

Oct. 11, 1932.

R. HOOVER ET AL

1,881,585

QUOTATION BOARD PRINTING UNIT

Filed May 4, 1931

4 Sheets-Sheet 1

FIG. 1

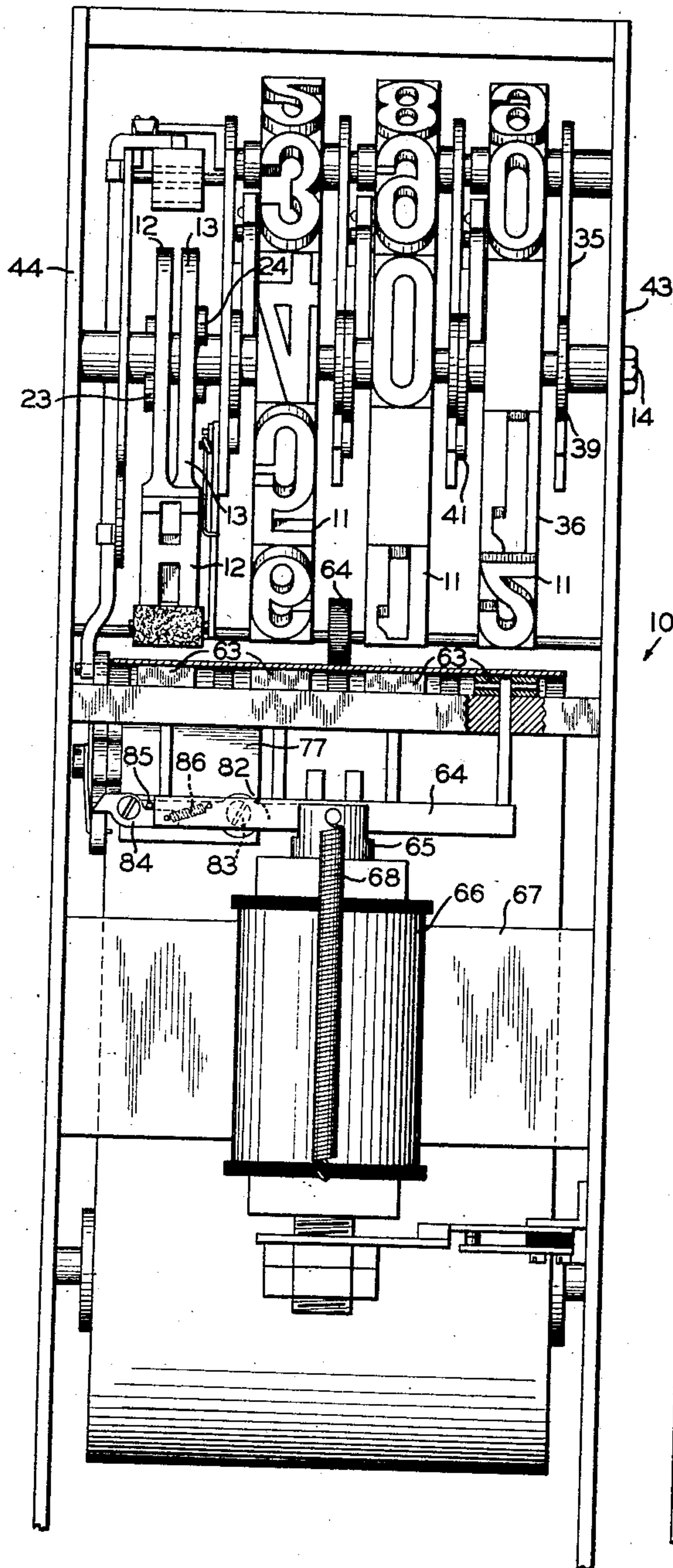


FIG. 4

