

May 30, 1933.

R. F. DIRKES ET AL

1,912,183

TRANSMITTER FOR AUTOMATIC TELEGRAPH SYSTEM

Filed Nov. 12, 1931

2 Sheets-Sheet 1

FIG. 1

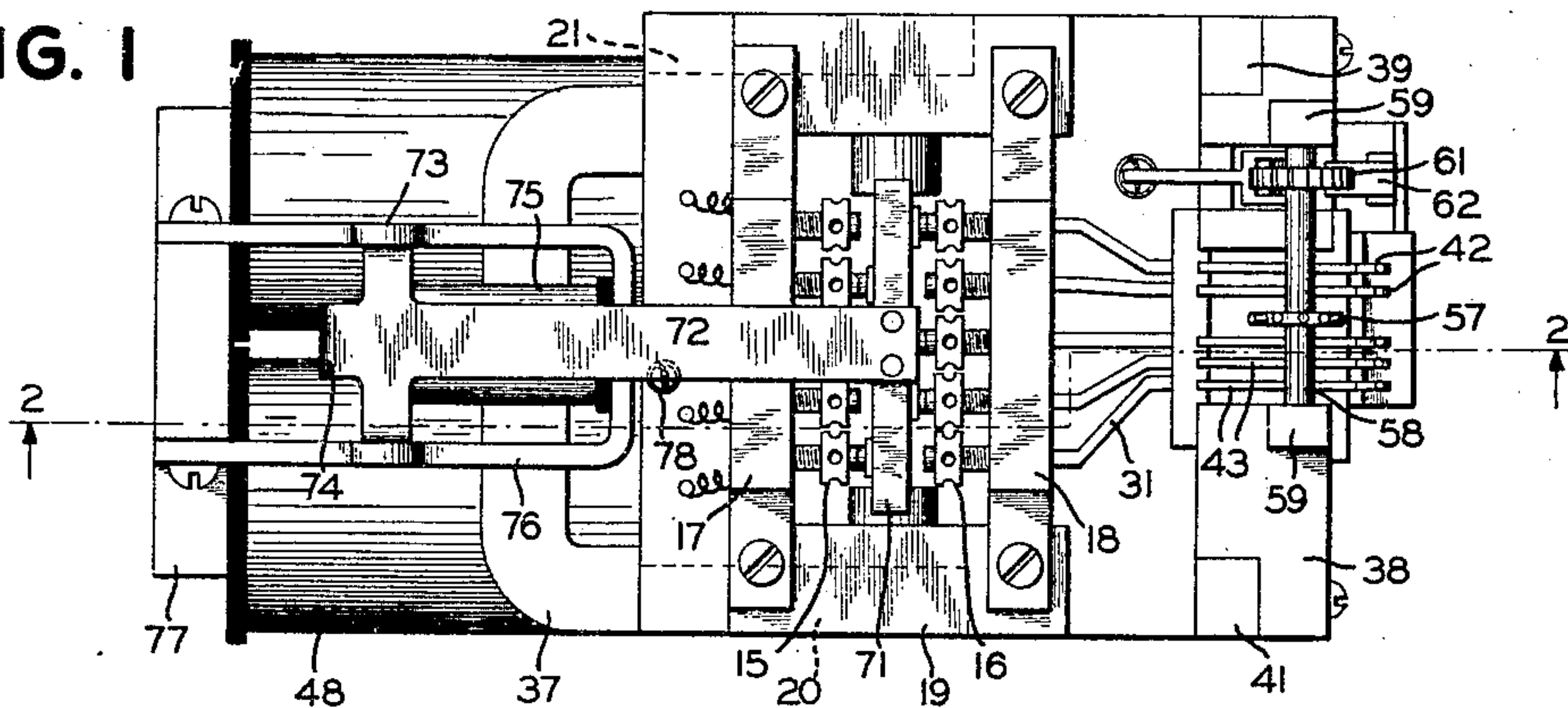


FIG. 2

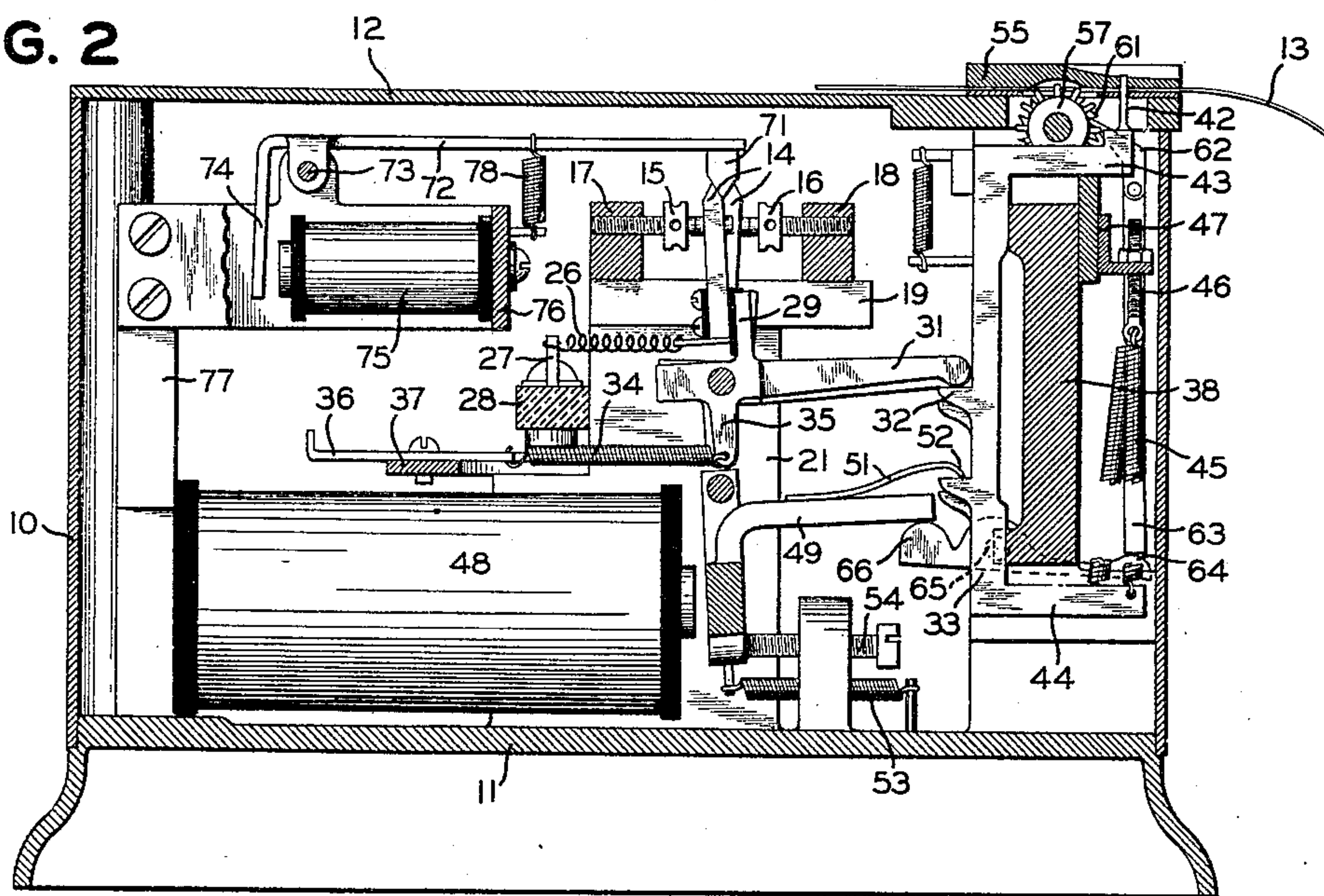
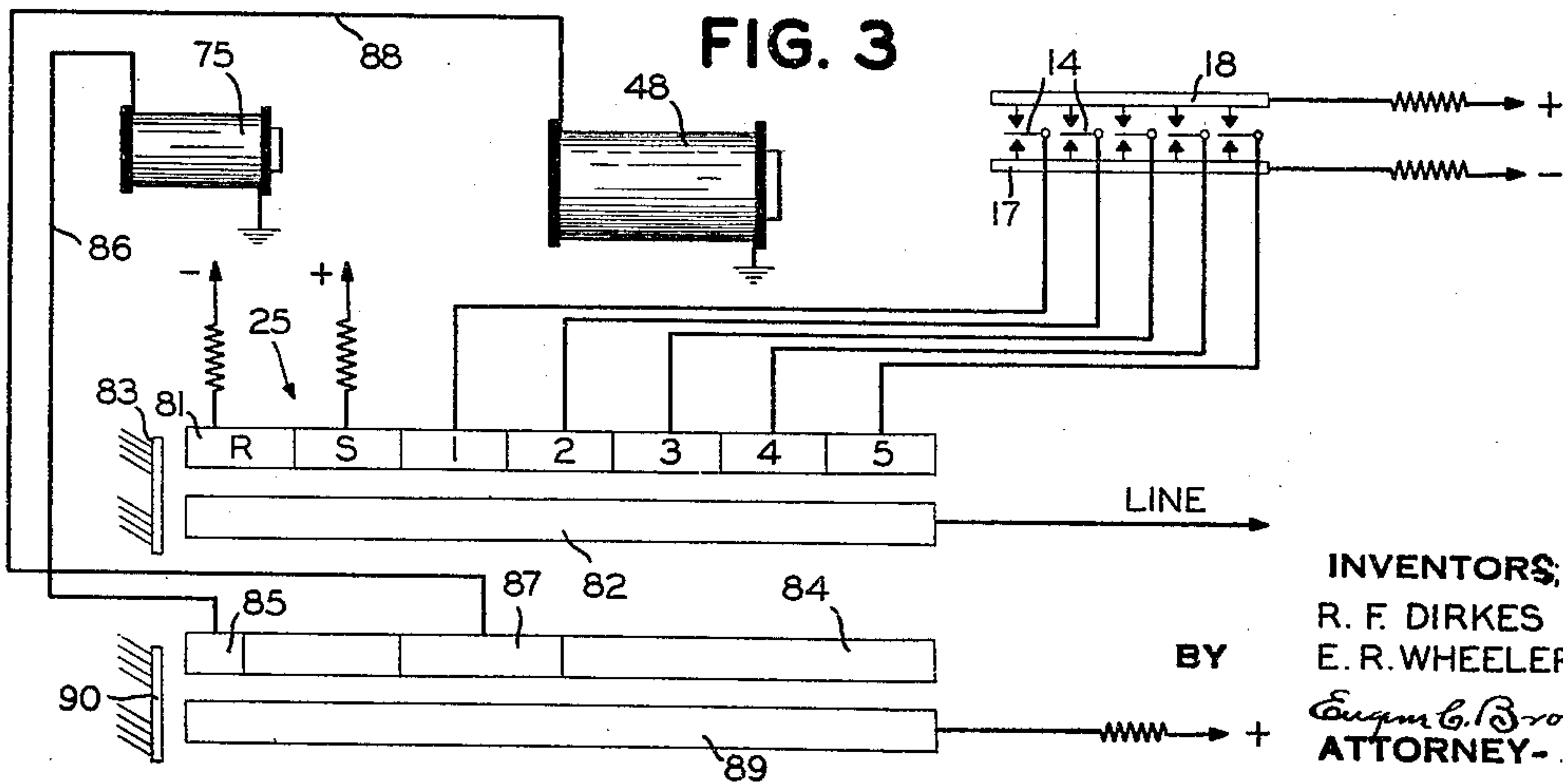


