

Dec. 15, 1936.

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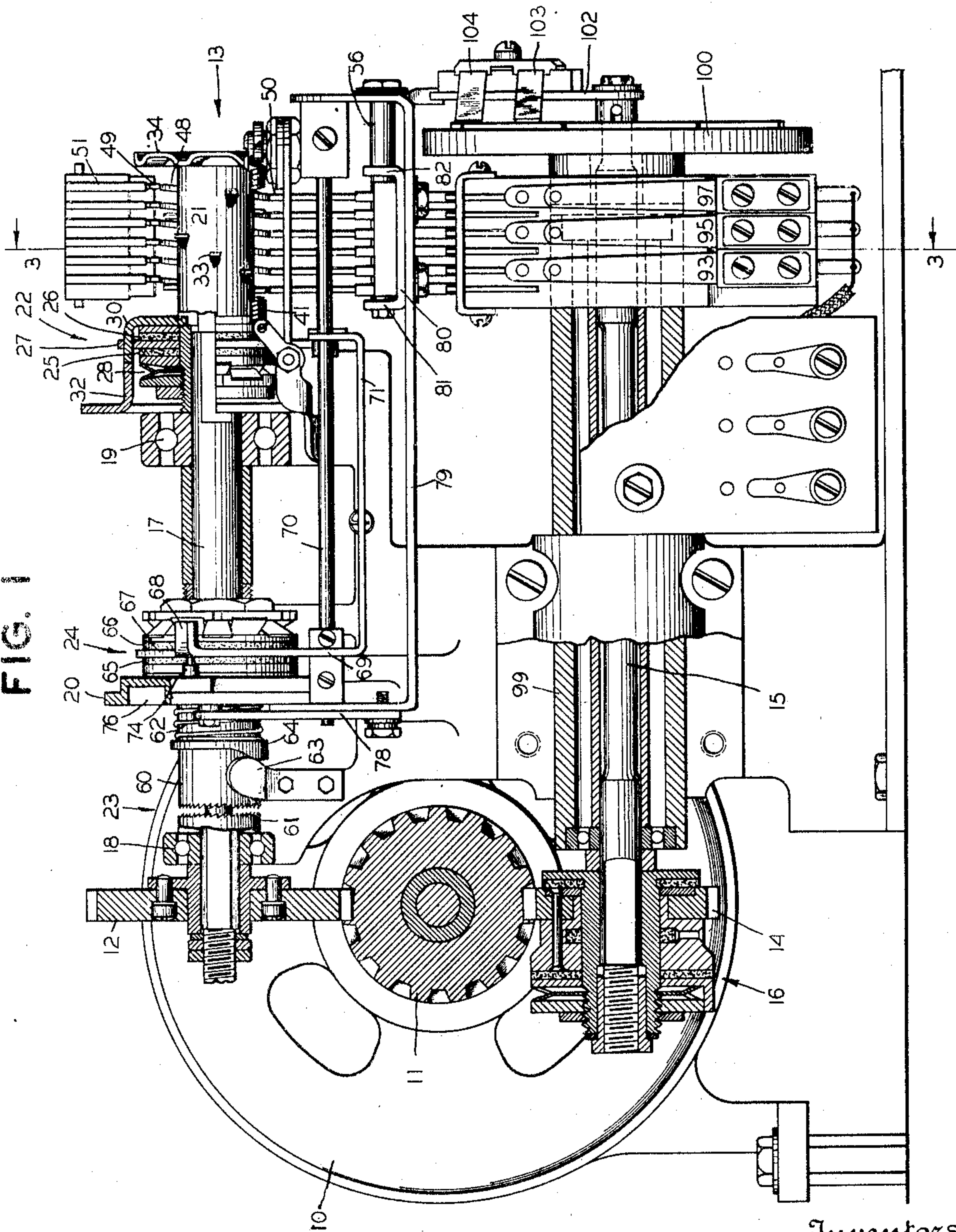
2,064,298

