

June 27, 1933.

R. F. DIRKES ET AL

1,916,168

TELEGRAPH RECEIVING APPARATUS

Filed June 16, 1928

8 Sheets-Sheet 1

Fig. 1.

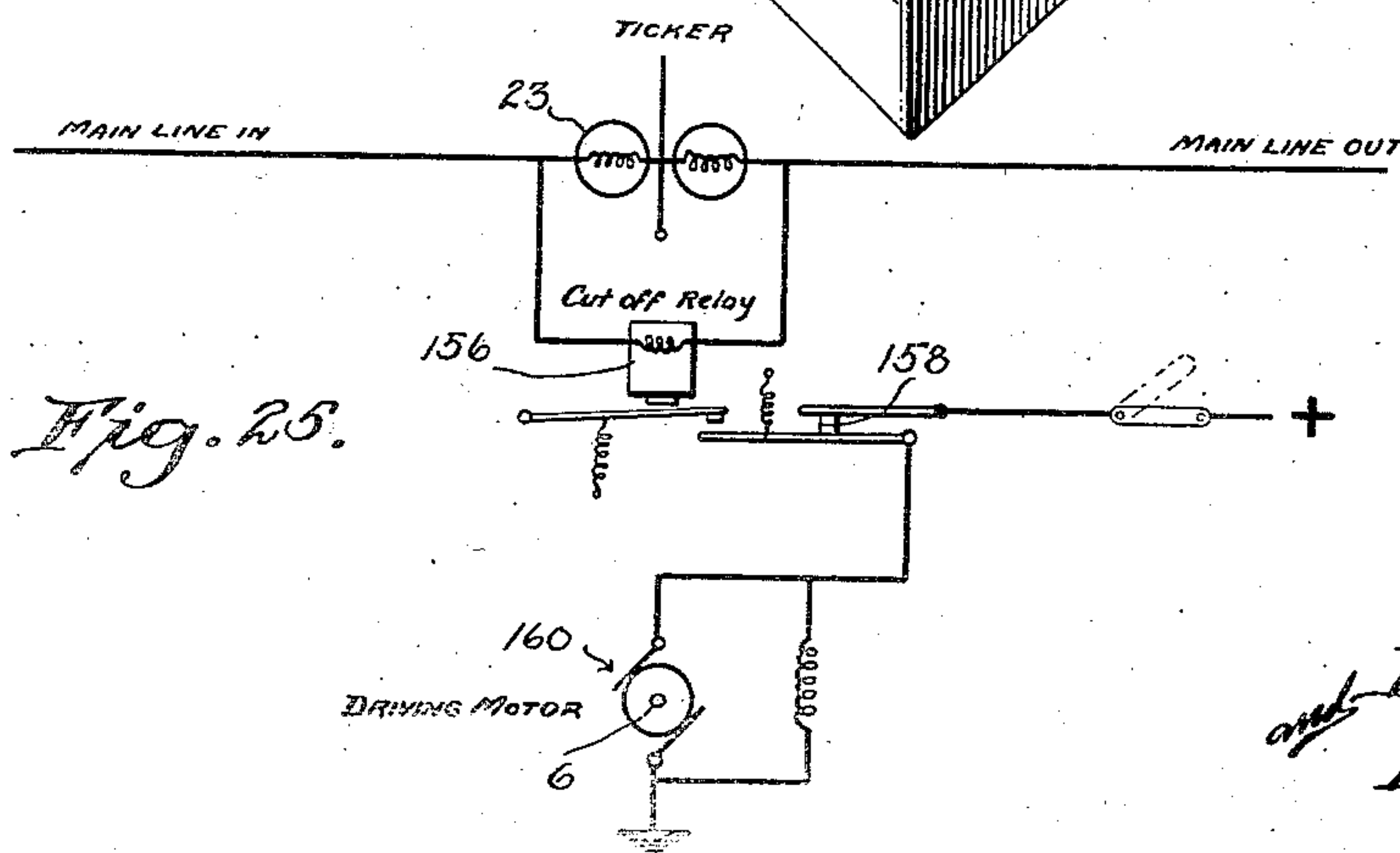
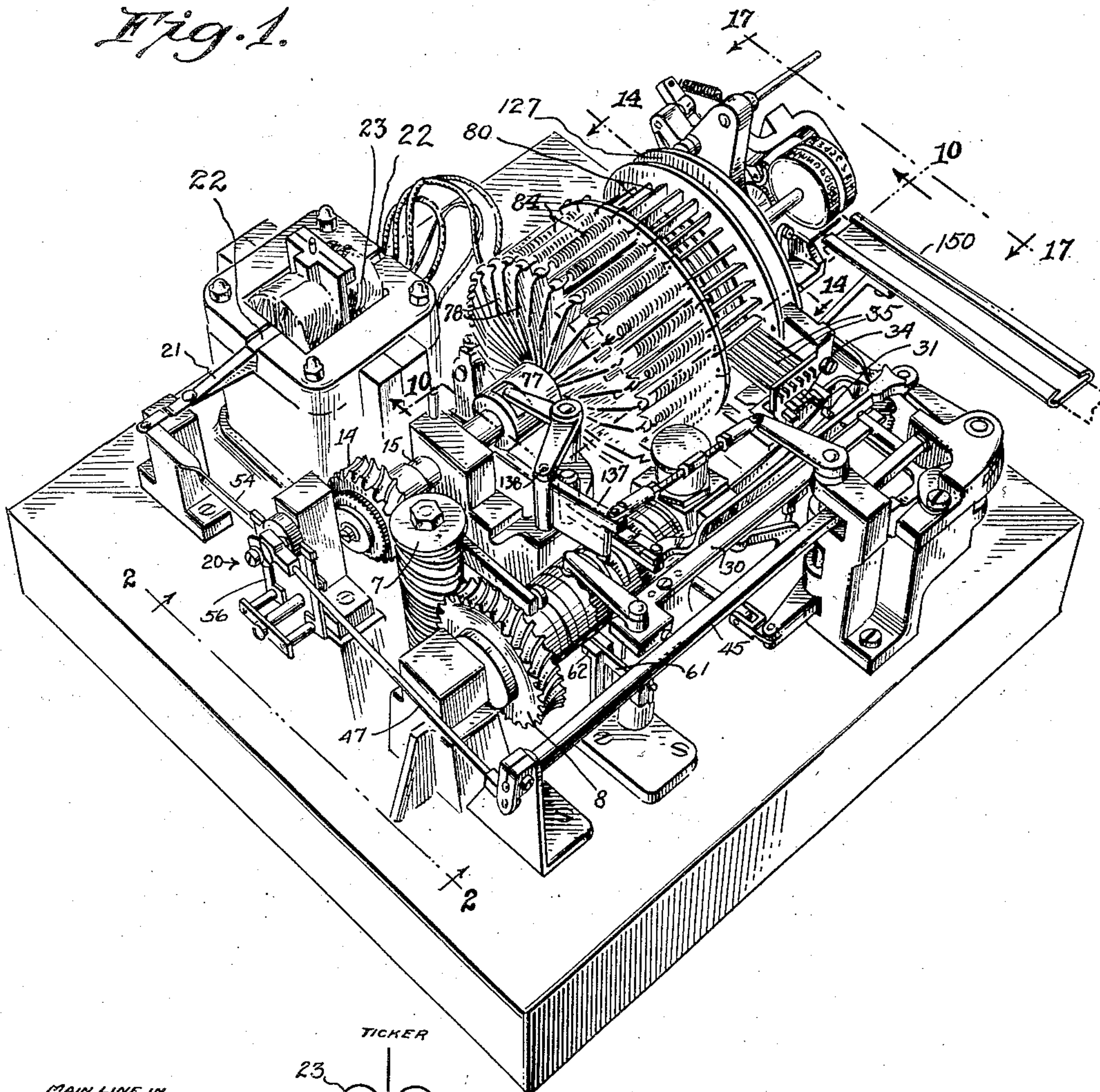


Fig. 25.

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Fig. 2.

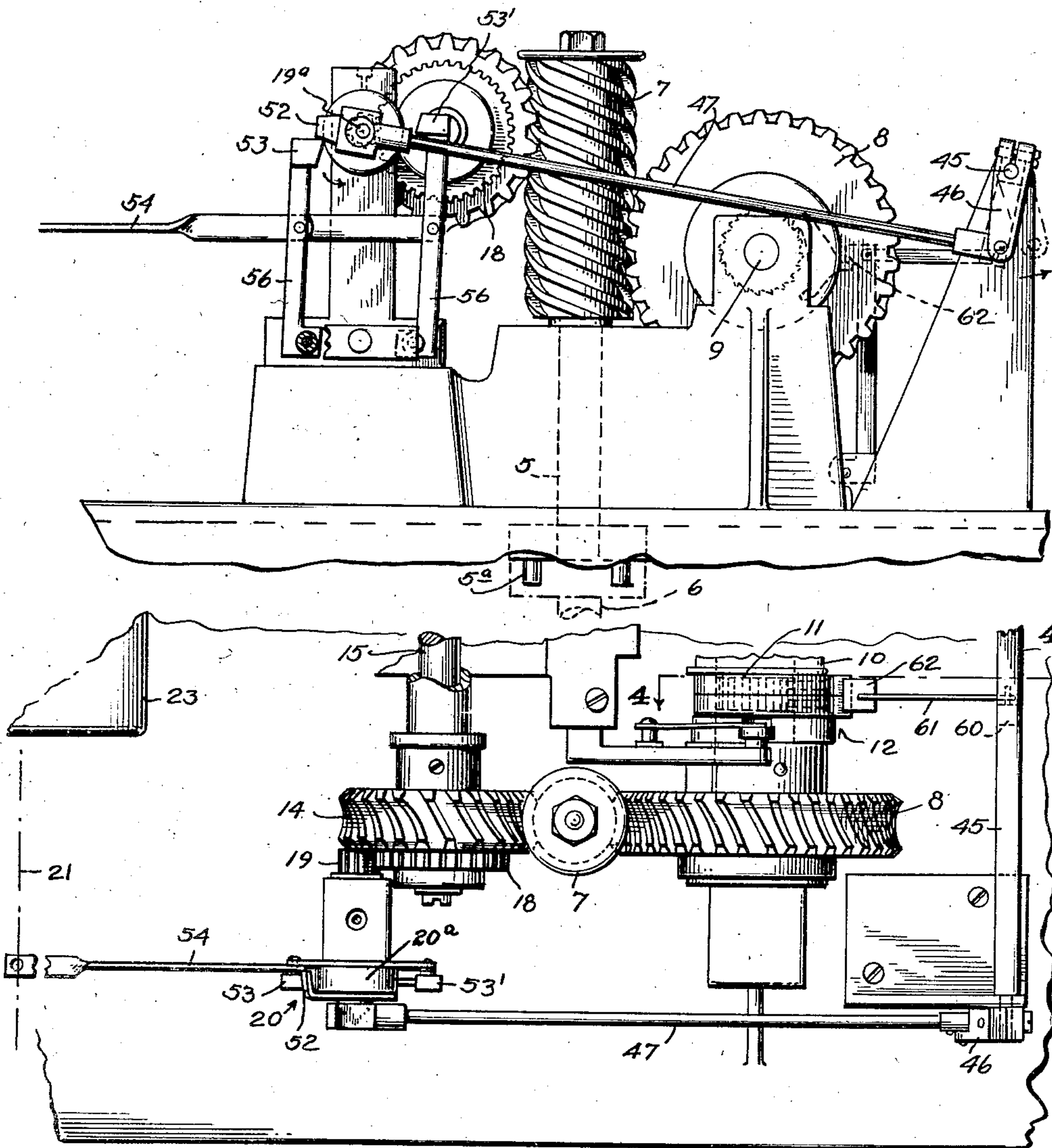


Fig. 3.