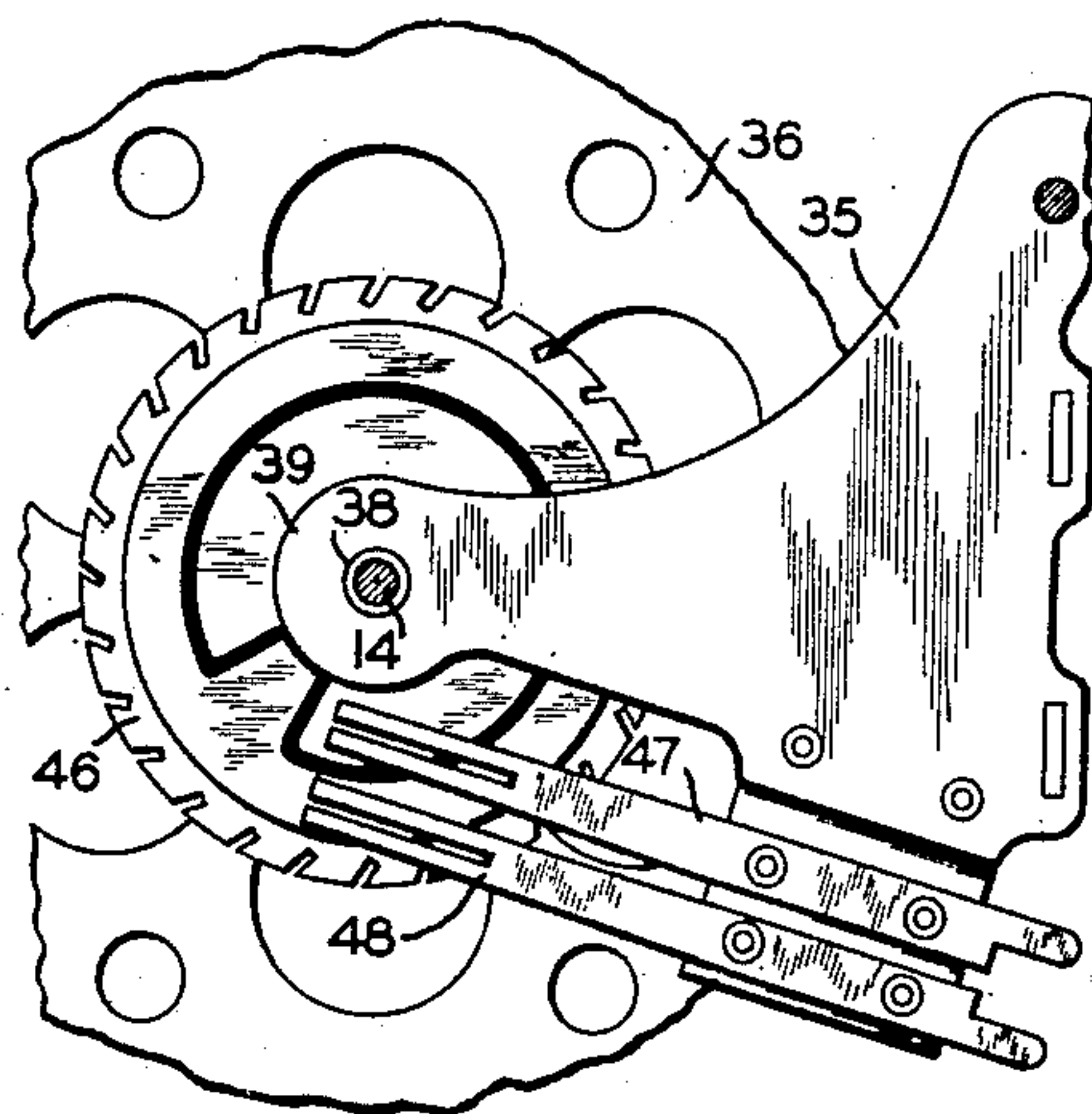
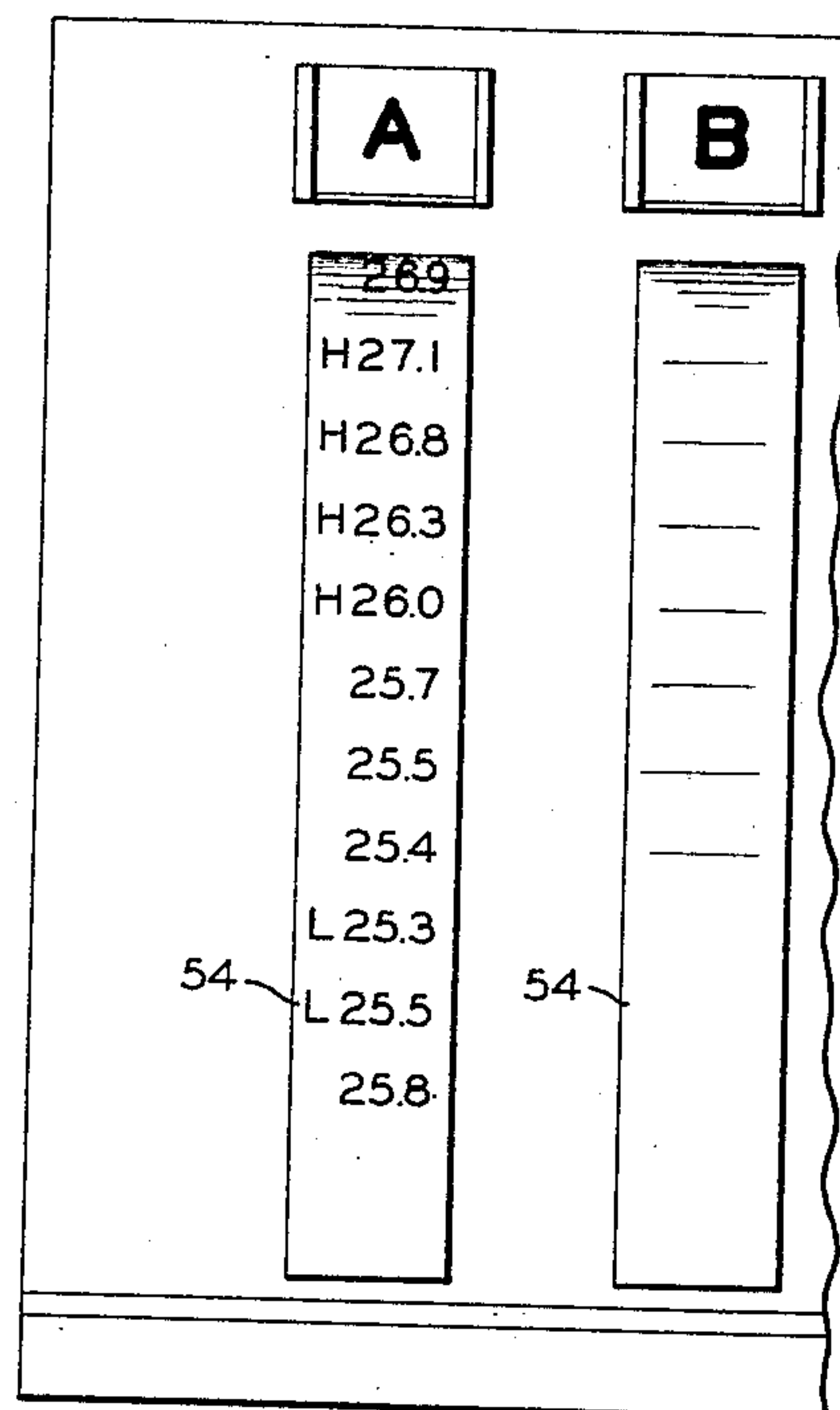