REGENERATIVE REPEATER

Filed Dec. 20, 1930

5 Sheets-Sheet 1

FIG. 1



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5 Sheets-Sheet 2

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2,064,298

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5 Sheets-Sheet 3

FIG. 6

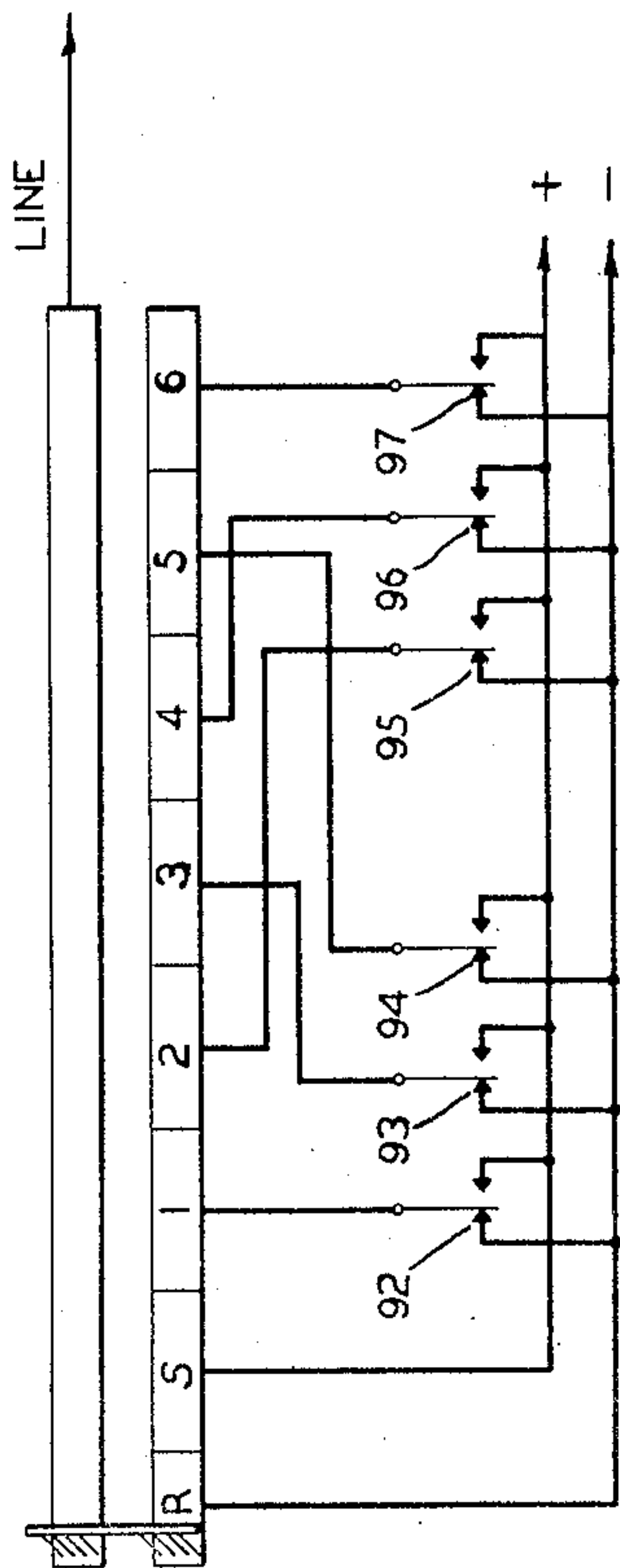


FIG. 4

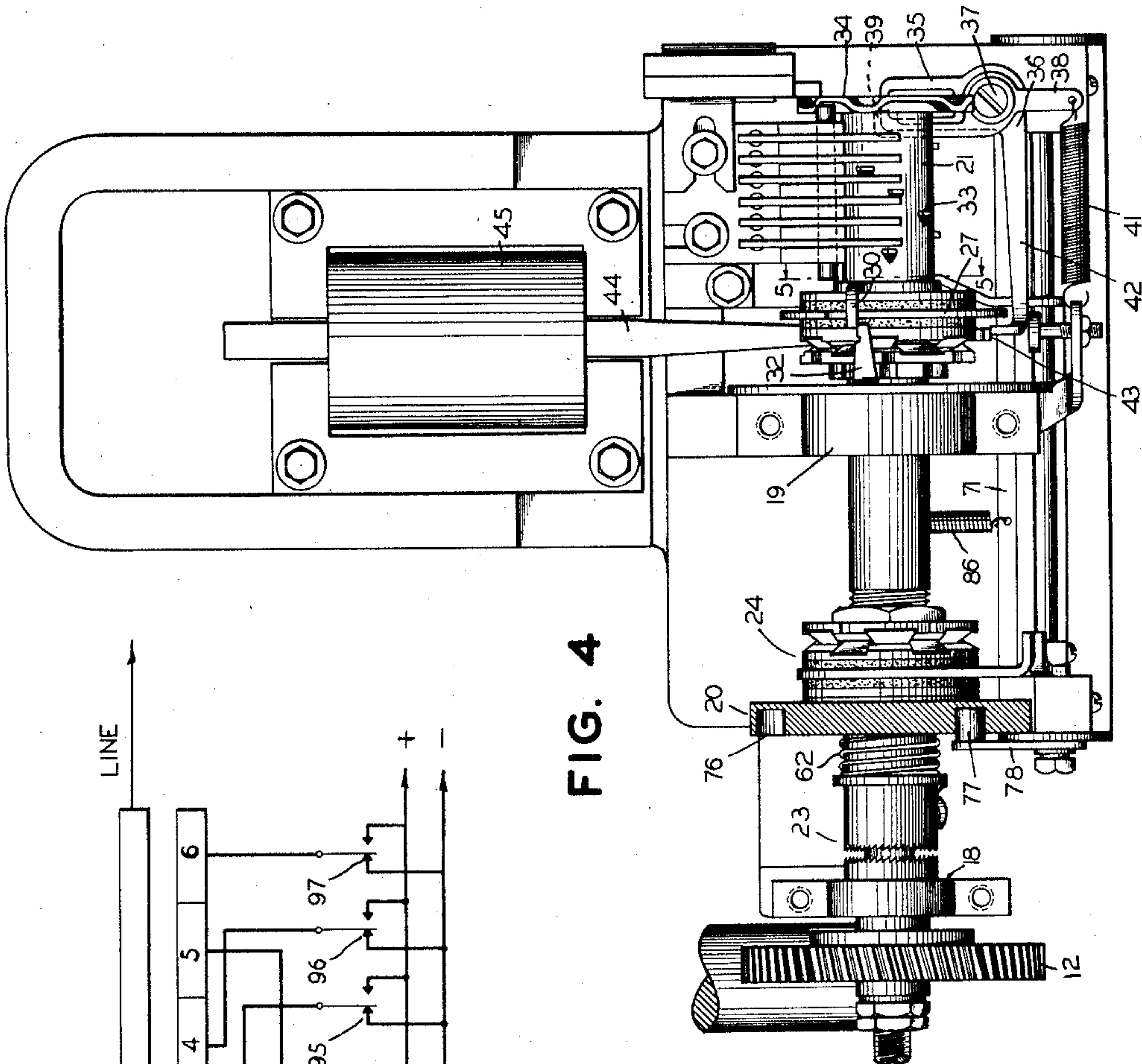
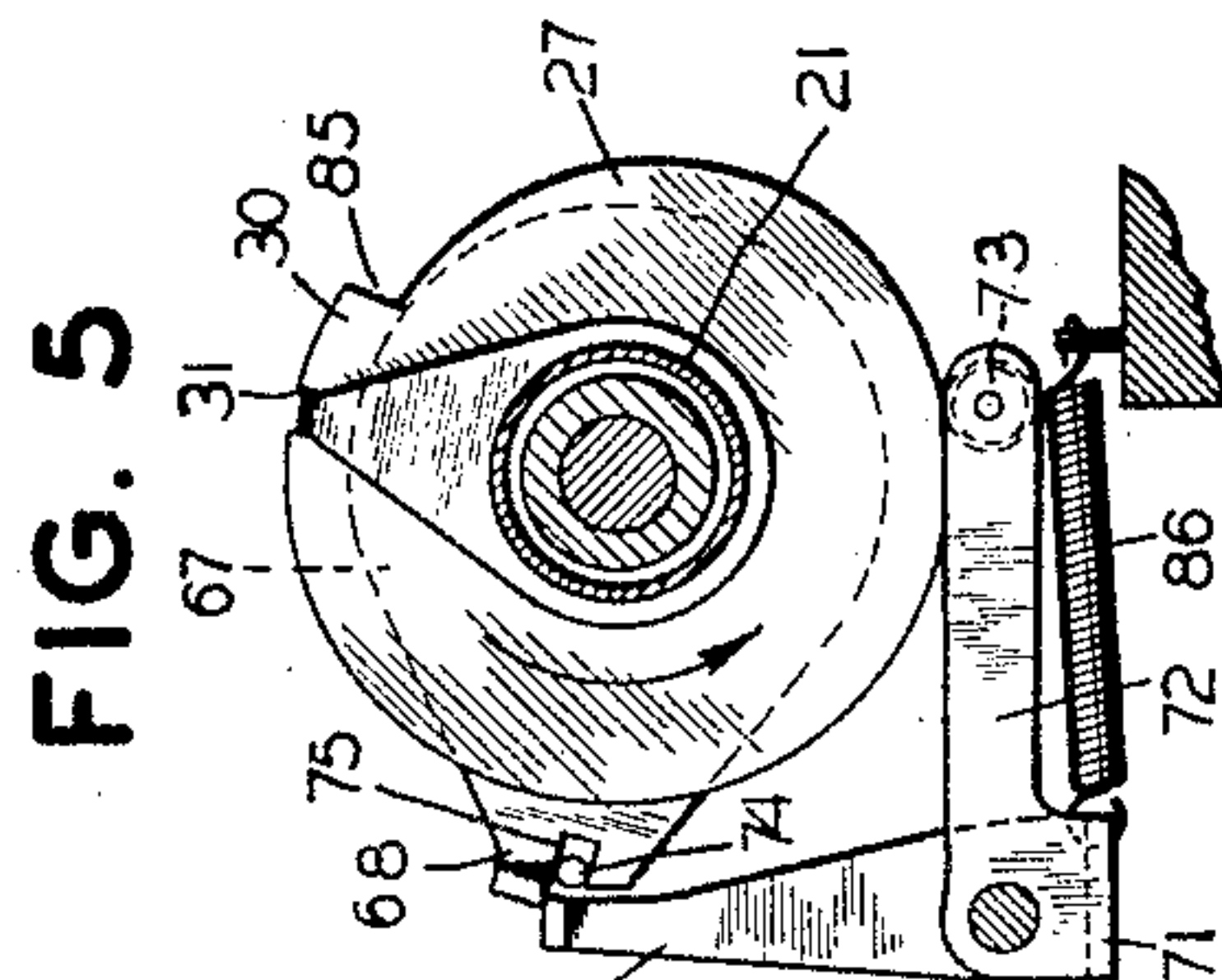