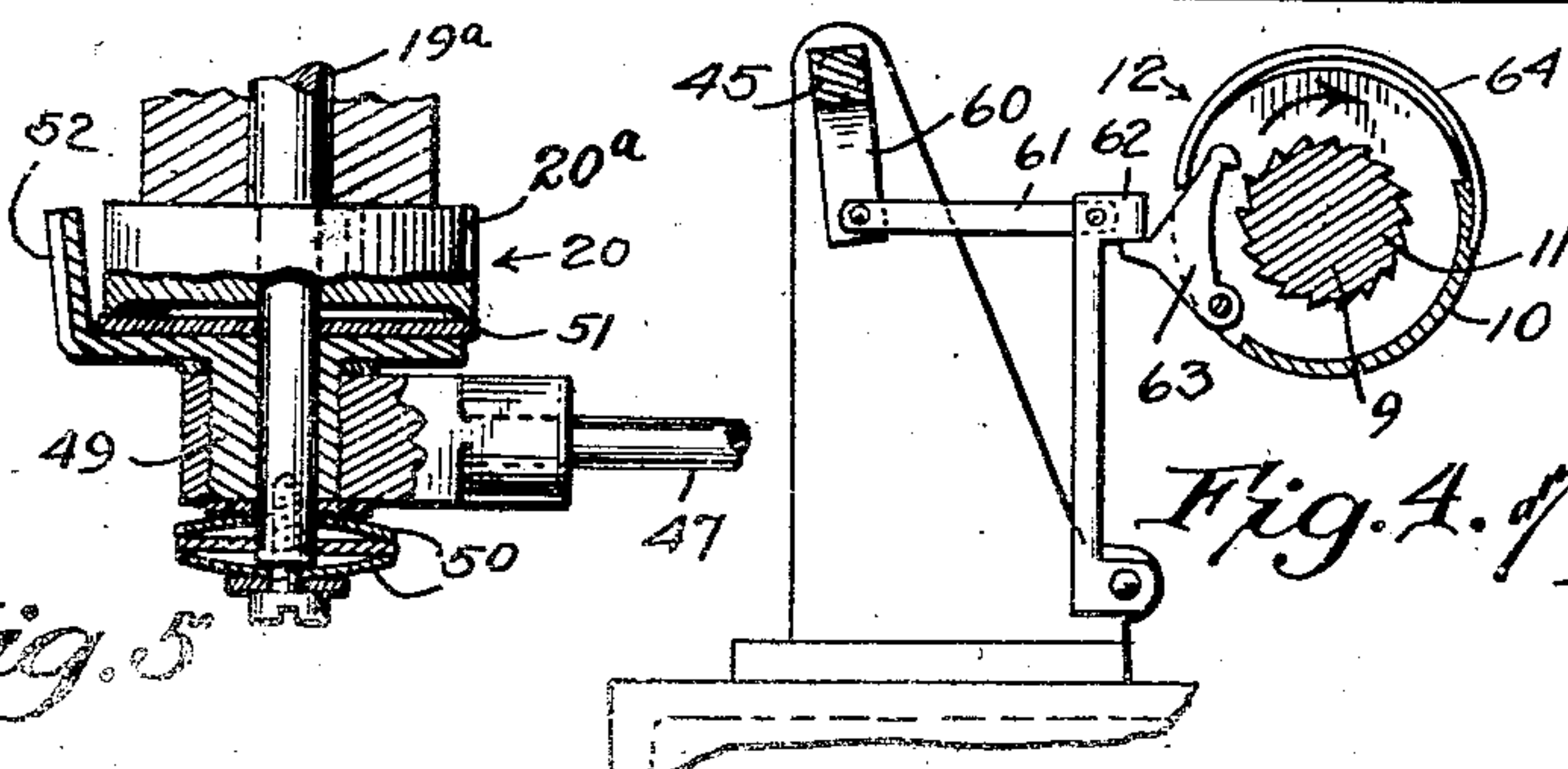


Fig. 5.

Fig. 4. R. F. Dirkes
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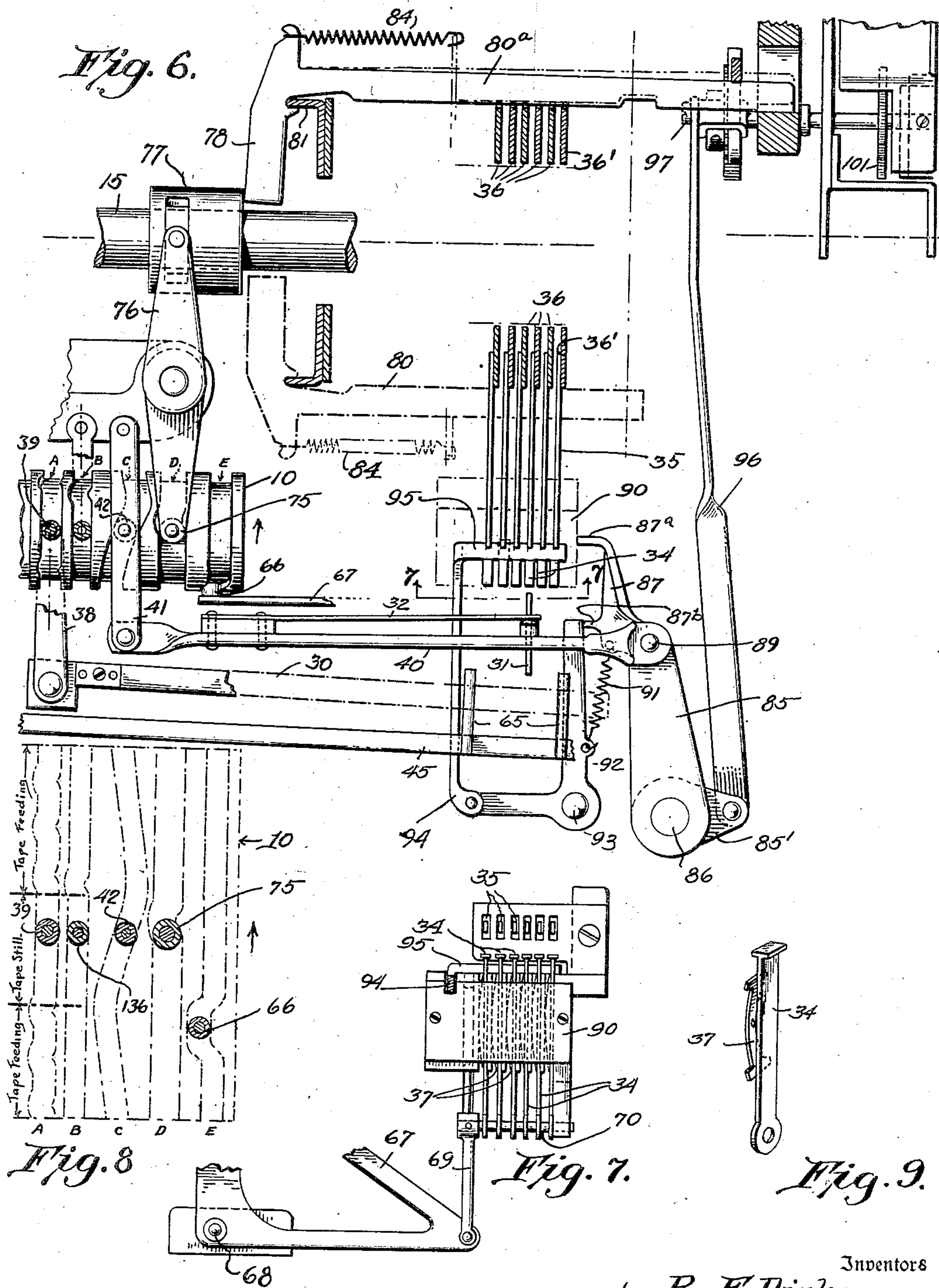
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Fig. 10.

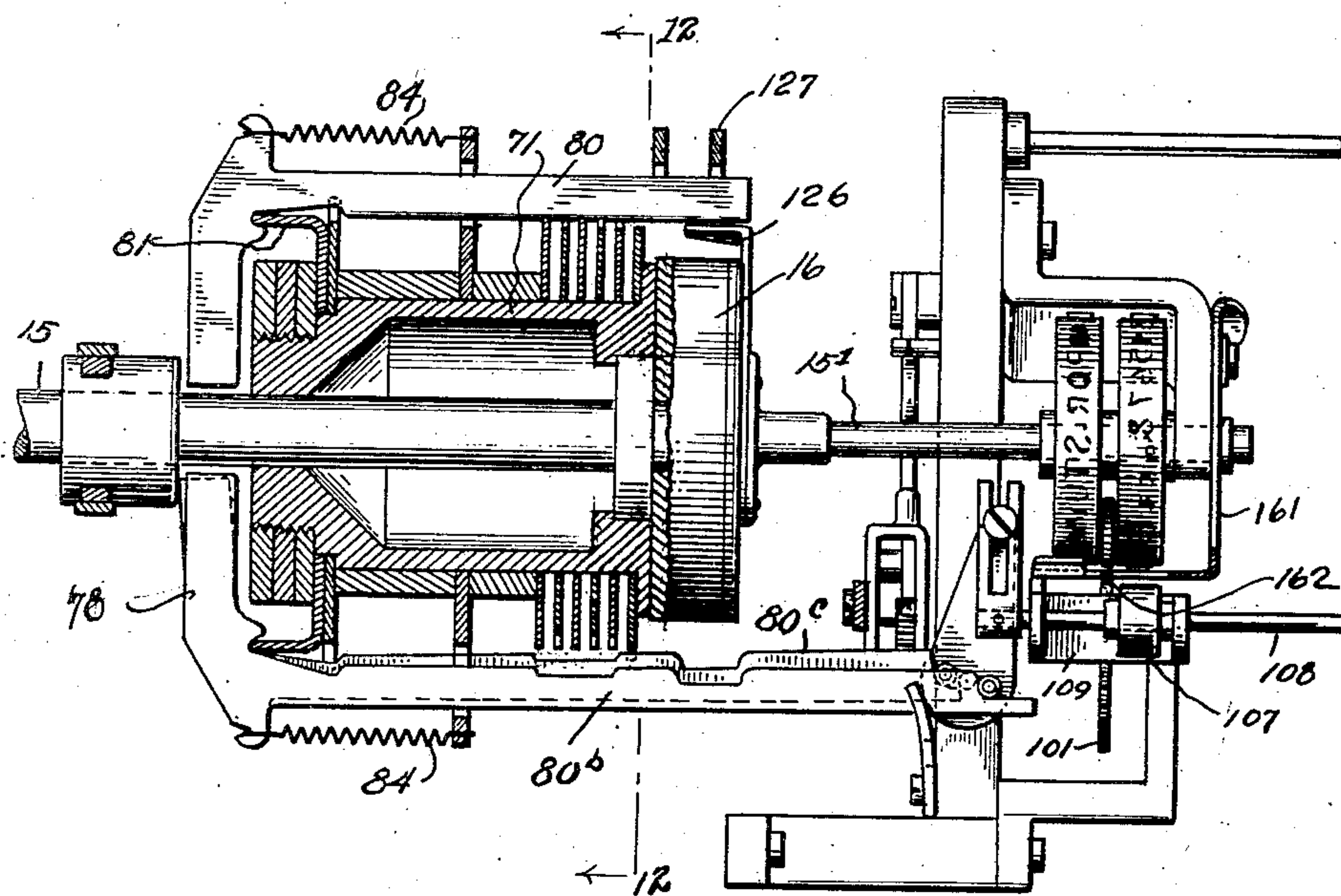


Fig. 12.

