

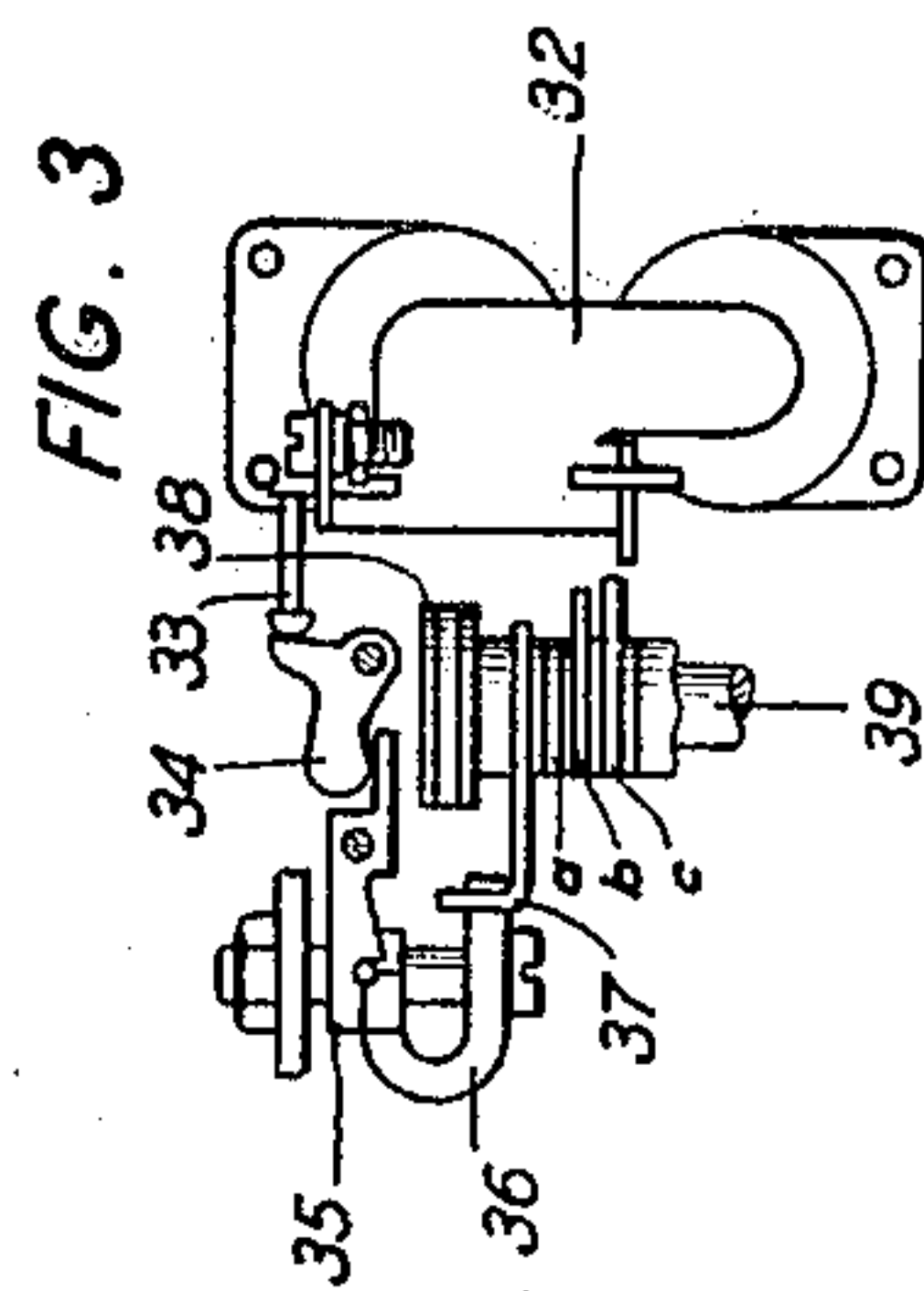
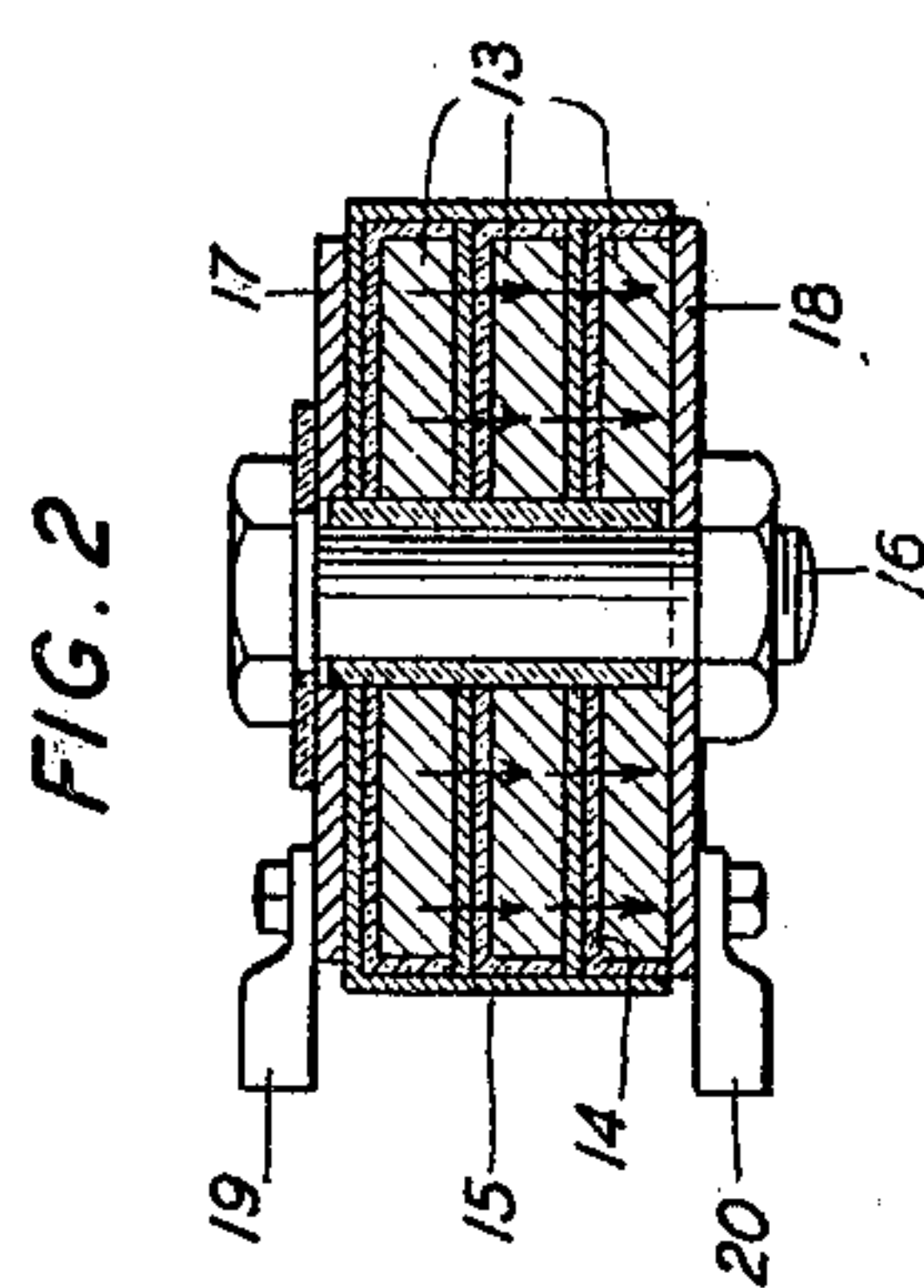