FIG. 5



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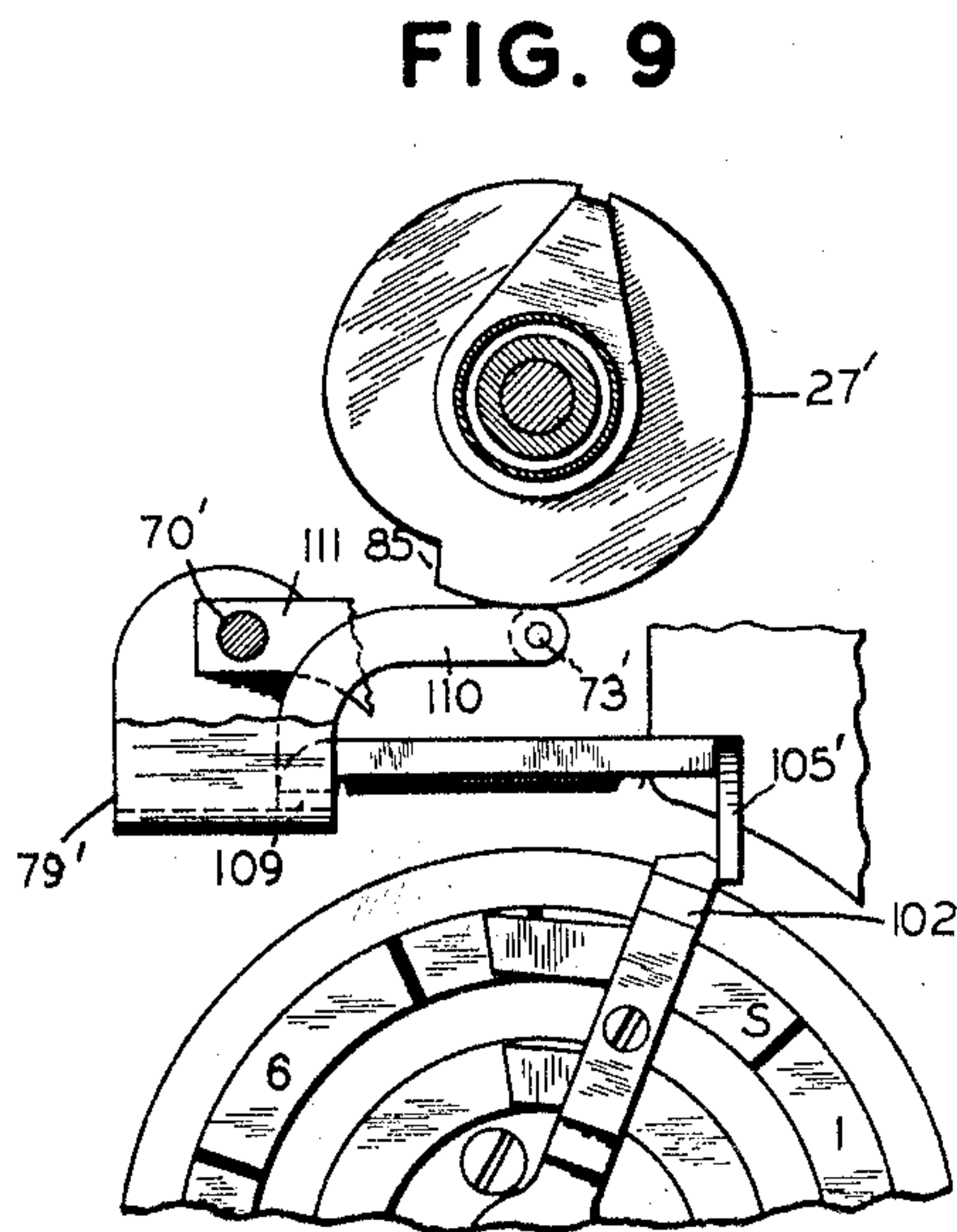
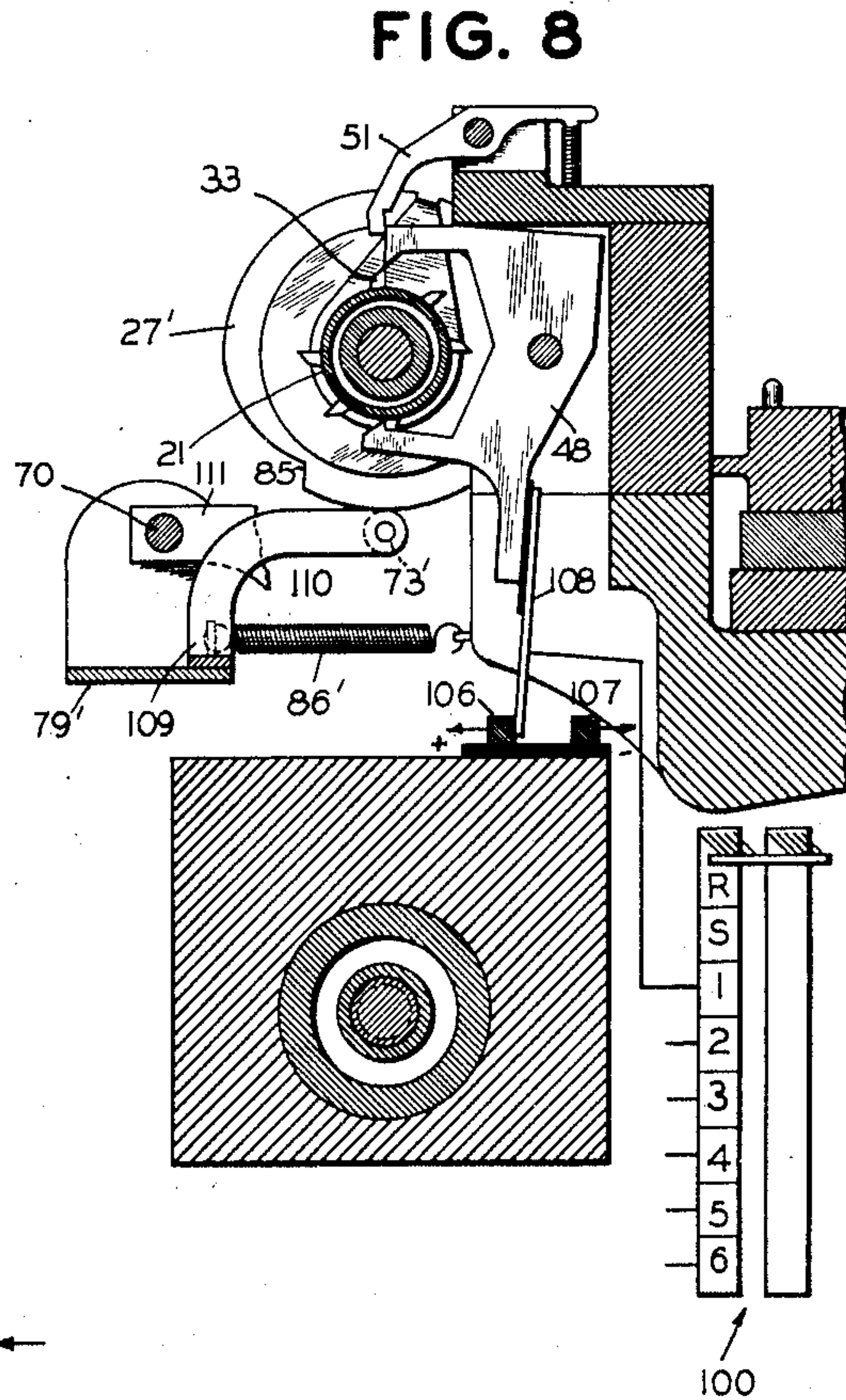
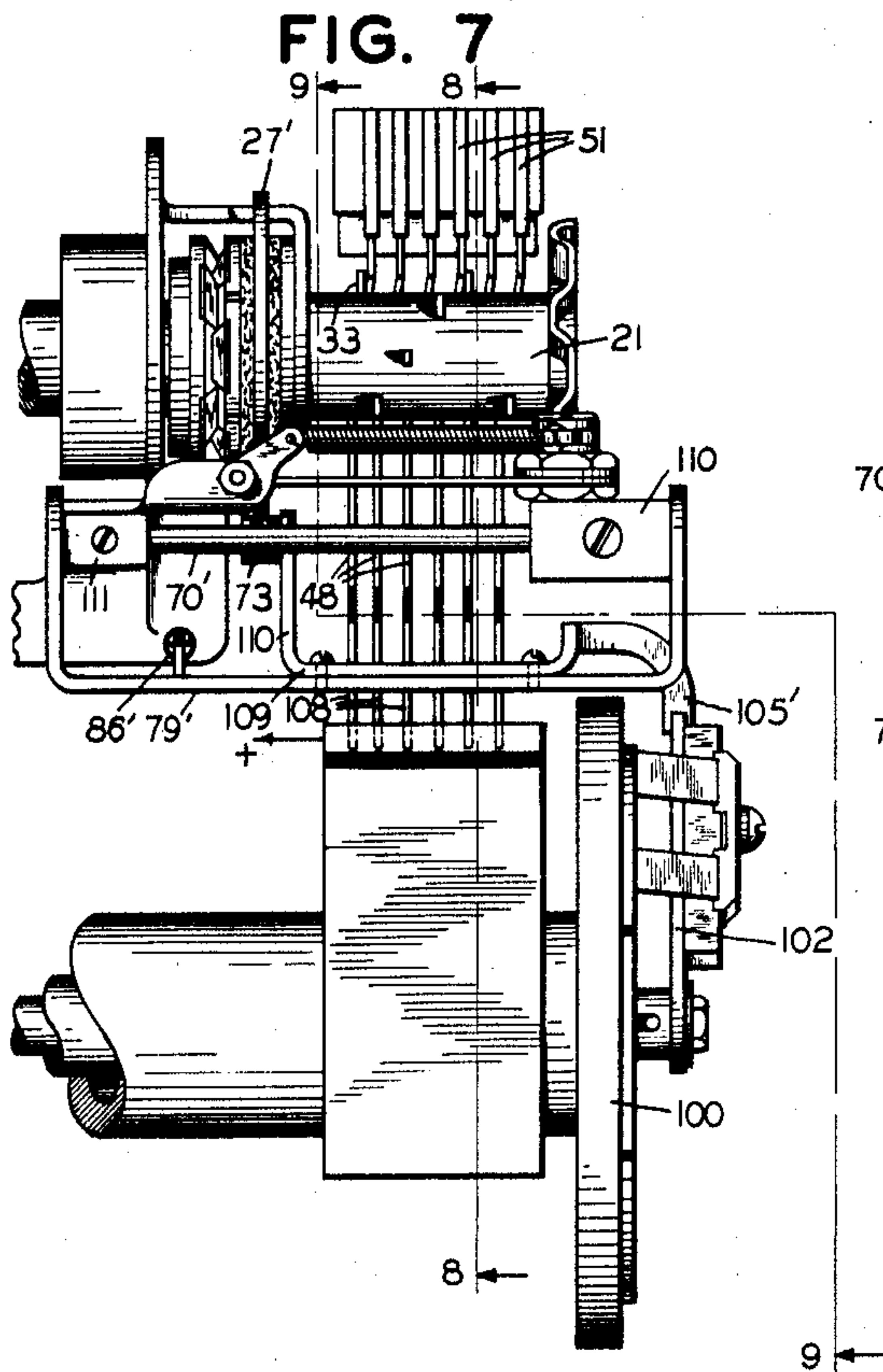
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5 Sheets-Sheet 4