FIG. 7



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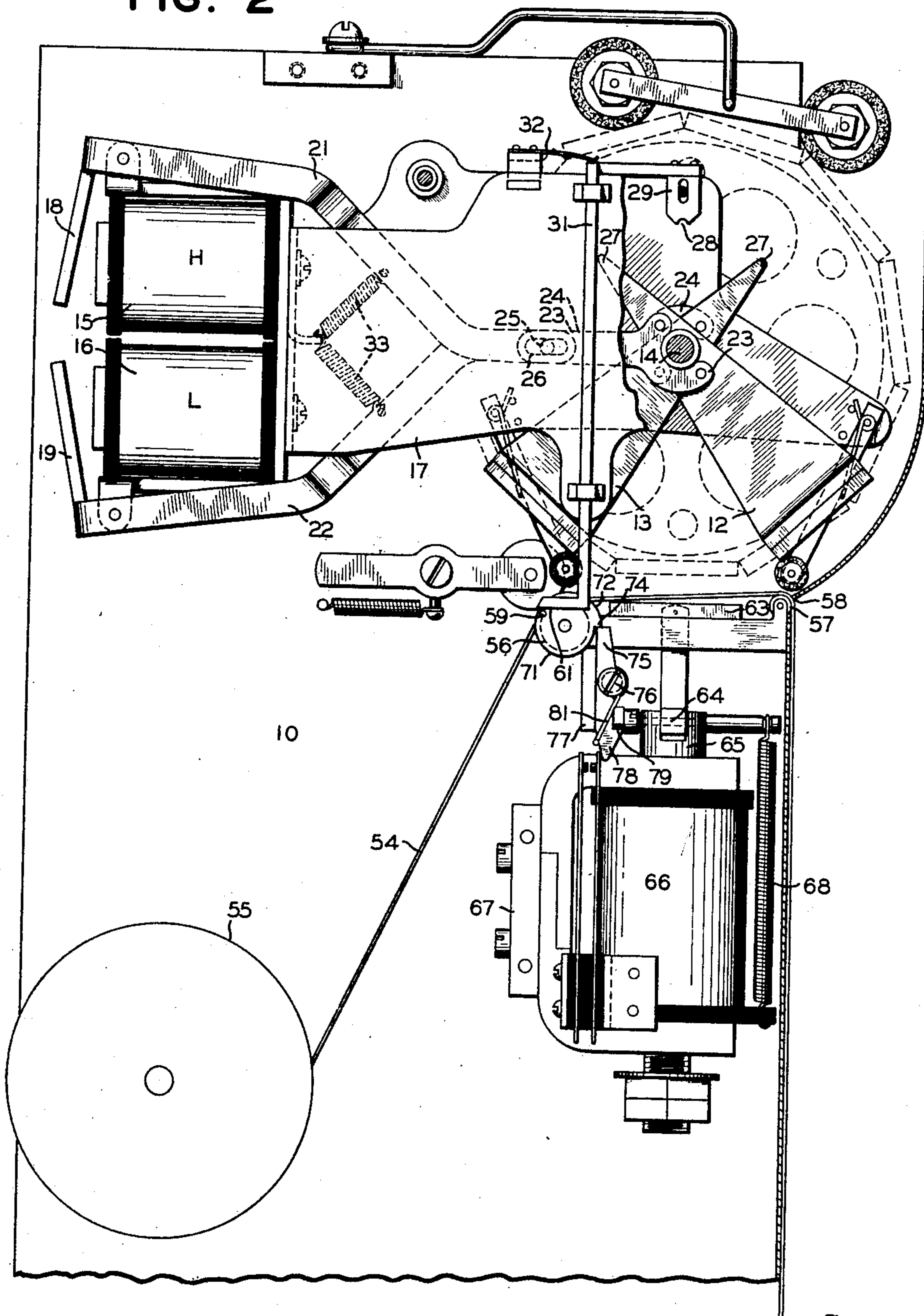
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4 Sheets-Sheet 2