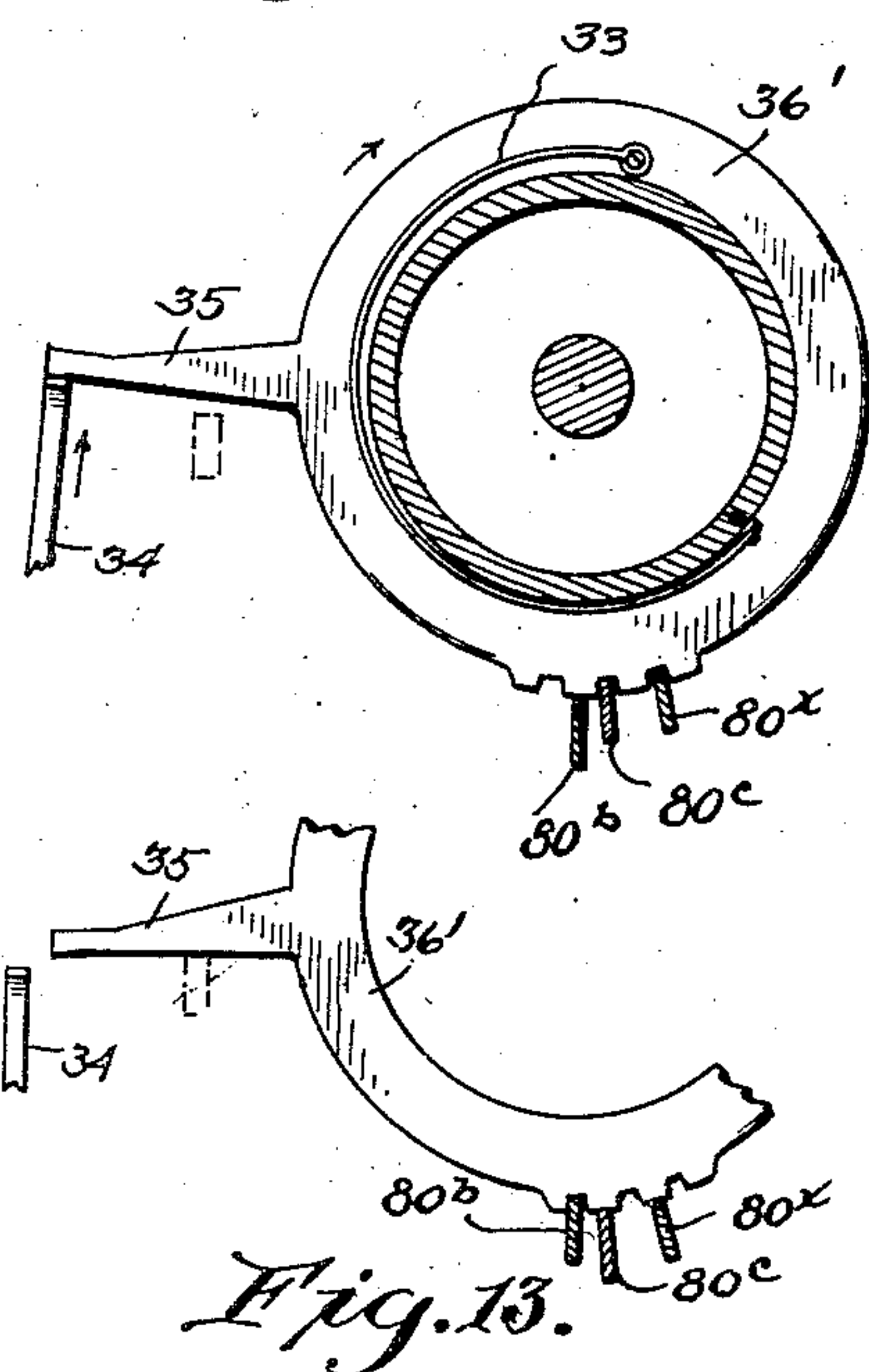


Fig. 13.

Fig. 11.

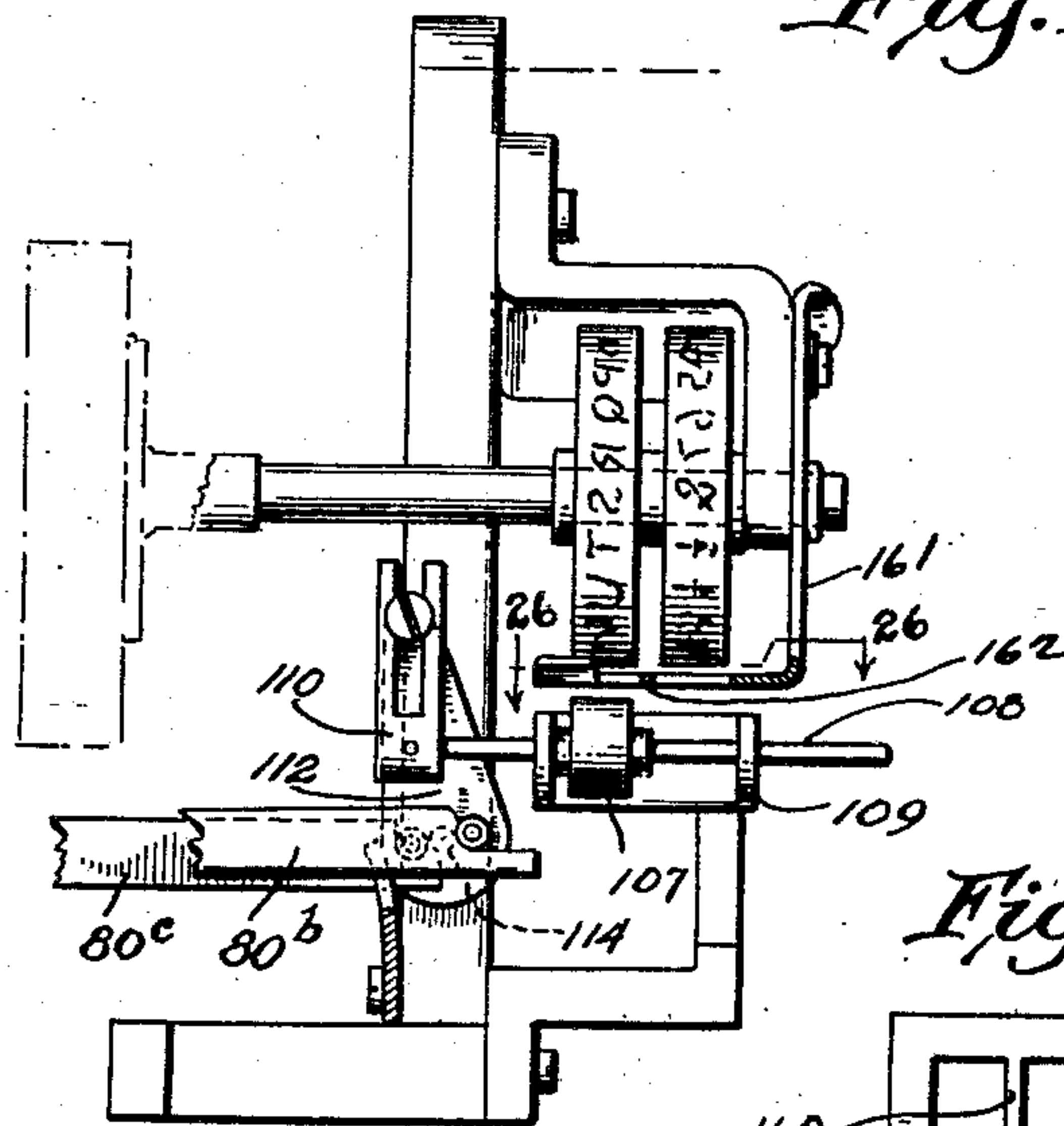
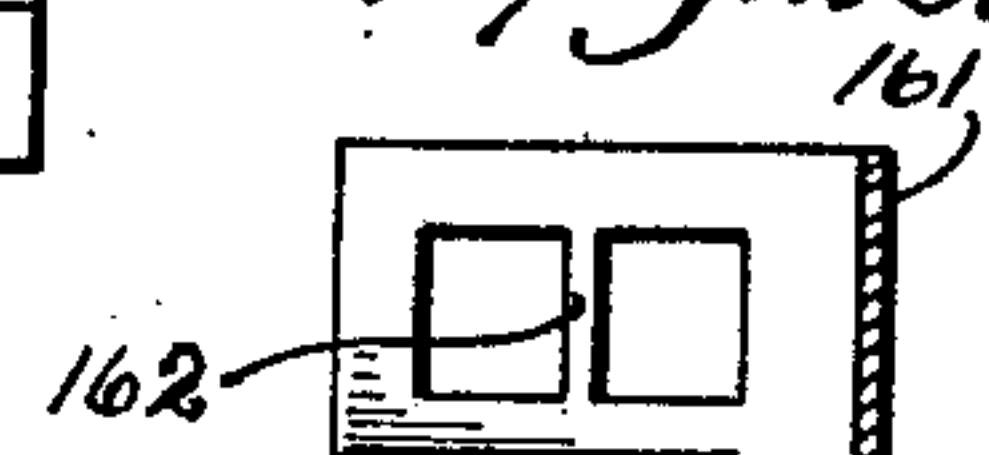


Fig. 26.



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Fig. 14.

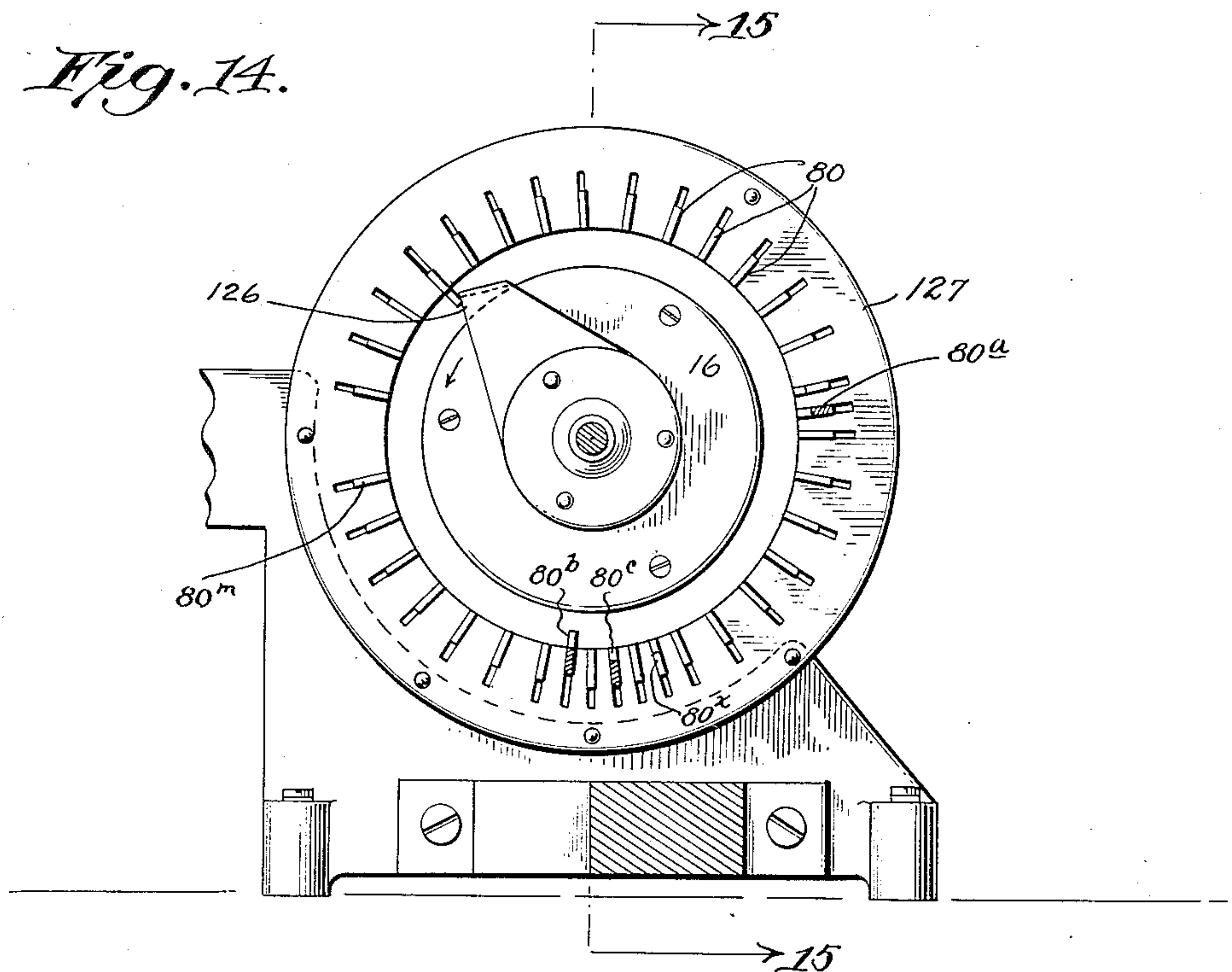


Fig. 15.