FIG. 3



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2 Sheets-Sheet 2

FIG. 4

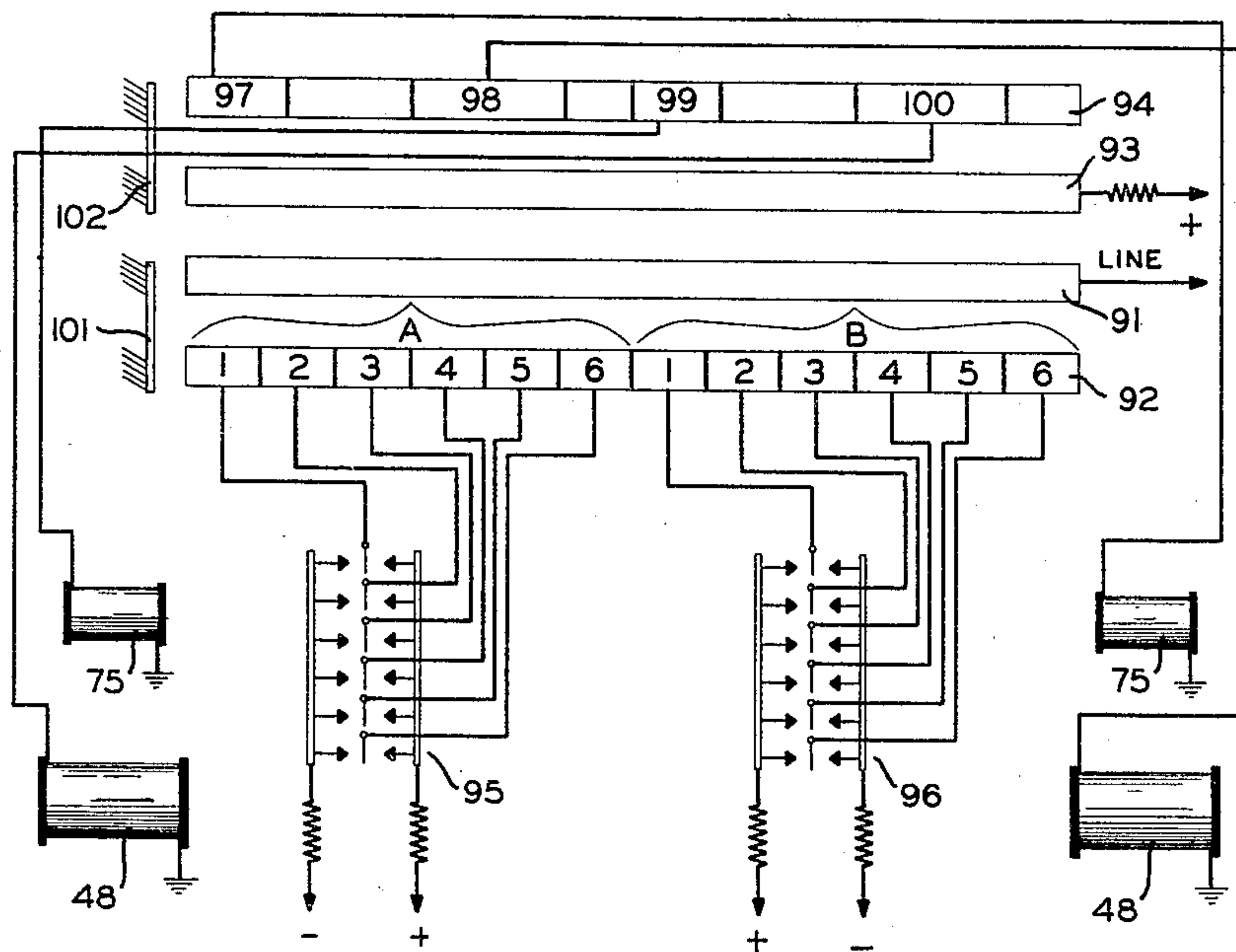
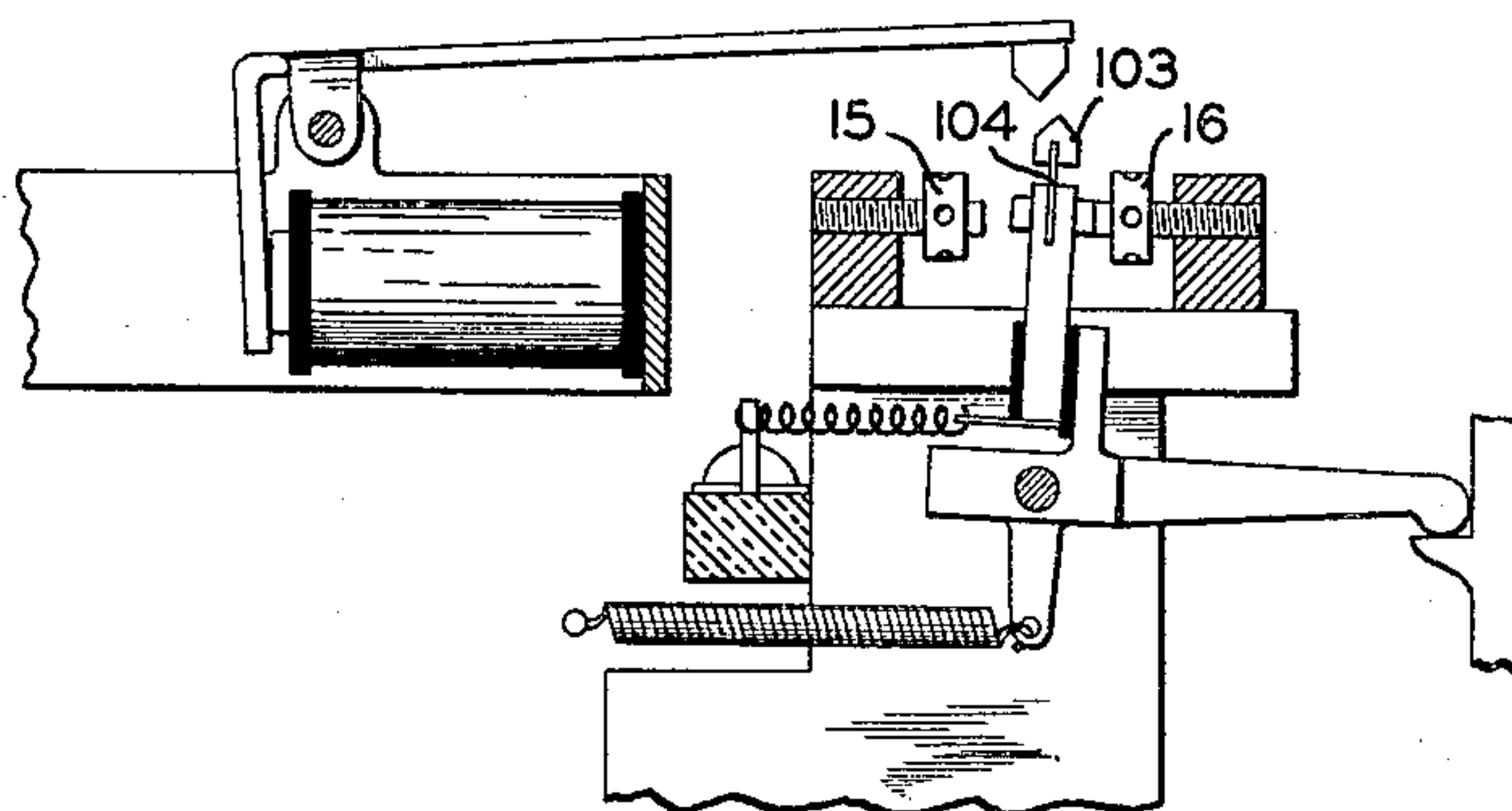


FIG. 5



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TRANSMITTER FOR AUTOMATIC TELEGRAPH SYSTEMS

Application filed November 12, 1931. Serial No. 574,622.

This invention relates to a transmitter for automatic telegraph systems and is shown particularly with reference to a transmitter in which a previously perforated tape passes across the path of a series of reciprocating transmitting pins which determine the electrical impulses to be transmitted over a line. 5

This form of transmitter is shown in patent to G. R. Benjamin, No. 1,298,440, granted 10 March 25, 1919, wherein the tape is fed longitudinally across the top of the transmitter, the pins being disposed vertically beneath the tape and being raised against or through the tape by individual springs and withdrawn from the tape by an electro-magnet. 15

The tape is perforated in transverse rows in accordance with a five or six unit code, the perforations representing marking conditions and the blank or unperforated tape 20 representing spacing conditions. In tape transmitters of this type the pin carriers actuate individual switch tongues which play between a marking bus bar and a spacing bus bar so as to set up on the tongues various combinations of marking and spacing conditions in accordance with the perforations 25 appearing in the tape. The switch tongues are connected to the contacts of a rotary distributor so that, as each code combination is set up through the tape transmitter, it is 30 transmitted over the line by means of the rotary distributor.