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REGENERATIVE REPEATER

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5 Sheets-Sheet 5

FIG. 10

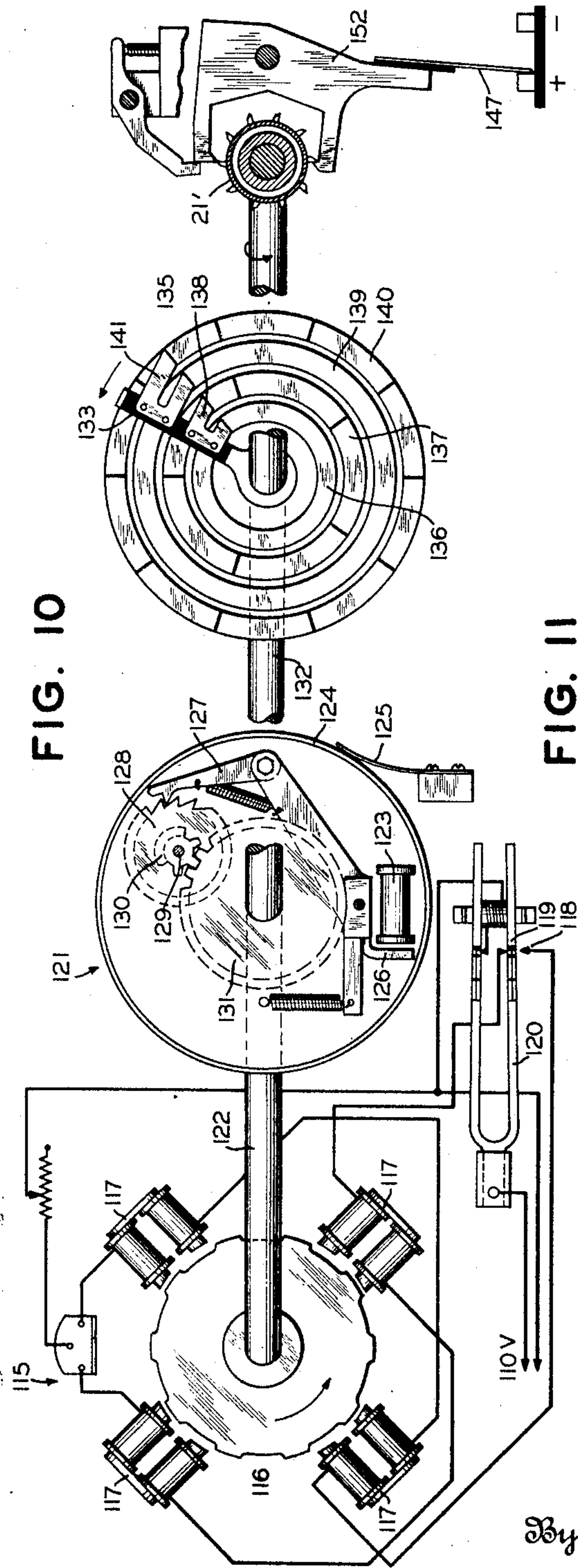
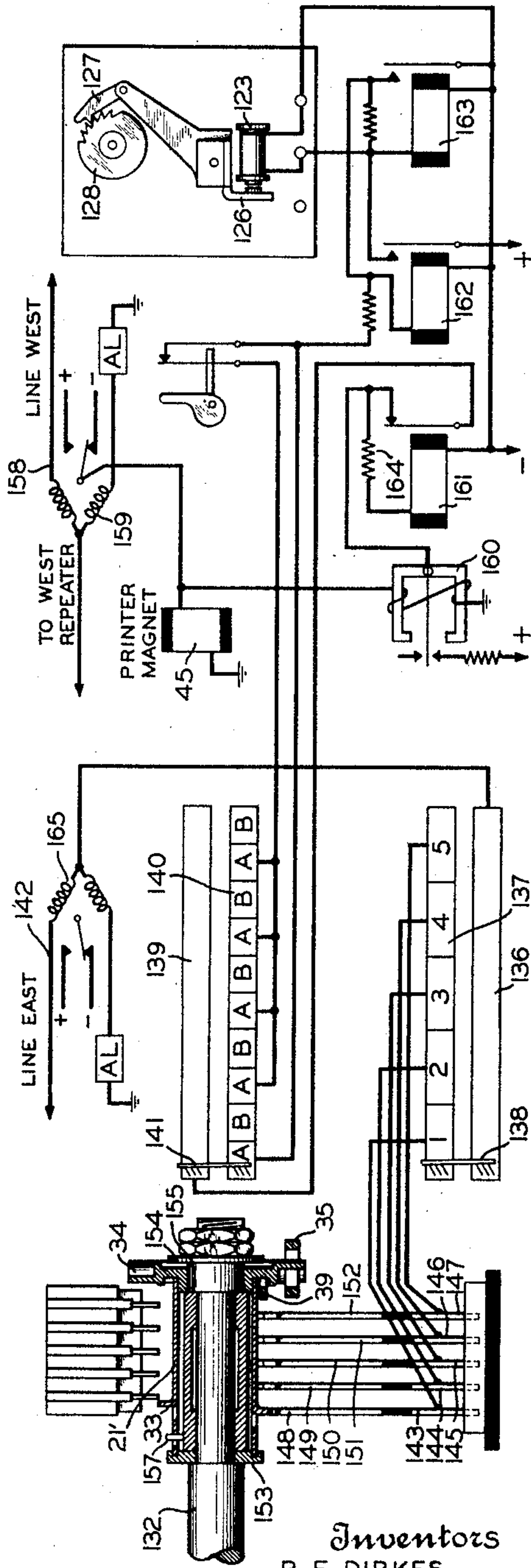