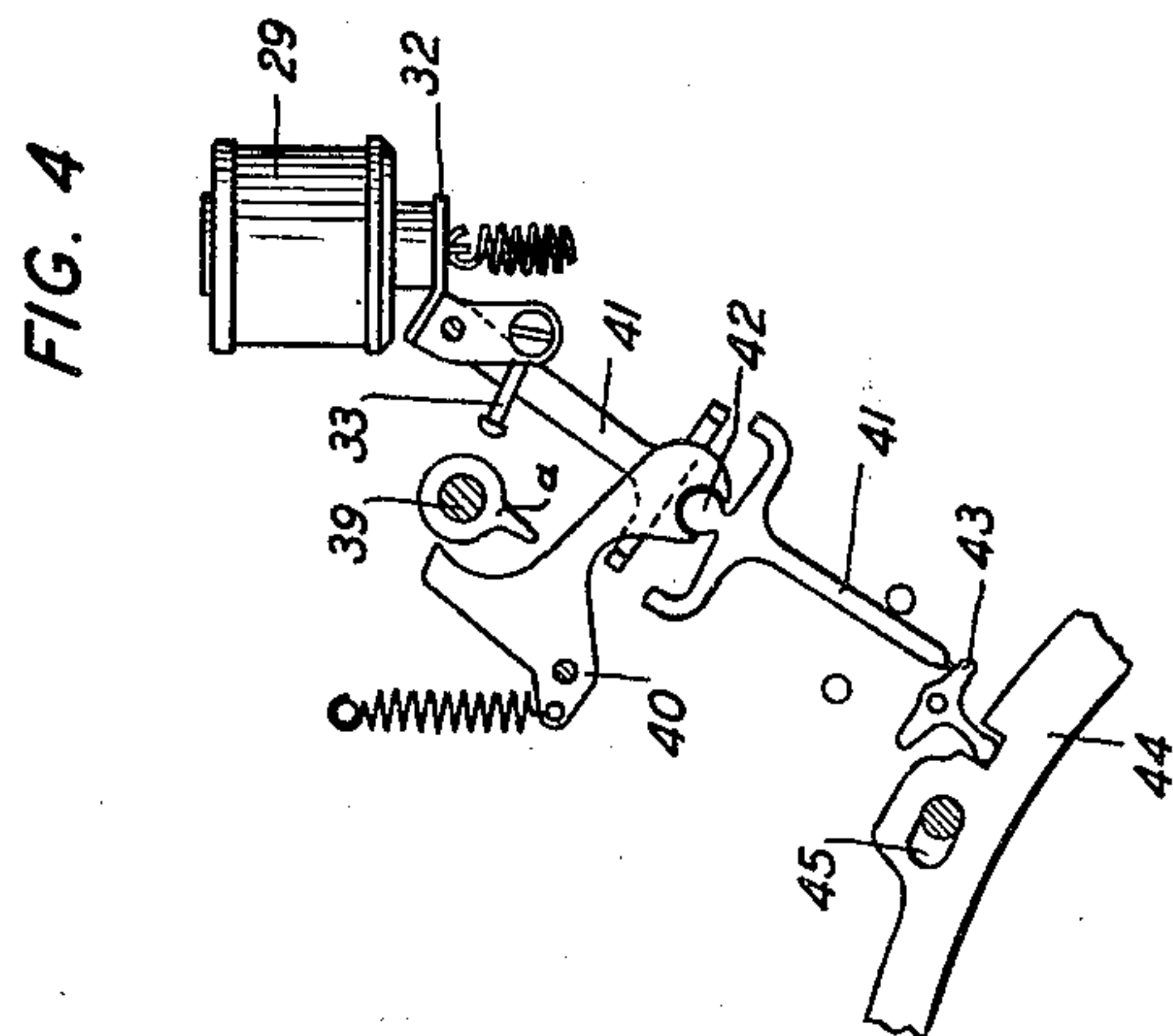
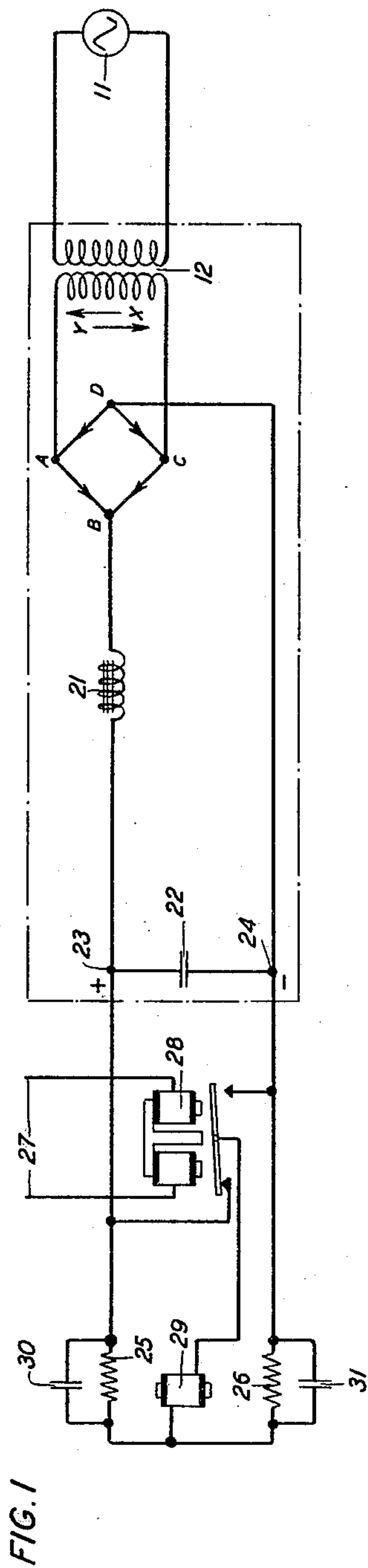
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1,867,638