The code combinations must be held set-up on the contacts of the transmitter until it 35 has been completely transmitted, after which a new code combination may be set up. In setting up a new combination it is necessary first to retract the pins from the perforations in the tape, step the tape ahead to bring 40 a new row of perforations into alinement with the pins and release the pins to reengage the new row of perforations and thereby to shift the transmitting contacts to their new positions. These operations require an appreciable period, and moreover some time is 45 required for the contact tongues to settle firmly on their seats after the selection is completed. In some multiplex telegraph systems where several channels are employed, sufficient time is usually available for setting up 50

the new combinations while the transmission is taking place over the other channels of the system, but in high speed multiplex circuits, particularly where the number of channels is small, as in two channel systems, the successive signal combinations follow each other with such rapidity that insufficient time is available for setting the contacts while the particular channel is idle. Also in start-stop systems of telegraphy the same difficulty is 60 experienced due to the fact that each group of signals proceeds from the same transmitter and the setting up of each new combination must occur within the period of the rest and start impulses. 65

Accordingly, it is one of the objects of the present invention to produce a tape transmitter in which a minimum of time will be required to shift from one setting thereof to the succeeding one. 70

Another object is to provide a tape transmitter having an overlap in its operation whereby one combination may be retained therein while the tape is being advanced and the pins operated to prepare the succeeding combinations. 75

A further object is to lock each of the transmitting contacts in position during the transmission period.

A further object is to increase the speed 80 of operation of tape transmitters and to prevent chattering of the contacts at the time they engage their respective seats.

Other objects and advantages of the invention will hereinafter appear. 85

In accordance with the present invention the contacts of the transmitter, as soon as they are positioned, are locked up so as to enable the tape engaging pins to be withdrawn from the tape and a new selection to 90 be immediately stepped into the transmitter. As soon as the previous combination has been transmitted, the combination previously prepared is transferred to the transmitting contacts where it is locked up, again releasing 95 the pin setting mechanism to prepare the next combination. The locking means engages the contacts so as to force them to their seats preventing chattering thereof.

In order that the invention may be more 100

fully understood, reference will be had to the accompanying drawings, in which:

Figure 1 is a top view of a tape transmitter having our invention applied thereto;

Figure 2 is a vertical section taken on the line 2—2 of Figure 1;

Figure 3 is a circuit diagram showing the tape transmitter and associated distributor;

Figure 4 is a diagrammatic view showing the transmitter associated with a multiplex circuit; and

Figure 5 shows a modified form of switch contact.

The transmitter comprises a suitable casing 10 mounted upon a base 11 and enclosing the transmitter mechanism. It is provided with a removable cover 12 adapted for the passage of a perforated tape 13 thereover, this tape in practice being perforated transversely in accordance with the so-called Baudot code of five impulses, of which some may be positive and others negative. The transmitter is shown as comprising five distinct sets of transmitting contacts, each set of transmitting contacts being arranged to produce current reversals. It is to be understood, however, that the number of contacts may be varied and the transmitter may be adapted for making and breaking the circuit instead of transmitting current reversals.

Each set of transmitting contacts comprises a contact tongue 14 and adjustable contact stops 15 and 16, between which the tongue is adapted to move.

The several contacts 15 are mounted upon a supporting bridge or marking bus bar 17 and the contacts 16 are mounted upon a supporting bridge or spacing bus bar 18, these bridges being carried upon insulating blocks 19, in turn carried by spaced uprights 20 and 21, integral with the base 11. The bus bar 17 is connected to a source of negative or marking battery and the bus bar 18 to a source of positive or spacing battery. The several transmitting contact tongues 14 have connected to them, conductors 26 extending to individual binding posts or soldering lugs 27, carried by an insulating strip 28, extending between the uprights 20 and 21. The terminals 27 may be connected to the segments 1 to 5 of the transmitting ring of a rotary transmitter, 25, as is well understood by those versed in the art.

Each of the transmitting contact tongues 14 is mounted upon a separate pivoted bell crank lever 29 having a forward extension 31 which engages the upper side of lugs 32 formed on the rectangular pin carriers 33. The levers 29 are normally urged in a clockwise direction by individual springs 34 extending between the downward extensions 35 of the levers and adjusting slides 36, carried by a U-shaped bracket 37 mounted upon the uprights 20 and 21.

The pin carriers 33, one of which is pro-

vided for each unit of the code, are arranged to slide in guides formed in a block 38, mounted upon uprights 39 and 41 integral with the base. The pin carriers or slides 33 are substantially rectangular in shape the forward side being removed and each carrier having a pin 42 extending upwardly from the forward end of the upper arm 43, the pins being adapted to pass through perforations in the tape 13. The lower arm 44 of each of the carriers also projects forwardly and has secured thereto, one end of a spiral spring 45 which extends upwardly in substantial alignment with the pin 42 and is anchored at its upper end to an adjusting pin 46, carried by a bracket 47 from the block 38. A separate adjusting pin is provided for each spring.

The springs 45 tend to raise the pins 42 against or through the tape and in so doing to rock the levers 29 against the pressure of springs 34, to position the transmitting contact tongues 14 on their left hand or marking contacts.