FIG. 11



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UNITED STATES PATENT OFFICE

2,064,298

REGENERATIVE REPEATER

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Application December 20, 1930, Serial No. 503,812

11 Claims. (Cl. 178—70)

This invention relates to a telegraph system and more particularly to a simplex repeater for a start-stop printing telegraph system.

The object of the invention resides in the provision of means for repeating and regenerating signal impulses, particularly for use in high speed start-stop systems of telegraphy, although the invention is not limited thereto.

In start-stop systems approximate synchronization is maintained between the rotary distributor at the transmitting station and the receiving rotary element, by stopping each rotary device at the end of each signal group and starting them in a predetermined position at the beginning of the transmission of the succeeding signal group. The impulses comprising each signal group consist of a start impulse, a plurality of code impulses, usually five or six depending upon the number of selections desired, and a stop or rest impulse.

The telegraph printer at the receiving end of the system ordinarily comprises a rotary element set into operation by the starting impulse, to rotate in substantial synchronism with the received code impulses to effect the setting of code members or selectors in accordance with the code combination. After the last code impulse has been received the code members effect the selection of the character or symbol to be printed.

If high speed is not essential the rest period preceding the succeeding signal group may be prolonged sufficiently to enable the printing to occur from the selected character before beginning the transmission of the succeeding group of signals.

However, where high signal speeds are required it is necessary to transmit each signal group in rapid succession and in such cases an overlap must be provided whereby each code combination will be transferred to a storage mechanism and printing effected in accordance therewith while the succeeding group of signals is being received.

We have applied this latter principle to a start-stop repeater. In accordance with the preferred form of our invention each signal group, as it is received, is set up on selectable elements positioned in accordance with the polarity of the impulse received. Each selectable element, as it is positioned, may set up the impulse on a repeating sunflower or upon the reception of the last code impulse of the group, the entire code combination may be transferred from the selecting elements, to a storage contact mechanism by which it is applied to the segments of the sun-

flower. Each signal group, comprising the start impulse, code impulses, and rest impulse, is repeated and regenerated by the sunflower transmitter.

The repeater may be used in connection with a system employing a six unit code, such as is used in high speed ticker systems, wherein five selecting impulses are employed in various combinations of positive and negative intervals to determine the type bar or type row from which printing is to take place and the sixth or shift impulse is employed to determine whether printing is to take place from an upper case or lower case character. Obviously the invention is not limited to such a system.

In order that the invention may be more fully understood reference will be had to the accompanying drawings in which

Figure 1 is a side elevation partly in section of a start-stop regenerative repeater embodying our invention;

Figure 2 is a front elevation of the repeater;

Figure 3 is a sectional view thereof on the line 3—3 of Figure 1;

Figure 4 is a plan view of the repeater;

Figure 5 is a sectional view of a portion thereof on the line 5—5 of Figure 4;

Figure 6 is a diagrammatic view showing the circuit connections for repeating the signals.

Figure 7 is a side elevation of a modified form of repeating mechanism in which complete overlap of the received and repeated signals is not obtained.

Figure 8 is a sectional view on the line 8—8 of Figure 7;

Figure 9 is a sectional view on the line 9—9 of Figure 8, with the contact mechanism eliminated;

Figure 10 is a schematic view of the repeater applied to a multiplex telegraph system; and,

Figure 11 is a sectional view of the multiplex selector mechanism, showing the transmitting face plate and corrector mechanism diagrammatically.

Referring to Figure 1, the repeater includes a constantly running motor 10 which, through a pinion 11, drives a gear 12 associated with the selecting unit, generally indicated at 13, and a gear 14 connected to a brush arm shaft 15 through a friction clutch 16.

The selecting unit comprises the driving gear 12 rigidly secured to shaft 17, extending through bearings 18 and 19. Mounted upon the shaft for relative rotation thereon is an operating cam 20 and a selector cam drum 21. The selector cam

drum is arranged to be driven from the shaft 17 by a friction clutch 22 and the operating cam is driven from the shaft by a ratchet clutch 23. A second friction clutch 24 causes an initial rotation of the operating cam to effect engagement of the ratchet clutch.

The friction clutch 22 comprises a pair of spaced friction disks 25, 26, between which is loosely mounted a clutch driven disk 27 for relative rotation. The friction disks 25, 26 are pressed into engagement with the driven disk 27 by a spring washer 28.

Secured to the rear end of the cam drum 21 is an L shaped stop arm 30 having its free end extending through a slot 31 in the periphery of the driven clutch disk 27. The end of the arm 30 normally engages a fixed abutment 32 which retains the cam drum and driven disk 27 against rotation under the drag of the friction disks 25 and 26.

The selector cam drum consists of a hollow cylinder having twelve cams 33 projecting from its outer surface. These cams are arranged in two spiral rows, six of the cams forming one spiral row being marking cams and the other six, forming the second spiral row, displaced 180 degrees from the first row, being spacing cams.

Secured to the front of the selecting cam drum is a crimped disk or flutter cam 34 having fourteen crimps or cam faces, seven of which project rearward and seven frontward. The flutter cam revolves with the drum and passes between the forked arm 35 of a lever 36, pivoted at 37.

Pivoted at the same point is a cam drum return lever 38, the right end 39 of which bears against an annular plane surface 40 on the back of the flutter cam, under the action of a spiral spring 41.

The selector cam is mounted so as to slide back and forward on a sleeve on the shaft 17, the spring 41 tending to move it to the right against the front stop. Consequently if the forked end of the flutter lever is held stationary as the flutter cam revolves it causes the drum to move backward and forward and if the flutter lever is left free to rock on its pivot, the cam return lever 38 retains the selector drum to the right, the flutter lever 36 rocking idly on its pivot as the flutter cam rotates.

The long arm 42 of the flutter lever projects to the rear and is of such length that when the upturned end 43 of the armature extension 44, of the selecting magnet 45, is in its marking or right hand position it will engage the end of the flutter lever, as shown in Figure 4, and prevent the lever from rocking clockwise. In this position the selector cam moves backward and forward as it revolves. However, when the armature 44 is in its spacing or left hand position it clears the end of the flutter lever permitting the same to rock idly under the action of the flutter cam, the selector drum being retained in its right hand position by the cam return lever 38.