TELEGRAPH PRINTER

Filed June 7, 1930



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TELEGRAPH PRINTER

Application filed June 7, 1930. Serial No. 459,762.

This invention relates to receivers for selective telegraph systems and particularly for those employing the Baudot code, that is, those in which the character signals consist of two different electrical conditions, such as permutations of positive and negative impulses or current and no current, extending through a definite number, usually five, of time intervals or units. The features of the invention relate more particularly to the so-called "start-stop" systems, wherein the rotating member or distributor of the receiver is kept in step or in phase with the signals by start-stop mechanism that rests the rotating member at the end of the signal period or during spacing intervals between signals and again initiates its operation in response to a starting interval or unit at the beginning of each signal.

The present invention is adapted to a selector mechanism for a printer of the type disclosed and described in U. S. Patent 1,745,633, granted to S. Morton and H. L. Krum on February 4, 1930. This mechanism is particularly adapted for start-stop systems and is one which can be mechanically operated under the control of a single magnet. Heretofore in printers wherein the selector mechanism was operated by a single magnet, the magnet was of the neutral type, but it is an object of this invention to operate a printer equipped with a magnet of the polarized type in an efficient and economical manner. Another object is to utilize a normal voltage in the output circuit of a current rectifier for operating the polarized magnet in response to received signal impulses.

According to the present invention an alternating current power supply for operating the printer motor is impressed through the transformer onto two opposite points of a Wheatstone bridge arrangement, the arms of which each include a suitable rectifier such as disclosed in U. S. Patent 1,749,549, granted to J. Slepian on March 4, 1930, for producing in a circuit connected to the other two opposite points of the Wheatstone bridge, a pulsating direct current. By passing the pulsating current through a filter connected across the circuit, the current pulsations are

reduced to a minimum. Connected, in series, in the circuit are two resistances of relatively high value and at opposite ends of these resistances are respectively connected two contacts of a relay, the winding of which is connected to the signal transmission line. The relay armature is connected to one side of a winding of the printer selector magnet, the other side being connected to the circuit at a point midway between the two resistances. Therefore the drop in voltage normally across each of the resistances is utilized for operating the armature of the selector magnet to either of two positions depending on the contact engaged by the relay armature in response to incoming signal impulses. A condenser is connected across each resistance for producing a sudden rise in the current passing through the windings of the magnet when the relay armature engages either contact.

Other objects and features will appear in the description hereinafter set forth, when taken in conjunction with the accompanying drawing and appended claims.

Of the drawing, Fig. 1 shows the operating circuit for the printer magnet; Fig. 2 shows a suitable type of rectifier for changing a power supply alternating current to a direct current; and Figs. 3 and 4 show fragmentary views of the selector mechanism of the printer.

The arrangements herein are shown as using an alternating power supply to control the printer operations through a single polar magnet. The power for printing is usually supplied from a 110 volt motor arranged to operate from the electric light or power supply of this voltage. Although an alternating current source is shown, this source might just as well be of direct current furnished by a motor generator or a battery.

Referring to Fig. 1, the source 11 of alternating current is connected through a transformer 12 to opposite points A and C of a Wheatstone bridge arrangement A, B, C, D, which serves as a single rectifier. Each of the arms of the Wheatstone bridge arrangement include a suitable rectifier such as illustrated in Fig. 2, wherein is employed the

uni-lateral conductivity found to exist in the case of certain metals with respect to current flow across the junction between the metal and a chemical compound formed directly within the body thereof. In the case where copper is used as the basic metal 13, its suitable compounds which may be electrolytically deposited thereon to form two distinct layers 14 and 15, are red and black oxides, respectively known as cuprous and cupric oxides. The basic metal is in the form of thin washers or discs 13 which are placed in pairs with their clean faces adjacent in a suitable electrolyte to form thereon the desired oxides. After removing these discs from the electrolyte they are separated and washed to remove all electrolyte adhering to their surfaces and then dried. A plurality of discs thus treated are superposed as illustrated in Fig. 2 to provide a rectifier which is able to withstand any desired counter-electromotive force and the whole assembly is clamped by means of an insulating bolt 16 between two end plates 17 and 18 to which terminal conductors are attached as indicated at 19 and 20, the direction of current flow being indicated by arrows. A more detailed description of the rectifier unit may be had by referring to Patent No. 1,749,549.