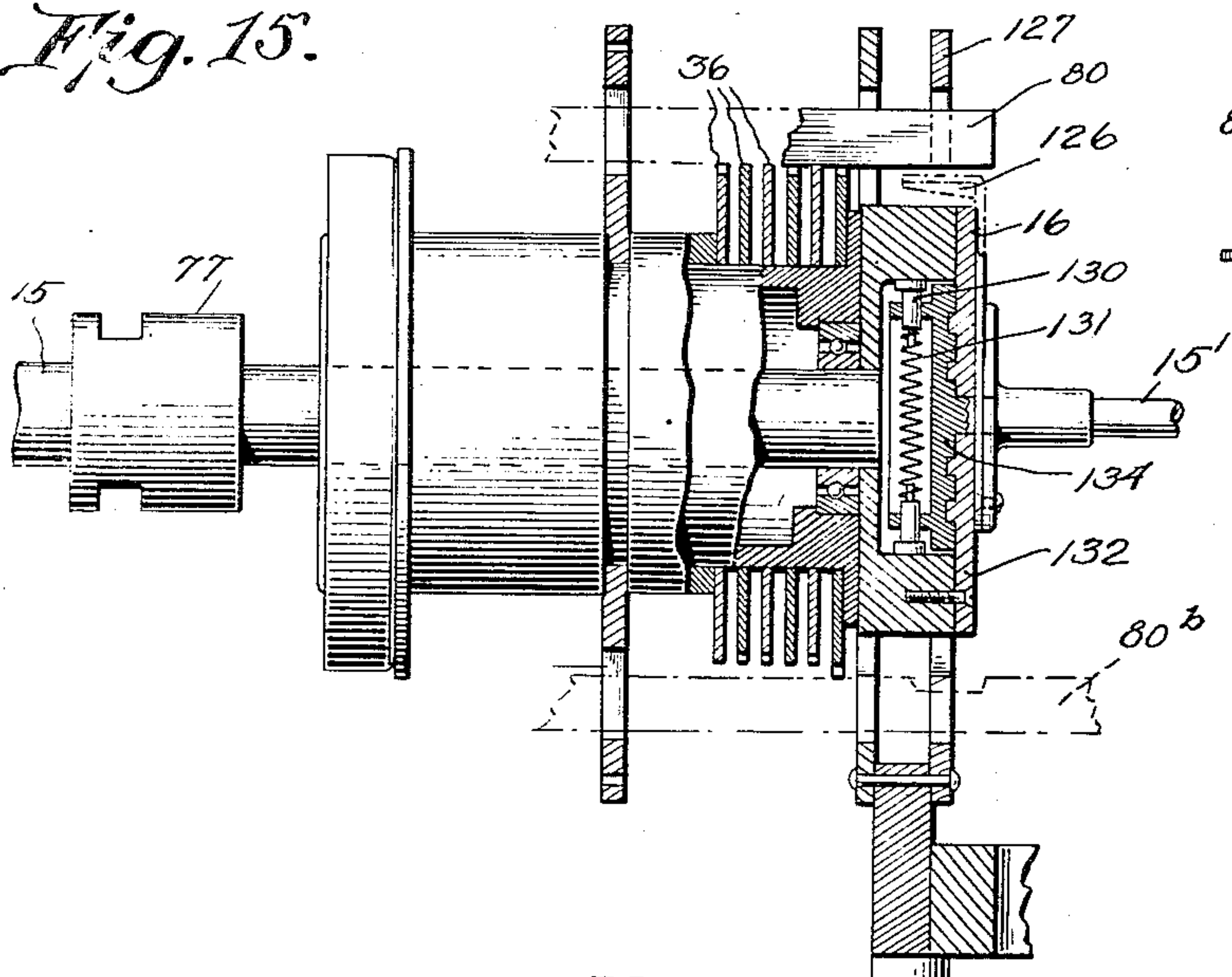
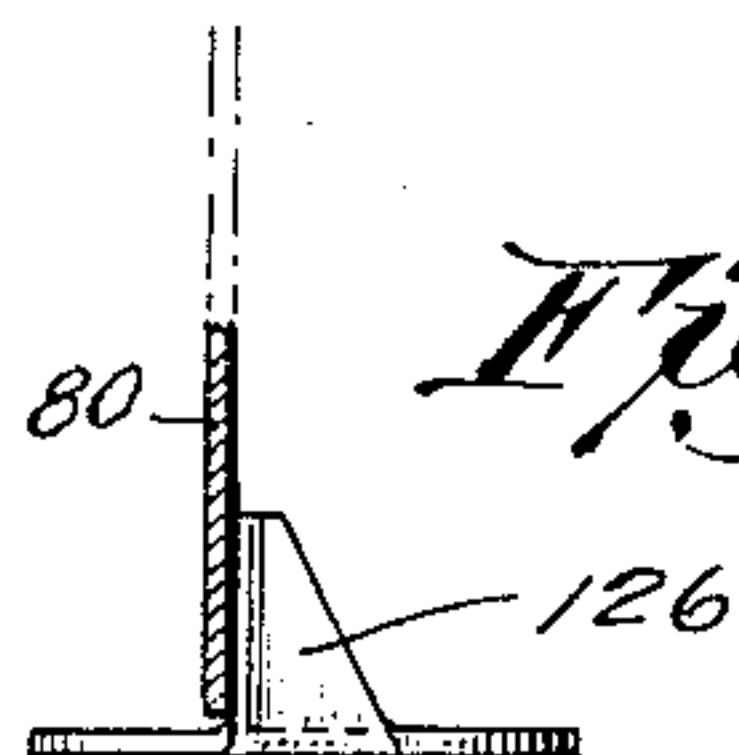


Fig. 16.



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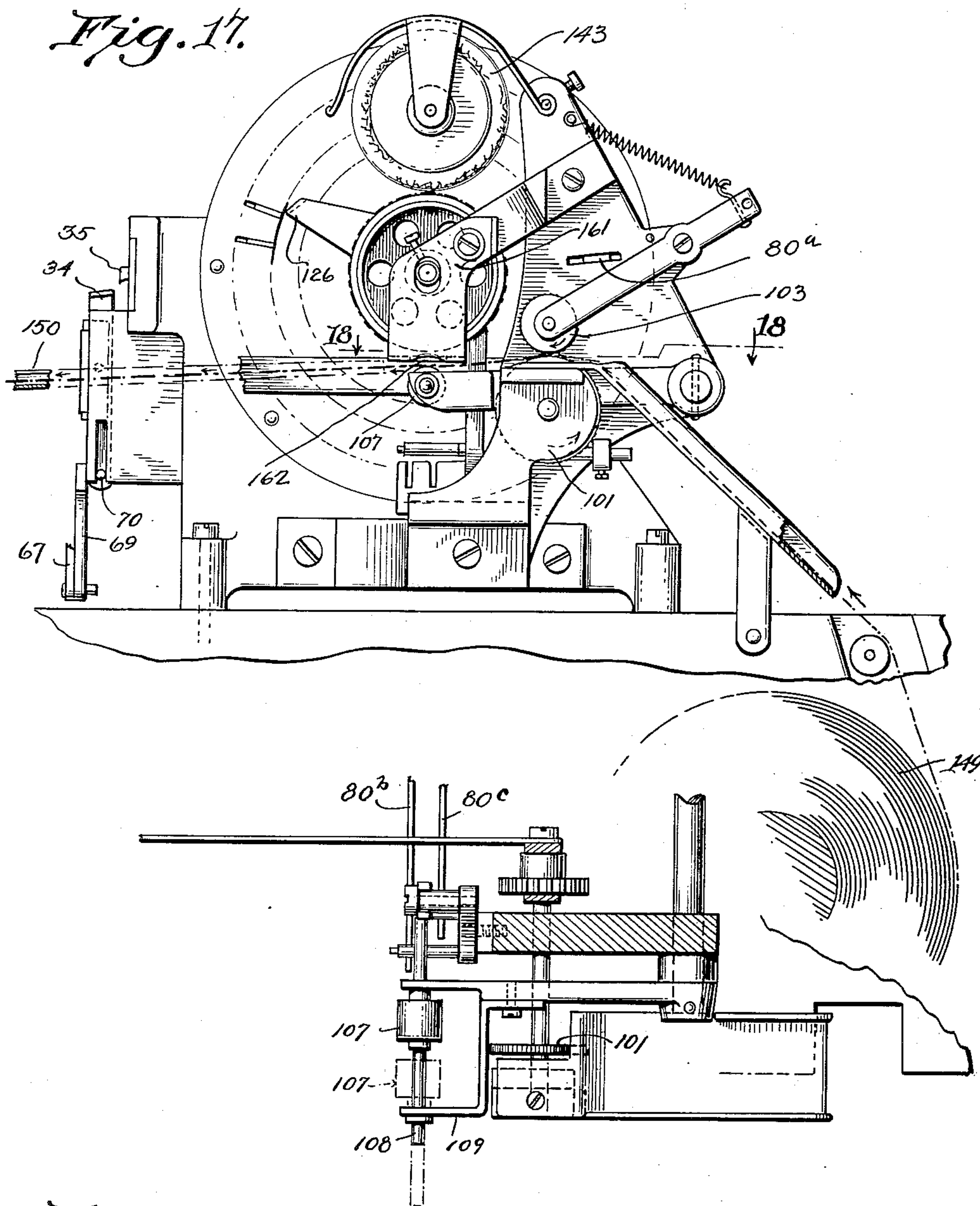


Fig. 18.

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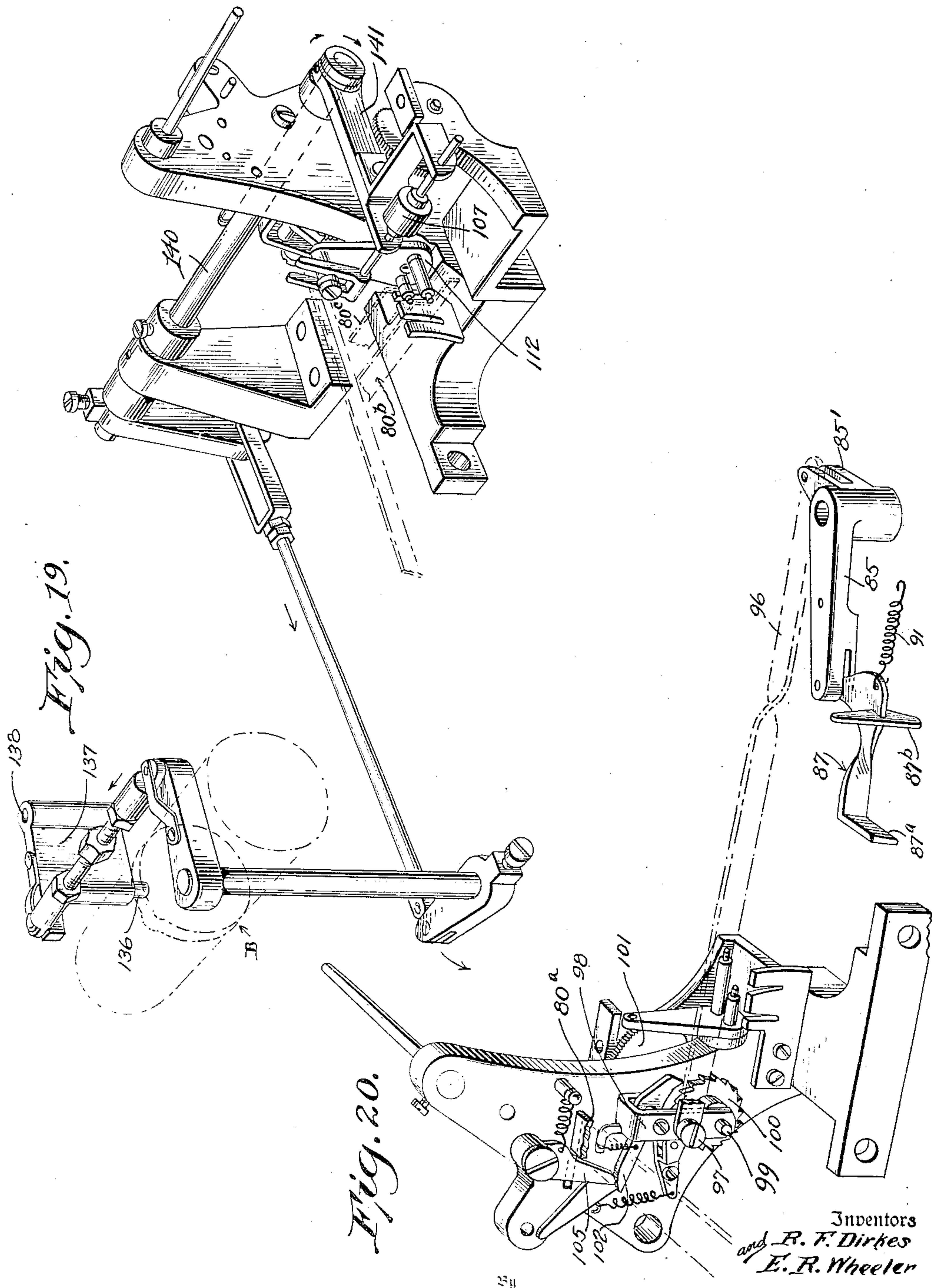
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Filed June 16, 1928