The pins are moved downwardly away from the tape against the action of springs 45 by an electro-magnet 48, having a pivoted bell crank armature 49, provided with a bail 51 which engages with lugs 52, one of which is formed on each of the pin carriers 33. It will be apparent that when the magnet 48 is energized to attract its armature, all of the pins 42 which are then in elevated position will be depressed. A retractile spring 53 is provided for the armature 49 to move the same against the adjustable stop 54 when the magnet is deenergized, thus assisting the springs 45 which have the same tendency to retract the armature of the magnet upon rise of any of the pin carriers.

The cover 12 is provided with a guide plate 55, above the tape having a transverse slot through which the pins pass in their upward position. The guide plate limits the rise of the tape under the action of the pins which do not happen to be in line with perforations of the tape.

A star wheel 57, having a peripheral row of teeth, serves to feed the tape forward, the teeth entering a center row of perforations of the tape, as is well known in the art. The star wheel 57 is mounted upon a shaft 58 journaled in bearings 59 carried by the block. Also mounted upon the shaft 58 is a ratchet wheel 61 arranged to be advanced step-by-step by a spring actuated pawl 62 mounted upon a sliding rod 63. The lower end of the rod 63 is engaged by a lever 64 pivoted at 65 and having its inner end 66 engaged by the forward extension of the armature of the operating magnet. The pawl carrying rod 63 is raised upwardly once for each stroke of the magnet 48 to advance the feed wheel one step.

The upper ends of each of the contact tongues 14 is provided with a pair of inclined

faces and mounted thereabove is a locking bail 71 carried by an armature lever 72 pivoted at 73 and having a downwardly extending armature portion 74 adapted to be attracted by the transfer magnet 75. The magnet 75 is mounted on a U-shaped bracket 76 carried by an upright support 77 upon the lower portion of which the tape stepping magnet 48 is mounted. The locking bail 71 is held in engagement with the upper ends of the tongues 14 by a coil spring 78.

The operation of the transmitting apparatus so far described is as follows: Assuming the magnet 48 to be energized so as to attract its armature 49, the bail 51 engages the lugs 52 of the pin carrying slides so as to lower each pin away from the tape, and as soon as the pins have cleared the tape, the lever 64 is rocked upwardly to actuate the feed ratchet 61 and to advance the tape through the space of one tooth. At the same time the lugs 32 move downwardly allowing the contacts 14 to move towards their right hand or spacing side. They cannot move to their spacing bus bar, however, since they are locked in their previously set position by the bail 71. As soon as the magnet 48 is deenergized such of the pins 42 as are disposed beneath perforations in the tape will tend to rise under the action of the springs 45, thus urging their corresponding contact tongues 14 towards their left hand or marking contacts. At the same time the pawl 62 will descend into engagement with the next tooth of the ratchet wheel 61. The new code combination is thus prepared in the transmitter while the tongues 14 are retained in their previously set position.

Referring to Figure 3 it will be noted that the rotary distributor comprises the segmented transmitting ring 81, having a rest segment R connected to marking or negative battery, a start segment S connected to spacing or positive battery and code segments 1 to 5 connected to the tongues 14 of the tape transmitter. The solid transmitting ring 82 is connected to the outgoing line. The rings 81 and 82 are traversed by a brush 83. The local ring 84 has a segment 85 disposed opposite the rest segment R and connected by a conductor 86 to the transfer magnet 75. This ring also has a segment 87 approximately opposite segment 1 of ring 81, connected to the tape stepping magnet 48 by a conductor 88. The solid local ring 89 is connected to a source of positive battery and the rings 84 and 89 are traversed by a brush 90.

Assume the tape transmitter to have one code combination locked up in the contact tongues 14 by the bail 71, a second code combination prepared in the transmitter and brushes 83 and 90 just passing on to the segments R and 85 respectively. As the brush 90 engages the segment 85 a circuit is com-

pleted from the positive ring 89, brush 90, segment 85, conductor 86 and the transfer magnet 75. The magnet 75 operates to raise the bail 71 unlocking the contact tongues and permitting them to assume positions corresponding to the setting of the transmitting pins. Since the contact tongues are constantly urged towards their new setting by the springs 34 or 45, they quickly assume their new positions upon being released by the locking bail 71.

As the brush 90 passes off of segment 85 the magnet 75 is released allowing the bail 71 to descend under the action of spring 78 against the inclined tops of the contact tongues, forcing them to their new seats and locking them in such position during the remainder of the cycle of the distributor brushes. This operation is very rapid requiring only a fraction of the interval of the rest impulse. The movement of the tongues 14 need not be completed at the time the locking bail descends, it being only necessary that the apex of the tongues pass beyond the apex of the bail. The downward movement of the bail will complete the movement of the tongues, forcing them to their proper seats.

As the brush 83 passes across the segments R, S and 1 to 5, a rest impulse of marking character, a start impulse of spacing character and five code impulses are transmitted over the line. Coincidental with the passage of brush 83 on to segment 1, brush 90 engages segment 87 completing a circuit to the tape stepping magnet 48 to prepare a new combination in the transmitter, in readiness for the next transfer operation.