As stated above, the induced alternating current in the secondary windings of transformer 12, is impressed on points A and C. When the current in the secondary windings is flowing in an upward direction as indicated by arrow X, the path taken is from A to B, through the windings of retardation coil 21 which has an inductance of about twenty henries, left hand contact of relay 28, through the winding of magnet 29, resistance 26, D to C and back to the secondary winding. When the same current is flowing in the opposite direction, say downward, as indicated by arrow Y, the path taken, is from C to B, coil 21, left hand contact of relay 28, through the winding of magnet 29, resistance 26 D to A and back to the secondary. It will be observed that the load on the rectifier is the same for either a marking or a spacing condition of relay 28, that is, when the relay armature is in engagement with either its left or right hand contact. The arrangement shown requires less voltage than those employed heretofore for operating polar magnets.

The telegraph line 27 over which polar signals are transmitted, is connected through the windings of relay 28, the armature of which is arranged to engage its associated contacts alternately in response to the incoming polar signals. The relay armature is connected to one side of the windings of the polar magnet 29, the other side of the windings being connected to the output circuit of the rectifier at a point midway between resistances 25 and 26. In this way, when the relay armature is in engagement with its left hand contact, as for example, after it has just responded to a line impulse of positive polarity, the potential drop across resistance 25 is impressed on the windings of magnet 29. This causes current to flow from point 23 and from the right hand side of resistance 25 in parallel. The combined current flows through the left hand contact and armature of relay 28, traverses the magnet windings in say, a right to left direction, and then passes through resistance 26 to point 24. When the relay armature is in engagement with its right hand contact, as for example, after it has just responded to an impulse of negative polarity, the potential drop across resistance 26 causes current to flow from point 23 through resistance 25 and from the left hand side of resistance 26 in parallel. This combined current traverses the magnet windings, say in a left to right direction, and flows through the armature and right hand contact of relay 28 to point 24. Therefore the magnet alternately operates and releases in response to the signal impulses of positive and negative polarity of line 27. Condensers 30 and 31 are respectively connected across resistances 25 and 26 in order to improve the "build-up" of the current which flows through the winding of magnet 29 at the time the relay armature engages its contacts.

This manner of operating magnet 29 is suitably adapted for printers designed to be operated by polar impulses, particularly where the printers are used at a plurality of receiver stations in a system employing one-way transmission of polar signals. However, it may so be used in systems employing neutral telegraph circuits, that is circuits where the line signals consist of intervals of current and "no current" and a line relay is desirable to improve operating margins. A line relay is particularly desirable in systems where the incoming signals received by the printer are distorted in shape such as when the printer is operated directly in a composed telegraph circuit. The line relay 28 is of the high speed type and requires that direct current be available at the receiving station for operating the receiver magnet 29.

The magnet 29 is suitably adapted for operation with the type of printer disclosed in Patent No. 1,745,633, supra, and for a detailed description of the operation of this type of printer reference may be made to that patent. However, a brief outline will be given here to describe the operation of the magnet in making the proper selection of characters to be printed, in order that the particular parts may be identified in Patent No. 1,745,633.

The printer is especially adapted for start-stop systems wherein a start and a stop impulse, in addition to the five unit message impulses, are received to record each charac-

ter. The receiving mechanism rotates in approximate synchronism with the transmitting mechanism so that when the latter is sending out a particular impulse, the former will have rotated to the proper position to receive that impulse. When the impulses have been received and a selection set-up in the printer, the printer mechanism is released and the character corresponding to the selection set-up, is printed. The stop impulse coming in over the line, stops the rotation of the receiving shaft until the start impulse for the next character is received. This stopping of the receiving mechanism after each revolution and restarting by means of a signal impulse sent over the line, automatically corrects once in each revolution for any minor variations in the speeds of different printers.

In Fig. 3 is shown polar magnet 29 which operates the receiving selecting mechanism of the printer. The magnet is normally in an operated condition. When the start impulse is received the magnet armature 32 is released and a pin 33, fixedly mounted on the armature and acting through an intermediate pivoted lever 34, trips a stop pawl latch 35 which is pivotally mounted on the printer structure (not shown). The stop pawl latch normally engages a stop pawl 36, which blocks a stop arm 37 from rotating. When the latch is tripped the stop pawl rotates slightly due to the pressure of the stop arm against it. The stop arm and the receiving cams, such as *a*, *b*, *c*, etc. (there being five in all in order to correspond to the five unit code) rotate through power transmitted by friction clutch 38 at the top end of the main shaft 39.