8 Sheets-Sheet 7



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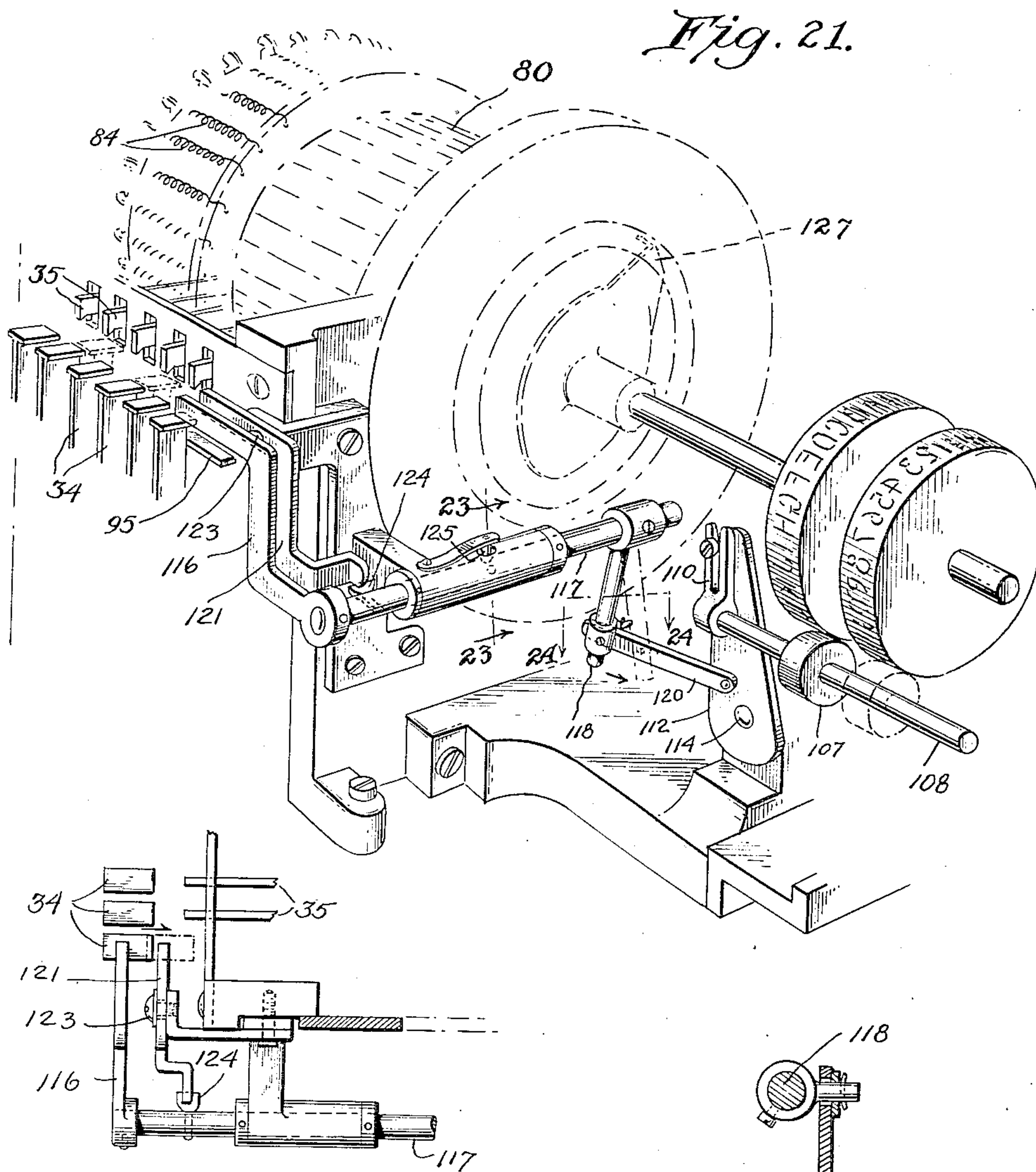
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TELEGRAPH RECEIVING APPARATUS

Filed June 16, 1928

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By

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TELEGRAPH RECEIVING APPARATUS

Application filed June 16, 1928. Serial No. 285,838.

This invention relates to telegraph receiving apparatus of the simplex operated type in which the machine is controlled directly from line impulses. It may however, be operated over a line having duplex connections so that printers at both ends of the line can be operated simultaneously. The machine is arranged to print letters and figures upon a tape and hence is particularly adapted for use as a ticker.

Telegraph recording apparatus which are known as stock tickers and are employed to record the fluctuating values of stocks and other market quotations must not only be absolutely accurate and free from liability to get out of order, but they must operate with great rapidity. The object of our invention is to provide a machine which is staunch, simple in construction and which will operate at a greater speed than has heretofore been attained. To this end we have made improvements in various features and have departed radically in other features from prior machines of this type. Instead of requiring a code character to accomplish the shifting from letters to figures or vice versa, we determine this by means of one pulse in the letter or figure character transmitted. The printing or press function is accomplished through the printer mechanism directly from a cam on the cam shaft which controls the other functions of the machine and is therefore made to operate in phase with the other functions of the ticker. The tape feed mechanism is accomplished with a smooth even movement which occupies three fourths of the time allotted to a character. The printing mechanism operates to print the characters on the tape with unusual clearness and the consumption of ink has been decreased. These and other objects will appear from the following description, in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of a telegraph receiving printer embodying our invention;

Figure 2 is a partial end view looking in the direction of the line 2—2 on Fig. 1;

Figure 3 is a top plan view of the parts shown in Fig. 2;

Figure 4 is a transverse section on the line 4—4 of Fig. 1, showing the pawl and ratchet device for starting and stopping the cam sleeve;

Figure 5 is an enlarged detail view, partly in section, of the friction clutch connecting the links shown in Fig. 2;

Figure 6 is a top plan view showing the cam sleeve and the actuating mechanism for setting up the code selection and for feeding the tape;

Figure 7 is a detail section on the line 7—7 of Fig. 6 showing the lever mechanism for lifting the selection fingers to transfer a selection to the code disks or combs;

Figure 8 is a diagrammatic illustration of the cam slots to show their relative arrangement;

Figure 9 is an enlarged perspective view of one of the selection fingers and its friction spring;

Figure 10 is a longitudinal sectional view on the line 10—10 of Fig. 1, certain parts being in elevation showing the selector bars for controlling the shift of the printer platen from letters to figures and vice versa;

Figure 11 is a fragmentary detail view of the platen shifting device;

Figures 12 and 13 are fragmentary detail views taken on the line 12—12 of Fig. 10, showing the different positions of the comb controlling the shift selector bars;

Figure 14 is an end elevation taken on the line 14—14 of Fig. 1, showing the manner in which the selected code bar projects into the path of the rotating type positioning arm;

Figure 15 is a longitudinal sectional view on the line 15—15 of Fig. 14, showing the construction of the friction clutch connecting the type wheel with the driving mechanism;

Figure 16 is a fragmentary detail view of the outer end of the type positioning arm;

Figure 17 is an end elevation of the machine looking in the direction of line 17—17 in Fig. 1;

Figure 18 is a sectional view on the line 18—18 of Fig. 17;

Figure 19 is a perspective view of the actuating parts of the printing mechanism;

Figure 20 is a perspective view of the actu-

ating parts of the tape feeding mechanism;

Figure 21 is a perspective view showing a modified arrangement for shifting the printer platen from letters to figures and vice versa;

Figure 22 is a detail top plan view of the shift selector parts shown in Fig. 21;

Figure 23 is a detail section on the line 23—23 of Fig. 21;

Figure 24 is a detail section on the line 24—24 of Fig. 21;

Figure 25 is a diagram of the circuits for controlling the operation of the driving motor;

Figure 26 is a cross section on the line 26—26 of Fig. 11.

This telegraph printer is arranged to operate on an 8-unit code. That is, there are eight impulses transmitted for each character in the following order: starting impulse, selection impulses, 1, 2, 3, 4, 5, shift and rest or stop impulses. The start and rest or stop impulses serve to synchronize the printers as is usual in all simplex-operated machines. The five selection impulses select the character to be printed, using the well-known 5-unit code. The shift impulse is used to determine whether a figure or a letter character is to be printed.

This printer apparatus is arranged on a base so that it may be placed as a unit upon a driving motor and its reduction gears. This is an important feature since one machine may be readily replaced for another in brokers' offices or other places by merely lifting one printer off of the motor and placing another thereon.

The shaft 5 which is detachably connected at the coupling 5^a to the drive shaft 6 of the motor, carries a worm gear 7 which meshes with worm wheel 8 to drive the cam sleeve 10, through a clutch 12, and with the worm wheel 14 to drive the type wheel shaft 15' through a clutch mechanism 16. The type wheel shaft is rotated faster (say 1½ times) than the cam shaft for the purpose of allowing the type wheel to rotate to its printing position during the time that a cam shaft selection is taking place. A gear 18 on the type wheel shaft drives a pinion 19 which actuates a friction clutch device 20, to transmit the movements of the tongue 21 carried by the armature 22 of the line magnet 23 in a manner to synchronize with the movements effected by the cam shaft. Rotation of the selection clutch 20 is much faster than the type wheel shaft, in practice we have made it revolve 4.8 times as fast, and 7.2 times as fast as a cam shaft. This ratio may be varied within certain limits without affecting the operation of the machine.

The code character impulses received over the line by the receiving magnet 23 are transferred or set up in the machine by the selecting mechanism associated with the cam sleeve

illustrated in Figs. 6 to 8. Cam groove or track A serves to vibrate the striker bar or reed 30, causing it to strike the selecting pin 31 and force it inward against the tension of the flat spring 32, by which it is carried. Whenever the pin is moved inwardly it strikes one of the six vertical selecting fingers 34 and pushes it under one of the extension arms 35 projecting from the code disks or combs 36. Each finger is frictionally held in either its selected or non-selected position by a spring 37. The striker reed 30 is vibrated once for each of the six selection impulses by the arm 38 which carries a roller 39 following in the cam groove or track A.

The selecting pin 31 is moved successively in front of the selecting fingers 34 by the traversing bar 40 which is shifted by the link 41 having a roller 42 following in the traversing cam track C. This track or groove C is so arranged that it will cause the bar 40 to position the pin 31 in front of the first or left hand selection finger at the instant the first selection impulse is received by the magnet 23. The pitch or incline of the groove is such that the pin will be moved synchronously with the line impulses so that it will be successively opposite the proper finger at the instant the corresponding impulse is received. At the end of each code or character selection the bar 40 returns the pin to its extreme left hand position during the interval of the rest and start impulses, so that it will be in a position opposite the first selection finger when No. 1 selection impulse is received.

As pointed out above, the cam track A causes the striker reed to vibrate once for each of the six selection impulses, but in order that the code character may be set up on the combs it is necessary that the selecting fingers should be moved inwardly only when marking impulses are received, while they should remain in non-selected position when spacing impulses are received. This distinction is effected by means of the clutch mechanism 20 interposed between the armature tongue 21 and the rock shaft 45. An arm 46 on the outer end of the shaft is connected by a connecting rod 47 which is reciprocated by an eccentric hub 49, which is yieldingly held by the spring disks 50 against the friction disk 51, the opposite side of which bears against the disk 20^a on the short shaft 19^a carrying the pinion 19. The eccentric friction member 49 carries a projecting tooth or stop 52 which is adapted to alternately engage the dogs 53, 53'.