It will be noted that the arrangement provided permits each new code combination to be prepared during the time of transmission of the preceding code combination so that during the rest period it is only necessary to effect the transfer operation. This enables the speed of operation of the transmitter to be very greatly increased and due to the engagement of the locking bail with the tongues insures firm contact of the tongues on their respective seats. It should be further noted that only those contact tongues, the position of which is to be changed, are actually moved during the transfer, the tongues in which no change is to be effected remaining on their former seats, whereas in tape transmitters of this type as previously constructed, all of the tongues are positioned to their spacing contact on the downward stroke of the pins and, if necessary, back to their marking contacts on the release of the pins.

Referring now to Figure 4, we have shown our transmitter associated with a two channel six unit multiplex telegraph system. The multiplex transmitting apparatus comprises a distributor having a solid transmitting ring 91, a segmented transmitting ring 92, a local

solid ring 93 and a segmented local ring 94. The solid ring 91 is connected to line and the ring 92 has two sets of six segments each comprising the A and B channels. The segments of the A channel are connected to the tongues of the tape transmitter 95 and the segments of the B channel are similarly connected to tape transmitter 96.

The solid local ring 93 has positive battery applied thereto and the ring 94 has live segments 97 and 98 disposed opposite the segments of channel A. Ring 94 also has segments 99 and 100 disposed opposite the segments of channel B. Segments 97 and 98 are connected to the detent magnet 75 and tape stepping magnet 48 respectively of the transmitter 96 and segments 99 and 100 are correspondingly connected to the magnets 75 and 48 of transmitter 95. The distributor rings are traversed by brushes 101 and 102 operating in unison.

Assuming one combination to be set up on the contacts of each transmitter and a second combination to be prepared therein, it will be obvious that as the brush 101 passes across the segments of the A channel, the combination set up on the contacts of transmitter 95 will be transmitted over the line. At the same time, as brush 102 engages segment 97, magnet 75 of transmitter 96 will be energized releasing the detent 71 and permitting the combination previously prepared in the transmitter to be set up on the contacts. This combination is locked up as the brush passes off the segment 97 and as it passes on to segment 98 the tape stepping magnet is operated to withdraw the transmitting pins from the tape. As brush 102 passes off of segment 98, the magnet 48 is released to permit a new portion of the tape to be advanced into the transmitter 96. Consequently, as brush 101 comes into contact with the segments of the B channel, the combination just transferred to the contacts of transmitter 96 will be transmitted over the line. In the same manner during the active period of the B channel, the segments 99 and 100 will be traversed by brush 102 transferring a new combination to transmitter 95 and operating the tape stepping magnet to prepare the succeeding combination.

It will be noted that each tape transmitter has available for the preparation of each code combination therein, the entire active period of the channel associated therewith and a portion of the idle period of such channel, thus permitting the moving parts to assume their new position and settle down before the transfer is effected. The transfer occurs immediately following the active period of each channel, thereby permitting the substantially full idle period of the channel for the contacts to reach a steady state.

The segments 97 to 100 may be made of any desired length depending upon the speed

of transmission and responsiveness of the magnets 75 and 48.

In Figure 5 we have shown a modification of the contact locking mechanism. In this form the beveled end 103 of each contact tongue is carried by a resilient member 104 secured to the contact tongue, thereby eliminating the necessity for extreme accuracy in the adjustment of the contacts 15 and 16 relative to the contact tongue.

It is obvious, of course, that various modifications will occur to those skilled in the art without departing from the invention and, therefore, we do not desire to be limited to the exact details shown and described.

What we claim is:

1. A telegraph tape transmitter comprising a plurality of transmitting members, means for setting said members in accordance with the perforations of a tape, means for locking said members in said set position and means for advancing a new section of tape into the transmitter while maintaining the previous setting of said members.

2. A telegraph tape transmitter comprising a plurality of transmitting members, means for setting said members in accordance with the perforations of a tape and means for advancing a new section of tape into the transmitter while maintaining the previous setting of said members.

3. A telegraph tape transmitter comprising a plurality of transmitting members, tape engaging pins for setting said members in accordance with perforations of a tape, means for locking said members in said set position and means for disengaging said pins from the tape and advancing a new section of the tape into the transmitter while maintaining the previous setting of said members.

4. A telegraph transmitter comprising a distributor, a tape transmitter having a plurality of contacts associated with said distributor and arranged to be set in accordance with the perforations in a tape, means for maintaining said contacts in a set position during the transmission of the code combination represented thereby and means for preparing a new combination in the transmitter during the transmission of said previous code combination, whereby an overlap is provided.

5. A telegraph transmitter comprising a distributor, a tape transmitter having a plurality of contacts associated with said distributor and arranged to be set in accordance with the perforations in a tape, means for maintaining said contacts in a set position during the transmission of the code combination represented thereby, means for preparing a new code combination in the transmitter during the transmission of said previous code combination, whereby an overlap is provided and means for transferring said new code combination to said contacts after the

transmission of the previous code combination.

6. A telegraph transmitter comprising a tape transmitter having a plurality of contacts arranged to be set in accordance with the perforations in a tape, a line, a distributor for transmitting said code combination directly from said contacts to the line and means for preparing a new code combination in the transmitter during the transmission of said previous code combination.