A better understanding of the operation of the selecting mechanism will be had by referring to Fig. 4 wherein the mechanism responsive to one impulse only of the transmitted signal, is shown, there being five such sets of mechanisms to set-up each character. When the main shaft rotates slightly in response to the start impulse the cams which are fixedly mounted thereon, also rotate. When cam *a*, for example, rotates sufficiently, it strikes the end of a code bar operating lever 40 which is pivotally mounted on the printer structure. At this time the armature is either operated or unoperated, depending on the polarity or nature of the message impulse received from the line at that time. Let it be assumed that it is an impulse that will restore the armature to its normally operated position as shown in the figure. As cam *a* passes its code bar operating lever 40, the latter is rotated slightly in a counter clockwise direction, carrying back with it a finger or sword-shaped member 41. The sword-shaped member is flat and its two arms have upturned ends, and when it is drawn back by lever 40 the right hand upturned end will strike the

right hand end of armature extension 41. The sword member will be rotated clockwise in its pivot 42, and when the cam projection moves to clear lever 40, the sword member will move downward against the left hand end of a T lever 43. The T lever is also pivotally mounted and any pressure on its left hand end will cause code bar 44 to move to the right as provided for by the pin in slot 45. This completes the setting of the first code bar for building-up the combination which effects the printing of the desired character. If it is assumed that the impulse received from the line releases the armature and the armature extension, the sword member when pulled back by the action of the selector cam *a* rotating the code bar operating lever, will strike the left hand end of the armature extension and will be moved counter clockwise to engage the right end of the T lever and move the code bar to its non-selected position. In this manner each of the code bars is made to occupy either a selected or non-selected position as a part of the operation of printing each character.

The main or cam shaft 39 rotates through one revolution for each character and the remaining four cams engage their respective code bar operating levers successively, it taking approximately three quarters of a revolution of the shaft to complete the set up of any combination of code bars.

In addition to the five cams, there are in each printer five code bar operating levers, five sword members, five T levers, five code bars, but only one armature extension bar 41 which is T shaped at its free end, the ends of the cross piece being turned up in order to be in engageable relation with all the sword members.

What is claimed is:

1. A telegraph receiver having a polar relay, adapted for printing characters in response to groups of signal impulses, a source of voltage, a continuously closed circuit for said source, elements of fixed impedance in said circuit for producing a plurality of potential drops, and electromagnetic means responsive to said signal impulses for selecting one of the elements in said circuit across which the potential drop occurs, in order to utilize the potential drop produced for operating the polar relay of said receiver in accordance with the signal impulses.
2. A telegraph receiver adapted for printing characters in response to groups of signal impulses, a normally closed circuit, a local source of alternating current for operating said receiver, means utilizing said source for generating a direct current in said circuit, a pair of impedance elements connected in series in said circuit, a distant source of impulses, means responsive to said impulses, a polarized printer magnet connected in shunt, first to one and then to the

other of said impedance elements under the control of said impulse responsive means whereby the potential drop across either of said impedance elements is effective to operate or release the armature of said printer magnet in accordance with the impulses from said distant source.

3. A telegraph receiver adapted for printing characters in response to groups of signal impulses, a normally closed circuit, a local source of alternating current for operating said receiver, means for converting said alternating current into a direct current in said circuit, a pair of resistances connected in series with said circuit, a condenser connected across each of said resistances, a single polarized printer magnet arranged to be connected across either of said resistances, an electromagnetic relay directly responsive to said signal impulses for effecting the connection of the printer magnet across said resistances alternately, whereby the potential drop across the resistance which happens to be shunted at the time, operates or releases the armature of the printer magnet in accordance with the signal impulses.

4. A system for operating a two-position polar relay to either of its two positions from a source of direct current with a current drain upon the source of current independent of the position of the relay comprising two impedances in series with said source and a circuit making-and-breaking control device connected to said relay by contacts whereby said relay is connected first across one of said impedances and then across the other dependent upon the contacts of said control device, said impedances being maintained under all operative conditions in series with said source.

5. A system in accordance with claim 4 wherein said control device upon each change from one of its contacts to the other is arranged to reverse the direction of voltage applied to said relay.

6. A system in accordance with claim 4 wherein a condenser is connected across the terminals of each of said impedances to absorb the current during the time said control device is changing from one position to another, the charge stored in said condenser serving to accelerate the operation of said relay.

In testimony whereof, I have signed my name to this specification this 3rd day of June, 1930.

ALLAN WEAVER.