In its rest position, with marking current on the line, the flutter lever rests against the end of the armature 44, with the forked arm 35 holding the cam drum in its rear or left hand position so as to cause engagement of the stop arm 30 with the abutment 32.

The start signal of each signal group is always of spacing polarity and upon receipt thereof the armature 44 is moved to the left away from the end of the flutter lever 36, thereby permitting the same to rock inwardly, whereupon the lever 38 moves the cam drum to the right freeing the stop

arm 30 from the abutment 32 and permitting the drum to be rotated by the friction clutch 22.

The cam drum revolves in substantial synchronism with the succeeding code signals so that as each code impulse is received by the selecting magnet 45, each succeeding cam 33 is brought into selecting position. If the impulse is spacing, the drum will rest against its right hand stop at the time the impulse is received, and if marking, it will rest against its left hand stop. The last or rest impulse being marking in every case, the drum will be moved to the left to cause re-engagement of the stop arm 30 with the abutment 32 at the end of the revolution.

Disposed along the selecting cam drum are six selecting levers 48 pivoted at 47 and having two spaced arms 49 and 50, the former being disposed above the cam drum and the latter below the cam drum. The ends of these arms are offset with respect to each other, the lower or marking arm being offset towards the back and the upper or spacing arm being offset toward the front. This is done so that when the marking cams line up with the marking arms the spacing cams will pass to the rear of the spacing arms and when the spacing cams are in line with the spacing arms, the marking cams will pass to the front of the marking arms.

The marking cams are the series of six cams located spirally around the drum 21, the number one cam, when the drum 21 is at rest, being the rearmost cam on the underneath side of the drum, adapted to engage the lever arm 50 of the first or rearmost selector lever, the remaining five marking cams extending spirally around the drum in a clockwise direction, looking at the right end of the cam drum. The spacing cams are the series having the number one cam placed on the upper side of the drums just to the right of the stop arm (Figure 1).

The selecting levers will be rocked either clockwise or counterclockwise as the cam drum revolves, depending upon whether the cam drum is shifted to the right in response to a spacing signal so as to cause the spacing cam to line up with the spacing arm, or to the left in response to a marking signal so as to cause a marking cam to line up with one of the marking arms. The selector levers are thus set up in succession as each impulse is received and they are held in their set position by individual detents 51 engaging either with the top or the front thereof, under the pressure of detent springs 52.

By way of a specific example, supposing the code combination representative of the fraction $\frac{1}{2}$, consisting of two marking impulses, two spacing impulses and two marking impulses is received, following the start impulse. The start impulse releases the cam drum for a single revolution and the first code impulse, being marking, moves the selector armature 44 to the marking or righthand side. As the cam drum rotates, the flutter lever will be moved outwardly, permitting the armature to move into the path of the lever and block it. When the flutter lever is blocked by the armature, the forked arm 35 guides the flutter cam as it rotates so that the number one marking cam on the drum will be moved into line with the marking arm of the first selector lever and the cam will move the lever downward to the marking position.

The second impulse also being marking, the armature lever remains in the righthand marking position and the number two marking cam is brought into line with the marking arm of

the second selector lever, causing this lever to move downward into marking position.

The third impulse is spacing. Therefore, the armature is moved to the spacing or lefthand side, whereby the flutter lever is released and the cam drum permitted to move to its front stop, by means of the lever 38, so that the number three spacing cam will be in line with the third selector lever, so as to move the same upwardly to spacing position.

The fourth impulse also being spacing, the number four selector lever will be moved upwardly.

The fifth and sixth impulses are marking. Consequently the armature is again moved to its marking or righthand side, causing the fifth and sixth marking cams to line up in succession with the marking arms to shift the same to the marking position.

After the reception of the sixth selecting impulse, the stop impulse is received, which is always marking in character, thus causing the drum to move to the left so that the stop arm 30 will engage the abutment 32 at the end of the revolution. The cam drum is thus held at rest until the reception of the next starting impulse.

The two transfer arms 53 and 54 of the selecting levers are disposed above the spaced arms of a series of six transfer levers 55, carried on a pin 56, capable of being raised after the selection has been set up, to rock the transfer levers either clockwise or counterclockwise by engagement of one of their spaced arms with one or the other of the arms 53 and 54.

The transfer levers are raised through the action of the operating cam 20, controlled by mechanism now to be described.

The operating cam 20 is secured to the driven member 60 of the ratchet clutch 23, the driving member 61 of which is rigid with the shaft 17. The clutch members are normally held disengaged against the action of a spring 62, by a fixed arm 63 engaging a cam surface on the annular shoulder 64 of the driven clutch member 60.

The friction clutch 24 is similar to the clutch 22 and comprises two friction discs 65, 66 secured to the shaft 17 to rotate therewith and have loosely mounted there-between the driven clutch disc 67, provided with a forwardly extending stop member 68, normally engaged by a stop arm 69, pivoted on a rod 70 and having a U-shaped extension 71 provided with an intumed arm 72 projecting under the driven disc 27 of the clutch 22. A roller 73 carried by the arm 72 extends beneath the disc 27, which is cam shaped, as shown in Figure 5, the raised portion of the cam engaging the roller 73 to hold the stop arm 69 normally in engagement with the stop member 68. A pin 74 carried by the operating cam 20 extends into a slot 75 in the driven clutch disc 67 and locks the cam and clutch disc for rotation together.

The operating cam 20 has an internal eccentric cam groove 76 in which rides a pin 77, carried upon one arm 78 of a U-shaped lever 79. The lever 79 is pivoted at each end upon the rod 70, and has a U-shaped bracket 80 mounted thereon. The pin 56, carrying the transfer levers 55, extends between the upwardly projecting arms 81, 82 of the bracket 80.

The operation of the transfer mechanism is as follows. During the rotation of the cam drum 21 and just after the reception of the fourth impulse, the depression 85 in the edge of the driven clutch

disc 27 comes opposite the roller 73 carried by the lever 72, permitting the lever to be rocked outwardly by the spring 86 so as to move the stop arm 69 out of engagement with the stop member 68, thus permitting the clutch disc 67 of the clutch 24 to rotate, carrying with it the operating cam 20. After the operating cam is rotated a few degrees, the ratchet clutch 33 is brought into engagement by movement of the cam face of the collar 64 away from the arm 63, whereupon the operating cam is positively driven nearly to the end of its revolution, at which point the ratchet clutch is again disengaged and the operating cam is driven by the friction clutch 24 until it is again stopped by engagement of the stop member 68 with the stop member 69.

As the operating cam revolves, it rocks the U-shaped bracket 79 so as to move the transfer levers 55 upwardly against the ends of the selector levers 48.

The depending arm 88 of each of the transfer levers engages in a recess 89 in individual contact bars 90 slidably mounted in a block 91, surrounding the brush arm shaft 15. The bars 90 are therefore shifted to the right or to the left (Figure 3) by the transfer levers and in so moving operate the central contact of the switches 92 to 97 to connect the same to either positive or negative battery through the outside contacts of these switches, in accordance with the code combination previously set up on the selector levers 48.

The switches 92, 94 and 96 are disposed on one side of the block 91 and the switches 93, 95 and 97 are mounted on the opposite side thereof. The bars 90 are held in their shifted positions by ball detents 98.

The block 91 is mounted upon the sleeve 99 carried by the frame of the machine and has a distributor face plate 100 rigidly secured thereto. The central contacts of the switches 92 to 97 are electrically connected respectively to the segments 1 to 6 of the distributor, the "rest" segment being connected to marking battery and the "start" segment being connected to spacing battery. The solid ring 101 is connected to the outgoing line.