When a marking impulse, say of negative polarity, is received, the armature shifts the tongue 21, the link 54 and pivoted yoke arms 56 to the left. This withdraws the dog 53 from the stop 52 and permits the eccentric 49 to make a half revolution until the stop engages the dog 53'. If this is the first or

starting impulse of the group of eight impulses, it will merely serve to release the clutch pawl in the clutch 12 and permit the came sleeve 10 to rotate. When the stop 52 makes a half revolution from the dog 53 to engagement with dog 53', the eccentric shifts the rod 47 to the right, swinging the arm 46 into dotted line position and turning the rock shaft 45 in anti-clockwise direction. At this instant there is no notch in the cam groove A, the roller 39 being in the intermediate position indicated in Figs. 6 and 8. The rock shaft carries an arm 60 which is connected by a link 61 with a pivoted dog 62 which in its inward position shown in Fig. 4, lies in the path of a pair of pawls 63 pivotally carried by the inner end of the cam sleeve 10. The dog holds the pawls out of engagement with the ratchet teeth 11 on the shaft 9, so that the latter rotates while the cam sleeve is held stationary. When the rock shaft 45 is swung in an anti-clockwise direction by the start impulse, as above indicated in Fig. 2, the dog 62 is withdrawn from the pawl which is then forced into engagement with the ratchet teeth 11 by the spring 64, and the cam sleeve 10 thereupon revolves with the inner shaft 9.

If the next impulse (which is the first of the selection impulses), is a marking impulse, the armature will remain in the same position and hence the eccentric 49, connecting rod 47 and rock shaft 45 will remain in the position to which they were moved by the starting impulse. The cam groove C will at this instant have positioned the pin 31 opposite the first selection finger 34 and the first notch in the cam groove A will cause the reed 30 to strike the pin 31 and move selecting finger 34 under the projecting outer end of the first extension arm 35.

If the next selection impulse is a spacing impulse (positive polarity), the armature tongue 21 will shift the link 54 and yoke arms 56 to the right, thereby shifting the position of the dogs 53, 53' and permitting the eccentric to make a half revolution and swinging the arm 46 and rock shaft 45 clockwise into the position shown in Fig. 2. The rock shaft carries a pair of slotted guide arms 65, the flat spring reed 30 moving within these slots. When, therefore, the rock shaft is swung in a clockwise direction by a spacing impulse, the guide arms 65 are tilted upwardly at such an angle that the outer end of the reed 30 will be guided above the pin 31. Accordingly when the cam groove A causes the striker reed 30 to move inwardly at the instant of the second impulse, it will not engage the pin 31 and hence the second selection finger 34 will remain in non-selected position. In this manner the first five selection fingers will be pushed inward or remain in outward non-selected po-

sition in accordance with the marking and spacing impulses of the code character.

Following the five code character selecting impulses a shift impulse is received which determines whether a letter or a figure shall be printed. If a letter is to be printed the shift impulse will be a spacing impulse of positive polarity. Hence the rock arm 45 will be swung in a clockwise direction (Fig. 2) to tilt the guides 65 upwardly so that the striker reed 30 will not hit the pin 31. The sixth selection finger will remain in non-selected position and likewise the sixth comb 36', as indicated in Fig. 13.

On the other hand, if a figure character is to be printed, the sixth selecting impulse will be marking so that the pin 31 will be caused to move the sixth selection finger inward under the extension arm 35 of the sixth comb disk 36'.

Just as the sixth selector finger has been positioned, the roller follower 75 carried by the lever 76, enters the offset in the selector bar cam groove D, and thereby causes the lever to slide the sleeve 77 to the right against the inner ends of the arms 78 of the entire annular set of selector bars 80, thus rocking all of the bars upon the pivot ring 81 and lifting the bar which had been selected by the preceding code combination from the slots or notches, permitting the combs to be returned by their springs 33 to initial position. Almost simultaneously with this movement and while the bars 80 are held away from the combs, the track roller 66 enters the offset in the comb setting cam groove E thereby rocking the triangular lever 67 on its pivot 68 which lifts the link 69 carrying the rod 70 and the selecting fingers 34. Those fingers which were selected and pushed inwardly by the pin 31, as indicated in dotted lines in Fig. 21, now lift their associated extension arms 35 and rotate the comb disks 36 about the stationary supporting drum or cylinder 71. As is well understood, the five annular code disks or combs 36, are provided with notches in their peripheries so arranged that for every code combination representing a letter or a figure, there is only one set of aligned notches into which the proper selector bar can enter.

At the instant the combs have been shifted to the new code combination, the follower roller 75 passes out of the offset in cam groove D thereby sliding the sleeve 77 to the left and permitting the selector bars to be brought against the combs by their retractile springs 84. One bar representing the character selected by the code combination enters the aligned row of notches in the combs. The next instant the selection fingers 34 are all returned to initial position in the manner hereinafter described.

As the striker pin positioning bar 40 moved from initial position across the six

selection fingers, the outer end of the bar moves the bell crank arm 85 slowly about its pivot 86. The yoke-shaped member 87 is pivoted to the outer end of the arm 85 at 89.

5 The yoke arm 87^a normally rests against the finger guide block 90, the other arm 87^b being yieldingly held by the spring 91 against one end of the bell crank lever 92, pivoted at 93. The other end of the lever carries a pivoted
10 lever 94 having its outer end 95 bent at right angles and offset to extend behind the selection fingers. As the bar 40 reaches the end of its travel the yoke arm 87^b slides from the end of the lever 92, thus permitting the
15 spring 91 to swing the yoke on its pivot 89 until the arm 87^b is below and at one side of the arm 92. When the arm 40 moves on its return stroke toward the left, carrying the pivot 89, the yoke arm 87^b pushes the
20 lever arm 92, causing the arm 95 to move forwardly and pull the selection fingers 34 back to their initial position. The yoke arm 87^a then strikes the block 90 and rocks the yoke on its pivot 89 until the end 87^b again slips
25 over the top end of the lever arm 92.

The movement of the bell crank lever 85 above described also serves to actuate the tape feeding wheel. As the longer arm 85 is swung outwardly the shorter arm 85' begins
30 to exert a pull upon the link 96 and continues to move the link to the end of its travel.

The outer end of the link is pivoted at 97 to an intermediate point in the inverted yoke frame 98, which is pivoted to swing about
35 the shaft 99 carrying the ratchet wheel 100 and the tape feed wheel 101. The pawl 102 carried by the yoke is normally spring pressed into engagement with the ratchet teeth so that as the link 96 pushes the yoke
40 frame rearwardly the pawl rides over the teeth and then on the forward stroke the pawl rotates the ratchet and tape feed wheel. An idler wheel 103 presses the tape against the feed wheel. The motion of the link 96,
45 using the time of the rest and start impulses to push the yoke frame rearwardly and the time of the six selection impulses to feed the tape, gives the tape a smooth easy movement, free from any sudden jerk, thus making
50 it easier to read the characters, because three-fourths of the full character cycle is taken up in advancing the tape.

The shift code impulse which determined
55 the position of the sixth selection finger is followed immediately by the eighth impulse or rest impulse which is the same polarity as the spacing impulses, and which moves the stop member 62 into the path of the pawl
60 63 so that upon the completion of one revolution the pawl is disengaged from the ratchet 11 on the shaft 9, thereby stopping the cam shaft until the start impulse of the next succeeding code combination is received.

65 We may provide one or more selector bars

for performing accessory functions or stunts separate from the stopping of the type wheel in printing position. For instance when the operator at the transmitting station has made a mistake in punching the wrong code combination of perforations in the tape its effect
70 is nullified by repunching with all of the perforations so that the entire number of impulses will be transmitted as marking impulses. This character is designated as a
75 "rub-out" character. When this is received by the printer we have provided a separate selector bar which performs the accessory function of preventing the feeding of the
80 tape and printing of a character. A pivoted spring pressed dog 105 is normally held out of engagement with the tail end of the pawl 102 by one of the selector bars 80^a. When the rub-out character is received this bar 80^a
85 falls into the row of aligned notches and in so doing moves away from the dog 105, permitting it to engage the pawl 102 and hold it free from the ratchet wheel 97 during the forward feeding movement of the link 96
90 and consequently the tape is not moved.

It will be appreciated, of course, that other selectors bars similar to bar 80^a may be employed for performing other accessory functions.

When the rub-out selection is received, concurrent with the dropping of bar 80^a, another bar 80^m (Figure 14) falls into another aligned set of slots. This bar 80^m acts as a stop for clutch arm 126 and stops the type
95 wheel in the same manner as for any letters selection. When the type wheel stops in this position by the rub-out selection, a blank and recessed portion of the type wheel is presented to the platen 107. The platen
100 operates on the rub-out character the same as on any other character but when it raises the tape, there is no impression made on the tape because there is no raised character on the recessed portion of the type wheel and nothing for the tape to strike when it comes
105 up.

We employ separate type wheels for the letters and figures characters and shift the platen beneath one or the other at the time
110 the bars 80 drop into their respective slots in accordance with the selection. As stated above this is accomplished by means of a sixth selection impulse. If a letter is to be printed, the sixth selection impulse or shift impulse, is a spacing impulse and consequently
115 the pin 31 is not permitted to strike the sixth selection finger, which remains in non-selected position, as indicated in Fig. 13, whereas if a figure is to be printed the sixth selection is a marking impulse and the sixth
120 selection finger is pushed under the extension arm of the comb 36' and the latter is moved to the position indicated in Fig. 12.

The printing platen 107 is fixed to a short shaft 108 slidable in a frame 109 and fas-
125

tened at one end to a slotted member 110 pivotally carried by a rock arm 112 pivoted at 114. The notched outer ends of the selector bars 80^b and 80^c are positioned to respectively engage pins located upon opposite sides of the pivot 114. When the letters shift is selected the bar 80^b is lifted by its spring 84 into a notch in the comb 36' as indicated in Fig. 13 and in rising strikes the right hand pin, thereby turning the rock arm to the left and sliding the platen 107 under the letters type wheel. The bar 80^c is held away from its pin by a raised portion of the periphery of the comb. If the figures shift had been selected the comb would be rotated to the position shown in Fig. 12, thereby permitting the figures selector bar 80^c to move upwardly into a notch and in so doing strike the left hand pin which would tilt the rock arm 112 in the opposite direction, thus sliding the platen 107 under the figures type wheel as shown in Fig. 10. In this case the bar 80^b engages a solid part of the periphery of the comb. In order that the bar 80^c shall move easily into and out of its notch without danger of binding, we provide a locking or positioning bar 80^x which enters a notch on the figures shift selection and holds the comb in the operated position shown in Fig. 12, leaving the bar 80^c free from any friction due to rubbing on the side wall of the slot in comb 36'.

We have shown another means of shifting the platen in Figs. 21 and 22, in which we dispense with the sixth comb 36'. The sixth selection finger 34 in non-selected position is directly beneath a lever 116 which is pinned or otherwise secured to one end of a rock shaft 117, the opposite end of which carries an arm 118, connected to the rock arm 112 by a pivoted link 120. When the selection fingers are raised in the manner previously described, the lever arm 116 rocks the shaft 117 in a clockwise direction, causing the rock arm 112 to swing to the left and move the platen 107 under the letters type wheel.

If the figures shift is selected the selection finger is moved back under one end of the lever 121 which is pivoted intermediate its ends at 123 as shown in Fig. 22. The outer end of lever 121 engages a lug 124 projecting from the shaft 117. When the selection fingers are lifted the sixth finger rocks the lever 121 on its pivot, which causes the shaft 117 to rotate in a counter clockwise direction thereby swinging the rock arm 112 to the right and thus shifting the platen 107 under the figures type wheel. The parts are yieldingly held in either position by a spring-pressed pin 125 which rides into a depression in the shaft 117.

