having contacts adapted to engage successively with fixed contacts and successively energize the armature-limiting magnet, the type-bar regulating, shifting and impressing magnets, and one or more of the carriage-feeding magnets, and an electric circuit in which said magnets and contacts are connected, substantially as described.

33. In an electrical type-writing machine employing type-bars having a plurality of characters arranged in lines transverse to the line of movement of the paper-carriage, the combination of a series of magnets each acting to shift a single type-bar from inoperative to operative position, a magnet having an armature adapted to engage and actuate the type-bar when in operative position, a magnet having an armature adapted to limit the throw of the type-bar and govern the portion of the character-line to be impressed, magnets actuating the carriage-feed, keys having a series of contacts adapted to successively engage separate fixed contacts connected respectively to the type-bar-limiting magnets, the type-bar-actuating magnets, and the carriage-feed-actuating magnets, and an electrical circuit in which said magnets, keys and fixed contacts are connected, substantially as described.

34. In an electrical type-writer the combination with the paper-carriage, its feeding mechanism, the type-bars and electromagnets adapted to actuate the same, of a keyboard having keys electrically connected to said magnets, a second keyboard having keys electrically connected to the same magnets, and a switch connected to the source of electrical energy and to which switch both keyboards are connected, whereby either keyboard may independently operate the type-writer, substantially as described.

35. The combination with an electrical type-writer, its keyboard and connections, a primary electric circuit, and a secondary battery, of a switch comprising a pair of connecting-bars pivoted at one end and connected respectively to the terminals of a secondary battery, a pair of contacts connecting with the opposite sides of the primary circuit, a pair of contacts connected with the opposite sides of the circuit in which the keyboard is connected, a cross-arm pivotally connecting said switch-bars and insulated therefrom, a forked lever engaging said cross-bar and adapted to move the switch-bars from one pair of contacts to another, and a T-lever having finger-keys on the T-arms and engaging said shifting-lever at its extremity, substantially as described.

36. The combination with an electrical type-writer, its keyboard and connections, of a primary electric circuit, a secondary battery, and a switch to which the primary circuit, the secondary battery and the keyboard-circuit are connected, whereby the switching off of current from the keyboard