Each code combination as it is transferred from the selector levers to the contact mechanism, sets up the code on the segments of the face plate. A brush arm 102, carrying the brushes 103 and 104, is secured to the shaft 15 to rotate therewith. The shaft 15 extends loosely through the block 91 and the face plate 100, the brush arm normally being held against rotation through the friction clutch 16, by engagement with a stop member 105 projecting downwardly from the arm 82 of the U-shaped bracket 80. At the instant arms 81 and 82 are rocked upwardly to effect the transfer of the code combination to the contact mechanism, the stop member 105 is raised out of the path of the brush arm 102 and the brush permitted to make a single revolution, thus transmitting the code combination set up on the face plate at the time of the transfer operation. The repeated signals are of full duration and strength.

As soon as the code combination has been shifted to the distributor, the selecting mechanism comprising the selecting levers 48 and the cam drum 21 are free to respond to a new combination. The new combination may be transmitted and received on the repeater during the period of retransmission of the previous code combination.

It will be noted therefore, that a repeater has been provided which responds to stop-start signals and repeats the same fully regenerated, and

that an overlap is provided whereby one signal combination may be received during the period of retransmission of the preceding code combination.

5 In Figures 7, 8, and 9, a modification has been illustrated in which a complete overlap is not employed, that is, wherein each signal, as it is received, is set up immediately on the repeating face plate and retransmitted fully regenerated an instant later. For example, the first code impulse 10 may be repeated by the rotary transmitter during the period of reception of one of the succeeding impulses of the same group, as for instance, the third. The selecting levers 48 in this form constitute the storage device, being held in each set 15 position until the corresponding impulse of the next signal group is received, each signal impulse being repeated prior to the reception of the corresponding impulse of the next signal group.

20 Referring to Figure 8 it will be noted that the transfer levers 55 have been omitted together with the slides 90 and the switches 92 to 97, and in place thereof two bus bars 106 and 107 of positive and negative polarity, respectively, are mounted upon 25 the block 91 and insulated therefrom. Each selecting lever has an insulated contact 108 mounted thereon, adapted to play between the bus bars, as the selecting levers are thrown one way or the other by the cam drum 21. The detents 51 assist the movement of the selecting levers, once they have been started, and hold the contacts firmly against the bus bars. The switch 30 contacts 108 of the six selecting levers are individually connected by conductors, to segments 1 to 6, of the face plate 100.

Since the transfer mechanism has been eliminated, the operating cam 20, friction clutch 24, ratchet clutch 23, and their engaging and disengaging mechanism may also be eliminated.

40 The brush arm 102 is normally held at rest on the rest segment R, by a stop arm 105' constituting one offset arm of a U-shaped bracket 109, the other arm 110 of which extends beneath the clutch driven disk 27' and has a pin 73' engaged by the 45 cam surface of the disk. The bracket 109 is secured to the U-shaped frame 79' supported on the shaft 70', carried in blocks 110 and 111, from the frame of the machine. A spring 86' maintains the pin 73' in contact with the periphery of 50 the disk 27', the raised portion of the disk, when the cam drum 21 is at rest, engaging the pin to rock the frame 79' so as to maintain the stop arm 105' lowered in the path of the brush arm 102. The drop 85 in the disk 27' is positioned 55 relative to the pin so that, at the proper time during the cycle, it comes opposite the pin, thereby permitting the frame to be rocked by the spring 86', to raise the stop arm out of contact with the brush arm 102.

60 By way of example, the brush arm may be released as soon as the first code impulse has been completely received; that is, when the first marking or spacing cam 33 comes opposite the first selecting lever to operate the same, and thereby 65 to set up the first code impulse of either negative or positive battery on segment 1 of the face plate 100. The brush 102 will then be released to sweep across the start segment S to retransmit the start impulse during the period of reception of the second code impulse; the first code impulse being 70 retransmitted during the period of reception of the third impulse, etc.

75 After the sixth selecting lever has been set, the rest impulse is received bringing the cam drum to rest. The brush 102 continues to rotate how-

ever to complete the transmission of the code group, after which it comes to rest on the rest segment R, against the stop arm 105'.

The selecting mechanism is in readiness to receive the succeeding code group immediately 5 upon completion of the preceding code group; that is, there is no delay required for effecting a transfer operation of the preceding code group to the transmitting mechanism and each signal group may be received in rapid succession. 10

The overlap between received and retransmitted signals may vary very greatly, it only being necessary on the one hand, that it be sufficient to insure that each signal impulse will be 15 completely received and set up on its segment prior to the movement of the brush onto said segment, thereby to insure complete regeneration, and on the other hand, that each impulse be completely transmitted before the corresponding impulse of the succeeding group is received. 20

In Figures 10 and 11 we have shown the invention applied to multiplex telegraph apparatus comprising the LaCour motor 115 having an armature 116 and field magnets 117, the latter being energized through the contacts 118 and 119 25 of the driving fork 120. A corrector 121 is mounted upon the motor shaft 122 and revolves with it. The corrector comprises the magnet 123 connected to the slip rings 124, and by means of brushes 125, to an external circuit. The armature 126 of the magnet operates a pawl 127, to rotate a ratchet wheel 128, one tooth each time the magnet is energized. A jockey (not shown) keeps the ratchet wheel in position and prevents its revolution unless properly operated by 35 its feed pawl. The ratchet wheel is rigidly connected to a shaft 129, which also carries a pinion 130. The pinion meshes with a gear 131 fastened to the end of the shaft 132, carrying the brush arm 133 and the cam drum 21'.

40 The function of the corrector is to rotate one shaft with respect to the other when for any reason the motors at each end of the line are not maintaining their synchronous relation. Ordinarily the motor 115 is operated slightly faster 45 than the motor at the other end of the line, and the shaft 132 is slightly retarded at intervals to effect correction.

As the whole corrector revolves with the La-Cour Wheel, the corrector pinion and brush shaft gear act as a direct coupling causing the 50 distributor brush shaft to revolve with the motor shaft. When the corrector is operated, the magnet 123 attracts its armature and in so doing rotates the ratchet wheel and small pinion. This 55 in turn rotates the brush shaft through the gear 131 over a small angle in the opposite direction to the direction of motor rotation.

The face plate 135 has a set of transmitting rings 136, 137 bridged by a brush 138 and a set 60 of correcting rings 139, 140 bridged by a brush 141. The solid transmitting ring 136 is connected to the outgoing line 142 (Figure 11) and the ring 137 has five segments, one for each unit of the code, connected individually to the contacts 143 65 to 147, carried by the selector levers 148 to 152, of the selecting mechanism.

In the multiplex repeater the friction clutch 22 and start-stop mechanism is eliminated and the drum 21' is rotated continuously in syn- 70 chronism with the incoming signals. It slides back and forth on the sleeve 153, carried by the shaft 132, between the front and back stops 154 and 155, respectively, through the action of the flutter cam, flutter lever 35, and cam return le-

ver 39. The drum 21' is rotated with the shaft by means of a pin and slot connection 157.

The selecting levers are thrown one way or the other, in synchronism with the received impulses, by the cam drum 21' controlled by the conjoint action of the armature of the printing magnet 45 and the flutter cam lever 35, acting on the flutter cam 34.

The incoming multiplex signals are received from the line 158 on the differential main line relay 159 and repeated to the printer magnet 45 which controls the position of the drum 21', to set up the received signals on the segments of the transmitting ring 137. The brush 138 rotates in such phase relation to the incoming signals, as to repeat each signal, slightly after its reception, as in the case of the simplex repeater described with reference to Figures 7, 8 and 9. The overlap is sufficient to ensure each signal being set up on a particular segment before the brush moves onto such segment, but the retransmission of each signal impulse is completed prior to the reception of the corresponding impulse of the next signal group.