The positioning of the type wheels to the character which has been selected is accomplished as follows: The two parts of the type wheel shaft 15, 15' are connected

through the friction clutch 16. The shaft 15' carries a stop arm 126 which rotates within the selector bar guide plate 127, just free of the inner edges of the ends of the selector bars 80 which project through guide slots in said disk when they are in their non-selected positions. The selector bar which has been selected in the manner previously described and has dropped into the aligned notches of the combs, projects into the path of the stop arm as shown in Fig. 14, to prevent further rotation of the shaft 15' and stop the type wheels in position to print the character selected by the code combination. The driving portion 15 of the type wheel shaft continues to revolve under the impulse of the continuously driven gear 14.

It will be noted that the end of the stop arm slopes rearwardly from the direction of rotation. This will prevent the loss of a selection if a selector bar should drop into the aligned notches at the instant the stop arm is passing thereunder. If the end of the stop arm were flat or nearly so, or if it should slope upwards and one of the selector bars should fall on it, the bar would rebound or be pushed upward and would thus release the selector disks or combs so that they would be returned to their non-selected position by their spring 33.

The friction shoes 130 are spring pressed outwardly to engage the annular wall of the clutch chamber 131 which is filled with grease. In order to prevent the grease from leaking or being thrown out, the end of the clutch chamber is closed by a plate 132 provided with a plurality of annular baffle rings which interfit with corresponding grooves and rings in the disk 134 on the inner end of the type wheel shaft 15.

The printing mechanism operates as follows: The track follower 136 enters the offset of the printing cam groove B just at the time the shift impulse of the following character is received (see Fig. 8) to produce a momentary swing of the plate 137 on its pivot 138. The platen 107 has been shifted either under the letters wheel or under the figures wheel in accordance with the shift selection as previously described. The plate 137 operates through the link and pivot connections shown in detail in Fig. 19 to rotate the shaft 140 at the front of the machine to thereby lift the arm 141 which carries the platen 107 upwardly to push the tape against the type wheel and print the character to which the type wheel has been rotated. The paper of the tape is easily crimped against the type wheel and does not require a heavy blow against the surface of the type wheel.

The platen and the shift mechanism associated therewith, when operated require an appreciable interval in which to settle down or come to rest and, therefore, we have timed the printing operation so that it does not im-

mediately follow the shift operation but is spaced therefrom by a time interval equal to the time of transmission of a number of impulses of the code combination. In the particular arrangement of the cam grooves illustrated in Figure 8, the shift operation occurs immediately after the receipt of the shift signal, at the time the code disks are moved to the new code combination, that is, during the last part of the same cycle in which the shift impulse is received and the printing operation is accomplished approximately simultaneously with the reception of the shift impulse of the following cycle and just previous to the shifting of the platen to its succeeding position. This is indicated in Figure 8 by the position of the off set portion of the cam groove B which controls the printing operation and which is substantially in axial alignment with the last off set in the cam groove A which controls the setting up of the shift finger 34. Therefore, the platen has nearly a complete cycle in which to come to rest before the printing is effected.

To prevent side print from adjacent characters on the same type wheel and also from the opposite character on the other type wheel we provide a shield 161 (Figures 10, 11 and 17) having two openings, one just over the platen 107 when it is in the figures printing position and one over the platen when it is in the letters printing position. In Figure 26, is shown a sectional view along the line 26—26 of Figure 11 showing the openings in the shield. When the platen 107 is raised it crimps the tape through one of these openings and impresses on the tape the character just over the opening. The walls of the shield prevent the tape from coming in contact with the characters adjacent to the one which is being printed. The dividing strip 162 deflects the tape downward away from the other opening in the shield which is not in use thereby preventing any impression of the character on the opposite type wheel.

We have found that the use of a soft rubber type wheel is superior to a hard surface type wheel in that the soft wheel will carry the ink supply from the inking roller 143 much better than a hard surface and will retain it for a number of impressions without fresh inking of the letter and we also find that a lighter print or press function can be used with the soft rubber type wheel which results in a more clear cut impression of the character.

The blank roll of tape 149 is supported at the front of the machine substantially under the type wheel so that the line of feed is straight from the roll to the feed wheel of the machine. This location of the tape roll is also readily accessible for replacement purposes.

It is desirable that the tape should be guided for a distance after leaving the type wheel and to this end and also for the purpose of preventing unauthorized attachments being made direct to the printer, we provide a channel improvement 150 having rounded inturned edges leaving the printed part of the tape exposed to view. This tape channel guide is detachably secured in any desirable manner to the frame of the machine.

At the close of office hours, or when the machine will be idle for a considerable period, the driving motor should be cut off by opening the main switch, but as this is liable to be neglected or overlooked by the operator, we have provided means for automatically disconnecting the driving motor when there is no current on the main line of the printer. As indicated in Fig. 25 we shunt the main line receiving relay 23 with a high resistance alternating current neutral relay 156 which holds its armature in attracted position when there is any current flowing in the main line. As soon however as current ceases to flow in the line the armature is retracted and opens the switch contacts 158, thereby stopping the driving motor 160.

Instead of connecting the cut-off relay 23 in shunt to the main relay, it may be connected in some other way, as for instance, in series with the main relay and provided with a low shunt resistance so that it will not interfere with the operating current on the main line and will normally maintain the motor supply switch closed. This manner of controlling the driving motor is, of course, applicable to any motor-driven printing telegraph machine.

It will be obvious to those skilled in the art that various modifications in the mechanism described may be made to suit requirements without departing from the essential features of such mechanism and we do not intend to limit ourselves except as by the appended claims.

We claim:

1. In a printing telegraph receiver, a series of independently movable selection fingers, a selecting pin, means for moving said pin in front of said fingers in succession, a relay responsive to the separate impulses of the received code combinations, means under the control of said relay to render said selecting pin operative or inoperative according to the character of the impulse, a type wheel having two parallel sets of peripheral characters, a platen coacting with said type wheel to effect the printing of a character of either set, said typewheel and said platen being positioned in accordance with the relative setting of said series of control fingers.

2. In a printing telegraph receiver, a series of independently movable selection fingers, a selecting pin, means for moving said pin across in front of said fingers successively, a

relay responsive to the separate impulses of the received code combinations, means under the control of said relay to render said selecting pin operative or inoperative upon the control finger opposite which it may be upon the receipt of an impulse of the code character or combination, a type wheel having parallel sets of peripheral characters, a platen coacting with said type wheel to effect the printing of a character from either set, a series of notched combs the relative positions of which control the position of said type wheel, means coacting with one of said selection fingers to position said platen under the peripheral character corresponding to the code character received, and means for moving the series of control fingers when set to correspond to a received code combination, to correspondingly move the combs relatively to one another.

3. In a printing telegraph receiver, as set forth in claim 2, said platen positioning means including one of said notched combs and selector bars coacting therewith to shift the platen.

4. A printing telegraph receiver comprising a type wheel having a plurality of sets of characters arranged on parallel circumferential surfaces, a shiftable platen coacting with said type wheel to print a character of any set, and means responsive to code combinations of impulses for simultaneously positioning said type wheel and shifting said platen over the character corresponding to the received code combination.

5. A printing telegraph receiver, comprising a selecting mechanism responsive to code combinations of electrical impulses and embodying a plurality of notched code disks and a plurality of annularly arranged selector bars selectively controlled by said disks; a type wheel frictionally connected to a continuously operating drive shaft and having a stop arm rotating in the path of said bars when in selected position, a platen coacting with the type wheel to print characters, feeding mechanism to advance a tape between the type wheel and the platen, said selecting mechanism operating in response to certain code or character combinations to position a blank portion of the type wheel over the platen and to simultaneously render the feeding mechanism inert.

6. A printing telegraph receiver according to claim 5, wherein one selector bar positions the type wheel with a blank portion over the platen and another selector bar renders the tape feeding mechanism inert upon the reception of certain code or character combinations.

7. In a printing telegraph receiver as described in claim 5, said tape feeding mechanism embodying a stepping ratchet and pawl device controlled by said selecting mechanism and the reception of certain code or

character combinations causes a selector bar to hold the pawl from engagement with the ratchet.

8. In a printing telegraph machine, a selecting mechanism responsive to received code combinations of electrical impulses, a printing mechanism controlled by said selecting mechanism, tape feeding mechanism operating to push the tape through the printing mechanism, and means controlled by said selecting mechanism to render said tape feeding mechanism inert upon the reception of certain code or character combinations, a tape supply associated with the machine and means for guiding the tape from said supply to said feeding mechanism.

9. A printing telegraph receiver, comprising a selecting mechanism responsive to received code combinations of electrical impulses and embodying a plurality of notched code disks or combs and a plurality of annularly arranged selector bars selectively controlled by said disks; a two-part character type wheel having a letters disk and a figures disk carried by a shaft connected to one member of a friction clutch, the other clutch member being constantly driven, a platen shiftable to a position under either letters or figures characters, and a stop arm carried by said type wheel shaft which is engaged by any one of said bars selected by aligned notches in said disks operating to position the type wheel and the platen in accordance with the received code combination.

10. A printing telegraph receiver, comprising a selecting mechanism responsive to received code combinations of electrical impulses, a rotary type wheel carrying a stop arm controlled by said selecting mechanism, a friction clutch device interposed between said type wheel and a constantly driven shaft, said clutch device having a box member secured to the shaft provided with a cover having alternate concentric annular ribs and grooves upon its inner face, and a clutch shoe carrying disk rotatably mounted within said box member and connected to the type wheel and having corresponding ribs and grooves interfitting with those of said cover to form grease retaining baffles.

11. A printer comprising a permutation type selecting mechanism responsive to received code combinations of electrical impulses, a printing mechanism controlled by said selecting mechanism and including a type wheel having two parallel sets of peripherally arranged characters, a platen coacting with said type wheel to effect printing of either set of characters, and means responsive to one impulse of a code combination for changing the relative relation of the platen and the sets of characters on the typewheel.

12. A simplex or start-stop printer comprising a permutation type selecting mechanism, printing mechanism controlled by said

selecting mechanism including a two-part type wheel having a letters character periphery and a figures character periphery, a platen coacting with said type wheel to effect printing of either set of characters, and means controlled by said selecting mechanism for shifting the platen under either periphery.

13. In a printer as set forth in claim 12, a shield interposed between the type wheel and the platen preventing the tape from engaging characters adjacent the one being printed and from engaging the opposite character from the other periphery.

14. In a printer as set forth in claim 12, said type wheel having peripheral surfaces of soft rubber embodying said characters whereby a light print or press function provides a clear sharp impression.

15. A simplex or start-stop printer comprising a selecting mechanism responsive to received code combinations of electrical impulses, a printing mechanism controlled by said selecting mechanism and including a type wheel, a platen coacting with said type wheel, and a spacing mechanism comprising a stepping ratchet and pawl mechanism actuated by said selecting mechanism.

16. In a printing telegraph receiver as set forth in claim 9, said stop arm having the top end slope rearwardly to obviate the rebound of a selector bar in case it should strike thereon.

17. In a printing telegraph machine, a selecting mechanism responsive to received code combinations of electrical impulses, a printing mechanism controlled by said selecting mechanism, tape feeding mechanism operating to advance the tape through the printing mechanism, a rotary cam device operating synchronously with said impulses and making one complete revolution during the reception of a code combination, said cam device causing said feeding mechanism to advance the tape during substantially three-fourths of the time required for the reception and printing of one character.

18. In a printing telegraph machine as set forth in claim 17, said feeding mechanism operating to grasp the unprinted tape and push it forward through the printing mechanism to thereby afford an unobstructed view of the printed characters.

19. A printing telegraph receiver comprising a type wheel having a plurality of sets of characters arranged on parallel circumferential surfaces, a shiftable device coacting with said type wheel to print a character of any set, and means responsive to code combinations of impulses for positioning said type wheel and moving said shiftable device over the character corresponding to the received code combination.

20. A tape printing machine constituting a unitary structure comprising a base and

mounted thereon, a selecting mechanism including a relay responsive to received impulses of code combinations, cam actuated mechanism controlling the operation of said selecting mechanism, printing mechanism including a type wheel controlled by said selecting mechanism, and a drive shaft having positive clutch connection with said cam actuated mechanism and friction clutch connection with said type wheel, said shaft having means for separable connection with the drive shaft of a motor.