7. A telegraph transmitter comprising a signal storage means, a distributor, an automatic transmitter having a plurality of electrical contacts associated with the distributor and arranged to be set mechanically in accordance with a permutation code previously stored in said storage means, means for maintaining said contacts in a set position during the transmission of the code combination represented thereby and means controlled by said storage means for preparing a new code combination in the transmitter at least in part during the transmission of said previous code combination.

8. A tape transmitter for a start-stop telegraph system comprising a distributor arranged to transmit groups of signal conditions including a rest condition and a plurality of code conditions, an automatic transmitter having contacts arranged to control the code conditions, means for preparing one code condition in the transmitter during the transmission of the preceding code condition and means for transferring said prepared code condition to said contacts during the transmission of said rest condition.

9. A tape transmitter for a start-stop telegraph system comprising a distributor arranged to transmit groups of signal conditions including a rest condition, a start condition and a plurality of code conditions, an automatic transmitter having contacts arranged to control the code conditions, means for preparing one code condition in the transmitter during the transmission of the preceding code condition and means for transferring said prepared code condition to the contacts during the period of transmission of said rest and start conditions.

10. A telegraph transmitting system comprising a distributor arranged to transmit groups of code conditions, a tape transmitter having contacts directly connected to the distributor to control the code conditions, tape engaging means for said transmitter for positioning said contacts in accordance with perforations appearing in a tape, and means for disengaging said tape engaging means from the tape and advancing a new section of tape into the transmitter during the transmission of the preceding code conditions.

11. A tape transmitter for a start-stop telegraph system comprising a distributor arranged to transmit spaced groups of code

conditions, a tape transmitter having contacts arranged to control the code conditions, tape engaging means for said transmitter for positioning said contacts in accordance with perforations appearing in a tape, means for disengaging said tape engaging means from the tape and advancing a new section of tape into the transmitter during the transmission of the preceding code combination and means to position said contacts in accordance with the perforations in the new section of tape in the interval between the transmission of adjacent groups of code combinations.

12. A telegraph transmitter comprising a plurality of transmitting contact tongues, contacts disposed on opposite sides thereof, selective means for shifting said tongues to one contact or the other and means independent of said selective means engaging said tongues to hold them on their selected contacts.

13. A telegraph transmitter comprising a plurality of contact tongues, contacts disposed on opposite sides thereof, selective means for shifting said tongues to one contact or the other, a detent arranged to engage said tongues to hold them on their selected contacts against subsequent actuation by said selective means and means for periodically releasing said detent to permit said tongues to move to a new position.

14. A telegraph transmitter comprising a plurality of transmitting contact tongues having beveled ends, contacts disposed on opposite sides thereof, selective means for shifting said tongues to one contact or the other, a detent arranged to engage either side of said beveled ends to hold said tongues on their selected contacts against subsequent actuation by said selective means and means for periodically releasing said detent to permit said tongues to move to a new position.

15. A multiplex telegraph system having a contact setting mechanism associated with each channel of the multiplex system, means for maintaining the contacts of each contact setting mechanism in a pre-set position during the transmission of signals over the channel associated therewith, means for preparing a new setting for the contacts of each contact setting mechanism during the active period of the channel associated therewith and means for transferring said combination to the contacts of each contact setting mechanism during the idle period of its associated channel.

16. A multiplex telegraph system having an automatic transmitter associated with each channel of the multiplex system, means for maintaining the contacts of each transmitter in a previously set position during the transmission of signals over the channel associated therewith, means for preparing a new setting for the contacts of each trans-

mitter, at least in part, during the active period of the channel associated therewith and means for transferring said combination to the contacts of the transmitter during
5 the idle period of its associated channel.

17. A telegraphic transmitter comprising a plurality of transmitting members adjustable to different positions, selective means for shifting said members to one or the other of
10 said positions and means resiliently engaging said members to hold them in their shifted position against subsequent actuation by said selective means.

18. A telegraph transmitter comprising a
15 plurality of contact tongues, contacts disposed on opposite sides thereof, selective means for shifting said tongues to one contact or the other, a detent resiliently engaging said tongues to hold them on their selected
20 contacts against subsequent actuation by said selective means and means for periodically releasing said detent to permit said tongues to move to a new position.

19. A telegraph transmitter comprising a
25 plurality of transmitting contact tongues, beveled ends resiliently secured to said contact tongues, contacts disposed on opposite sides of said tongues, selective means for shifting said tongues to one contact or the
30 other, a detent arranged to engage either side of said beveled ends to hold the tongues on their selected contacts and means for periodically releasing the detent to permit the tongues to move to a new position.

35 20. A telegraph transmitter comprising a signal storage means, a plurality of transmitting members, means for setting said members in accordance with character combinations previously stored in said storage
40 means, and means for advancing a new character combination from said storage means into the transmitter while maintaining the previous setting of said transmitting members.

45 21. A telegraph transmitter comprising a signal storage means, a plurality of transmitting members, means for setting said members in accordance with character combinations previously stored in said storage means,
50 and means for advancing a new character combination from said storage means into the transmitter during transmission of the previous character combination.

In testimony whereof, we affix our signatures.
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