The signals transmitted over each channel of the multiplex system are repeated in succession by the mechanism described, the brushes 138 and 141 making one complete revolution for each character repeated. Obviously for a four channel system the brushes 138 and 141 rotate at four times the speed of the transmitting distributor brushes.

The corrector rings 139 and 140 are of the usual form and serve, together with the corrector relay 160, break relay 161, make relay 162, and shunt relay 163, to control the corrector mechanism.

The corrector relay 160 is connected to the tongue of the main line relay 159 so that it closes on its marking contact whenever the line current reverses from positive to negative. The circuit connections of the corrector are not described in detail since they are well known to those skilled in the art and form no part of the present invention. It is sufficient to say that whenever the brush arm shaft is in synchronism with the transmitting distributor, the brush 141 will be on one of the dead or B segments of ring 140 whenever a reversal occurs and the corrector mechanism will not be operated. However, if the brush arm shaft 132 gains so that the corrector brush 141, at the time of the reversal, is on one of the live segments A, a circuit is completed for the corrector magnet 123, to operate the pawl 127 and thereby retard the brush arm shaft. As a consequence, the brush arm and the cam drum are maintained in substantially exact synchronism with the received impulses.

It will be noted that the signals are set up on the face plate 135 through the mechanical selector using the single printer magnet 45 and without the use of a receiving sunflower or storage relays and an instant later they are retransmitted in fully regenerated form.

The repeater shown serves to repeat signals to the east line 142 only, a similar repeater (not shown) being provided, controlled by the line relay 165, for repeating signals received over the east line to the west line 158.

It will be noted that we have provided a repeater which does not employ any storage relays and which, in the case of simplex signals, may provide a complete overlap of the received and repeated signals through the use of the transfer and mechanical storage mechanism, or a partial

overlap only may be provided by setting up each impulse, as it is received, on the face plate and repeating the same prior to the reception of the corresponding impulse of the next signal group.

It is obvious, of course, that various changes and modifications in the construction of the repeater will occur to those skilled in the art and that the invention may be applied to various types of selecting mechanism, all within the scope of the present invention, and therefore we do not desire to be limited to the specific details shown and described.

What we claim is:

1. A repeater for a start-stop telegraph system comprising a selecting mechanism responsive to groups of signals to set up received code combinations, a sunflower transmitter, a contact mechanism for setting up code combinations on said sunflower, means for simultaneously transferring a complete code combination from said selecting mechanism to said contact mechanism, means operating upon such transfer of each code combination for starting said sunflower transmitter into operation to retransmit the code combination and means for stopping the same upon the completion of said retransmission.

2. A repeater for a start-stop telegraph system comprising a selecting mechanism responsive to groups of signals to set up received code combinations, a sunflower transmitter, a contact mechanism for setting up code combinations on said sunflower, means for simultaneously transferring a complete code combination from said selecting mechanism to said contact mechanism, means operating upon such transfer of each code combination for starting said sunflower transmitter into operation to retransmit the code combination and means for stopping the same after the completion of said retransmission, said selecting mechanism being free to respond to a succeeding code combination during the period of retransmission of the preceding code combination.

3. A repeater for a telegraph system comprising a selecting mechanism responsive to groups of signals to set up received code combinations, a rotary transmitter, a storage device and means for transferring in one operation each complete received code combination to said storage device, the storage device setting up said code combination on the rotary transmitter, and means acting upon completion of said transfer for setting the rotary transmitter into operation to retransmit the code combination, said selecting mechanism being independent of said storage mechanism after said transfer has been effected, whereby the selecting mechanism is free to respond to succeeding groups of signals during the period of retransmission of the preceding group of signals.

4. A repeater for a telegraph system in which successive character code combinations of impulses are received in continuous succession comprising a mechanical selector element individual to each code impulse of a signal group, means operating in synchronism with the code impulses to position mechanically the selector elements in succession in accordance with each received code impulse, contact mechanism actuated by said selector elements and a rotary transmitter for repeating the code impulses in accordance with the position of said contact mechanism, each selector element being free from said transmitter in time to respond to its actuating impulse of the succeeding signal group, when said signal groups are received in continuous succession.

5. A repeater for a telegraph system in which

successive character code combinations of impulses are received in continuous succession comprising a mechanical selector element individual to each selecting condition of a signal group, means operating in synchronism with received selecting conditions and acting upon said selector elements in succession to position the same mechanically in either a marking or spacing position in accordance with received selecting conditions, a rotary transmitter, a contact member individual to each selector element for applying marking or spacing potential to the segments of the rotary transmitter in accordance with the position of said selector elements, said transmitter serving to repeat each selecting condition a predetermined time after its reception and prior to the reception of the corresponding selecting condition of the succeeding signal group, when said signal groups are received in continuous succession.

6. A repeater for a multiplex telegraph system comprising a mechanical selector element individual to each selecting condition of a signal group, means operating in synchronism with received selecting conditions and acting upon said selectors in succession to position the same mechanically either in a marking or spacing position in accordance with received selecting conditions, a rotary transmitter, a contact member individual to each selector element for applying marking or spacing potential to the segments of said rotary transmitter in accordance with the position of said selector elements, said transmitter serving to repeat each selecting condition prior to the reception of the corresponding selecting conditions of the succeeding signal group when said signal groups are received in continuous succession.

7. A repeater for a multiplex telegraph system comprising a mechanical selector element individual to each selecting condition of a signal group, a continuously operating receiving distributor operating in synchronism with received selecting conditions and acting upon said selectors in succession to position the same mechanically either in a marking or spacing position in accordance with received selecting conditions, a rotary transmitter, a contact member individual to each selector element for applying marking or spacing potential to the segments of said rotary transmitter in accordance with the position of said selector elements, said transmitter serving to repeat each signal group, at least partially, during the period of reception of the succeeding signal group.

8. A repeater for a telegraph system comprising a plurality of mechanical selector elements, a relay subject to line conditions, continuously operating rotary means operating in synchronism with received impulses of each signal group and co-operating with said relay to operate said selecting elements in accordance with the nature of the received impulses, a continuously operating rotary transmitter operating in synchronism with said received signals but retarded in phase relative thereto, said rotary transmitter having transmitting segments, and means for setting on said segments selecting conditions in accordance with the position of said selector elements, said selector elements being free to respond to each succeeding new group of signals when said groups of signals are received in continuous succession.

9. A repeater for a multiplex telegraph system comprising a mechanical selector element individual to each impulse of an individual signal group, a relay responsive to received signal impulses, a continuously traveling member co-operating with said relay to position said selector elements in succession in accordance with the nature of the impulses received over each channel of the multiplex system, a rotary driving element for said travelling member, a rotary transmitter operated by said driving member and contact mechanism controlled by the position of said selector elements to determine the nature of the signals repeated by said transmitter.

10. A repeater for a multiplex telegraph system comprising a plurality of mechanical selector elements, a relay responsive to received signal impulses and means co-operating with said relay to position said selectors in succession in accordance with the nature of the impulses received in continuous succession over each channel of the multiplex system, a rotary transmitter and contact means controlled by the position of said selector elements to determine the nature of the signals repeated by said transmitter.

11. In a telegraph receiver, a plurality of selecting elements, a line magnet, cam means rotating in substantial synchronism with received signal impulses for positioning said selector elements, under the control of said magnet, a set of contacts for each selecting element, and a transferring mechanism operated after the positioning of said selector elements and cooperating therewith to actuate said contacts in accordance with the positioning of said selector elements.

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