21. The combination with a printing telegraph receiver, comprising a relay responsive to the impulses of received code combinations, cam actuated selecting mechanism controlled by said relay, a type wheel printing mechanism controlled by said selecting mechanism, and a drive shaft operatively connected to said cam actuated mechanism and to said printing mechanism, of an electric motor connected to said shaft, a switch in the motor supply circuit, and a relay connected in shunt to said first named relay and operating when energized to maintain said switch closed and to open said switch when de-energized.

22. The combination with a printing telegraph receiver comprising a relay responsive to the impulses of received code combinations and an electrical motor connected to drive the selecting and printing mechanism of the receiver, a switch in the motor supply circuit and a second relay connected in the main line in circuit with the receiving relay and responsive to the impulses of the received code combinations, said second relay remaining energized when any operating current is on the main line, and operating when energized to maintain said motor supply switch closed and to open said switch when de-energized.

23. In a telegraph printer responsive to signal code combinations of a uniform number of impulses and operating in a definite cycle, a rotatable type wheel having a plurality of sets of characters thereon, type wheel positioning means operating in response to certain of the impulses of each code combination, shift means operating in response to a separate impulse of each of said code combinations to permit printing from any of said sets of characters, a platen, means for operating said shift means during the cycle in which the shift impulse is received and means for bringing the type wheel and platen together to effect printing after completion of said cycle.

24. In a telegraph printer responsive to a uniform number of impulses and operating in a definite cycle, a rotatable type wheel having a plurality of sets of characters thereon, shift means operating in response to a shift signal to permit printing from any of said sets of characters, a platen,

means for operating said shift means during the latter half of the cycle in which the shift impulse is received and means for bringing the type wheel and platen together to effect printing during the latter half of the succeeding cycle.

25. In a telegraph printer responsive to signal code combinations of a uniform number of impulses, a rotatable type wheel having a plurality of sets of characters, a selecting mechanism responsive to certain impulses of said code combination to position said type wheel in printing position, a platen, shift means controlled by a separate impulse of said code combination for positioning said type wheel and platen in relative positions to permit printing from any set of characters on said type wheel, means for bringing the type wheel and platen together to effect printing, and a timing device for causing the operation of said latter means a predetermined period after the operation of said shift means equal to the time interval of transmission of one or more of said impulses.

26. In a telegraph printer, a selecting mechanism comprising a plurality of notched code discs, means for setting said discs in response to code combinations of a definite number of impulses, a plurality of selecting bars disposed annularly about said discs, a type wheel, a stop arm therefore rotated in the path of certain of said selecting bars when actuated to position said type wheel, means for printing from said type wheel, means for normally feeding the paper after printing and mechanism controlled by one of said selecting bars when actuated, for disabling said paper feeding mechanism.

27. In a telegraph printer, a selecting mechanism comprising a plurality of notched code discs, means for setting said discs in response to code combinations of a definite number of impulses, a plurality of selecting bar disposed annularly about said discs, a type wheel, a stop arm therefor rotated in the path of certain of said selecting bars, when actuated, to position said type wheel, and mechanism mechanically controlled by one of said selecting bars, when actuated, to perform a function, other than the positioning of said type wheel.

28. A telegraph printer having a definite cycle of operation for printing each character, selecting mechanism responsive to signal code combinations of a uniform number of impulses, a type wheel controlled by said selecting mechanism, and paper feeding mechanism for advancing paper past the printing position, means for causing said paper feed mechanism to advance said paper during the setting-up interval of said cycle.

29. A telegraph printer having a definite cycle of operation for printing each character, said cycle comprising a setting up interval and a transfer interval, selecting mechanism,

means for setting-up a combination for said selecting mechanism during the setting-up interval, means for transferring said combination to said selecting mechanism during said transfer interval, printing means controlled by said selecting mechanism, paper feeding mechanism for advancing paper into the printing position, means for causing said paper feed mechanism to advance the paper during the first part of said setting-up interval and means for bringing the printing means into engagement with said paper during the latter part of said setting-up interval.

30. In a telegraph printer, a series of independently movable selection fingers, means responding to a code combination for shifting said selection fingers, a series of code discs arranged to be operated in accordance with the position of certain of said selection fingers, a type wheel, a platen cooperating therewith and means controlled by the position of another of said selection fingers, to determine the relative position of said type wheel and platen.

31. In a telegraph printer, selecting mechanism, a type wheel controlled by said selecting mechanism, a plurality of sets of characters on said type wheel, a platen associated with said wheel, shift means for varying the relative position of said type wheel and platen to permit printing from any set of characters, a selection finger having two positions of operation, means responsive to telegraph signals for setting said selection finger in either one of its positions and separate means for moving said finger into contact with said shift means to actuate the same, in accordance with the previous setting thereof.

32. In a telegraph printer, a selection finger, means responding to a code combination for shifting said selection finger, a code disc arranged to be operated in accordance with the position of said selection finger, a type wheel, a platen cooperating therewith and shift bars controlled by said code disc to vary the relative position of said type wheel and platen.

33. In a printing telegraph machine, a selecting mechanism responsive to receive code combinations of electrical impulses, a printing mechanism controlled by said selecting mechanism, a paper feed mechanism operating to advance the paper into printing position and means to render the paper feed mechanism inoperative upon the reception of certain code or character combinations.

34. In a telegraph printer, a type wheel having a blank portion, a selecting mechanism having type wheel stop bars and a stunt bar, said selecting mechanism operating upon receipt of a predetermined code combination to position said stunt bar in operative position and to simultaneously position one of said type wheel stop bars in operative position.

sition to stop said type wheel with said blank portion in printing position.

35. In a telegraph printer, a type wheel, a selecting mechanism having type wheel stop bars and a stunt bar, said selecting mechanism operating upon the receipt of a predetermined code combination to position said stunt bar in operative position and to simultaneously position one of said type wheel stop bars in operative position to stop said type wheel in a predetermined position.

36. In a telegraph printer, a series of independently movable selection fingers, comprising a shift selection finger and code selection fingers, a typewheel having two sets of characters, a platen, means for positioning said shift selection finger in accordance with the particular set of characters to be next printed from, means for setting the code selection fingers in accordance with the angular position of said typewheel from which printing is to be next effected, and means co-acting simultaneously with the shift selection finger and the code selection fingers after they have been so positioned for shifting said platen and stopping said typewheel in printing position.

37. In a telegraph printer, a series of independently movable selection fingers, comprising a shift selection finger and code selection fingers a typewheel having two sets of characters, a platen, a series of code discs, typewheel stop bars disposed about said code disc, means for positioning said shift selection finger in accordance with the particular set of characters to be next printed from, means for positioning the code selection fingers in accordance with the angular position of said typewheel from which printing is to be next effected, and means actuated after such positioning of said selection fingers, said means co-acting with said shift selection finger for directly shifting said platen and co-acting with said code selection fingers to move said code discs to position one of said typewheel stop bars in operative position to stop the typewheel in a predetermined printing position.

38. In a tape printer a selection mechanism responsive to permutation code combinations, printing mechanism and a feeding mechanism operating to grasp the unprinted portion of the tape and push it forward through the printing mechanism, thereby affording an unobstructed view of the printed tape.

39. In a printing telegraph recorder, a plurality of selectors, a common actuating means for said selectors variably movable into marking and spacing positions in response to received code combinations, means for invariably engaging said actuating means to operate the same in synchronism with each received impulse and thereby to actuate said selectors in accordance with the

setting of said actuating means, a recording mechanism, a shift mechanism, means for controlling said shift mechanism in accordance with the operation of one of said selectors and means for operating the recording mechanism in accordance with the operation of the remaining selectors.

40. In a printing telegraph recorder, a plurality of selectors, a power driven member, a common actuating means for said selectors variably movable into marking and spacing positions intermediate said power driven member and said selectors in response to received code combinations of conditions, said power driven means invariably engaging said actuating means to operate the same in synchronism with each received impulse and thereby to actuate said selectors in accordance with the setting of said actuating means, a recording mechanism, a shift mechanism, means for controlling said shift mechanism in accordance with the operation of one of said selectors and means for operating the recording mechanism in accordance with the operation of the remaining selectors.

41. In a printing telegraph recorder, a plurality of selectors, an electromagnet, a source of power, an escapement controlled by said magnet and driven by said source of power, actuating means operated by said escapement into marking and spacing positions in accordance with line signals received by said magnet, a plurality of selectors movable into marking and spacing positions by said actuating means, a type positioning member controlled by certain of said selectors and a case shift mechanism controlled by another of said selectors.

42. In combination, a plurality of selector levers, a sixth pulse selector lever, a plurality of second selectors, one for each of said first selector levers, a plurality of type elements, a type selecting mechanism controlled by said second selectors for partially selecting a type element, an auxiliary type selecting mechanism controlled by said sixth pulse lever for completing the selection of said type element, means for operating said second selectors in accordance with the operation of said first mentioned selector levers and for simultaneously operating said auxiliary type selecting mechanism in accordance with the operation of said sixth pulse selector lever.

43. In combination, a main type selector mechanism for partially selecting a character for printing, auxiliary type selecting mechanism for completing the selection of said character, a selector operating means having two modes of motion, one of said modes of motion acting to time the operation of the main and auxiliary type selector mechanisms and the other mode of motion acting to operate both main and auxiliary type se-

lector mechanism according to received code combinations of signals and a local source of power for supplying both modes of motion.

44. In combination, a main type selector mechanism for selecting a plurality of characters for printing, a shift mechanism for selecting one of said plurality of characters, a selector operating means having two modes of motion, one of said modes of motion acting to time the operation of the main and shift selector mechanism and the other mode acting to operate both the main and shift selector mechanisms according to received code combinations of signals, the power for both of said motions being entirely independent of the power furnished by the incoming signals.

45. In combination, character carrying means, a series of selectors therefor, shift mechanism, a selector for said shift mechanism, an element adapted to operate said selectors, a signal operated device, means to move said element to determine the selector to be operated, and means controlled by said signal operated device to move the element to determine the motion of the selected selector, both of said last mentioned means deriving their power from a source independent of the signal operated means.

46. In combination, character carrying means, a series of character selecting elements, an auxiliary character selecting element adapted to modify the selective action of said first selecting elements, a member common to all of said elements for variably operating the same, a magnet responsive to received code combinations of impulse conditions for modifying the operation of said common member, and means whereby said magnet has substantially no restraining influence during the interval that responds to the received impulse conditions.

47. In a telegraph recorder, a plurality of notched selector disks, a type wheel, a plurality of type selecting elements disposed about the periphery of said disks, means for operating said disks selectively in accordance with received code combinations of conditions to aline the notches thereof selectively and means comprising a plurality of said type selecting elements acting simultaneously to select a character of said type wheel for printing.

48. In a telegraph recorder, a plurality of notched selector disks, a type wheel, a plurality of type selecting elements disposed about the periphery of said disks and less in number than the number of characters on said type wheel, means for selectively positioning said disks in accordance with received code combinations of impulses to aline the notches of said disks and means controlled entirely by said type selecting elements for selecting a single character of said type wheel for printing.

49. In a telegraph recorder, a plurality of notched selector elements, a type wheel having a plurality of characters arranged in two rows, a plurality of character selecting members, less in number than the number of characters on said type wheel, said members co-operating with the notched selectors to select any one of said characters for printing.

50. In a telegraph recorder, a plurality of notched selector elements, a type wheel having a plurality of character selecting members, less in number than the number of characters on said type wheel, said members co-operating with the notched selectors and means controlled by the combined action of at least two of said character selecting members for selecting one of said characters for printing.

51. In a telegraph recorder, a plurality of notched selector elements, a type wheel having a plurality of characters arranged in two rows, a plurality of character selecting members, less in number than the number of characters on said type wheel, said members co-operating with the notched selectors, means controlled by one of said character selecting members to select the stop position of said type wheel and means controlled by another of said character selecting members for selecting the row of characters from which printing is effected.

52. In a printing telegraph, a series of characters divided into two groups, a series of permutation disks, each permutation thereof acting to select one of said characters, and one of said permutation disks acting as the sole control to select the group.

In testimony whereof we affix our signatures.

ROBERT F. DIRKES.
EVAN R. WHEELER.

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