FIG. 2



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FIG. 3

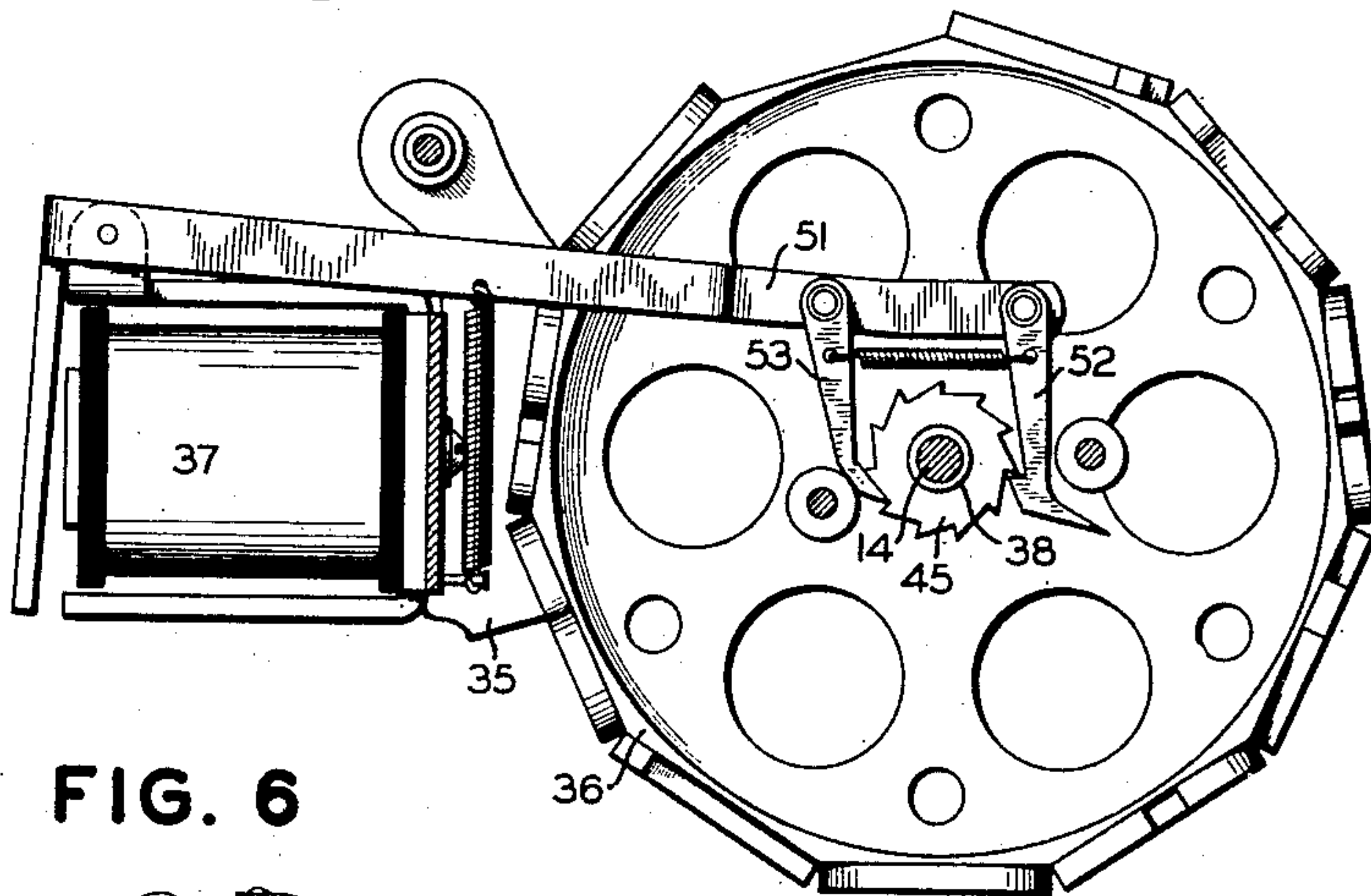


FIG. 6

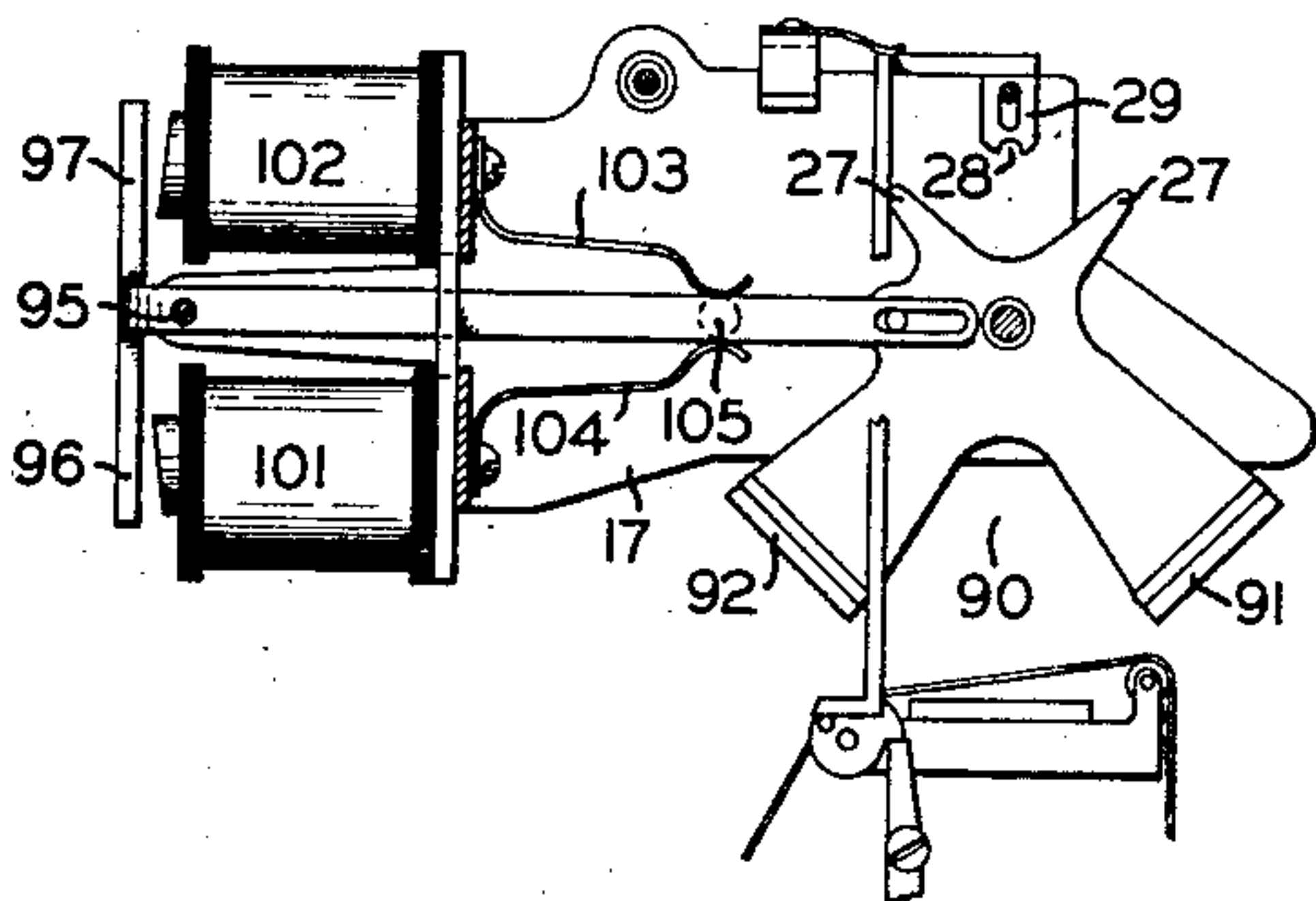
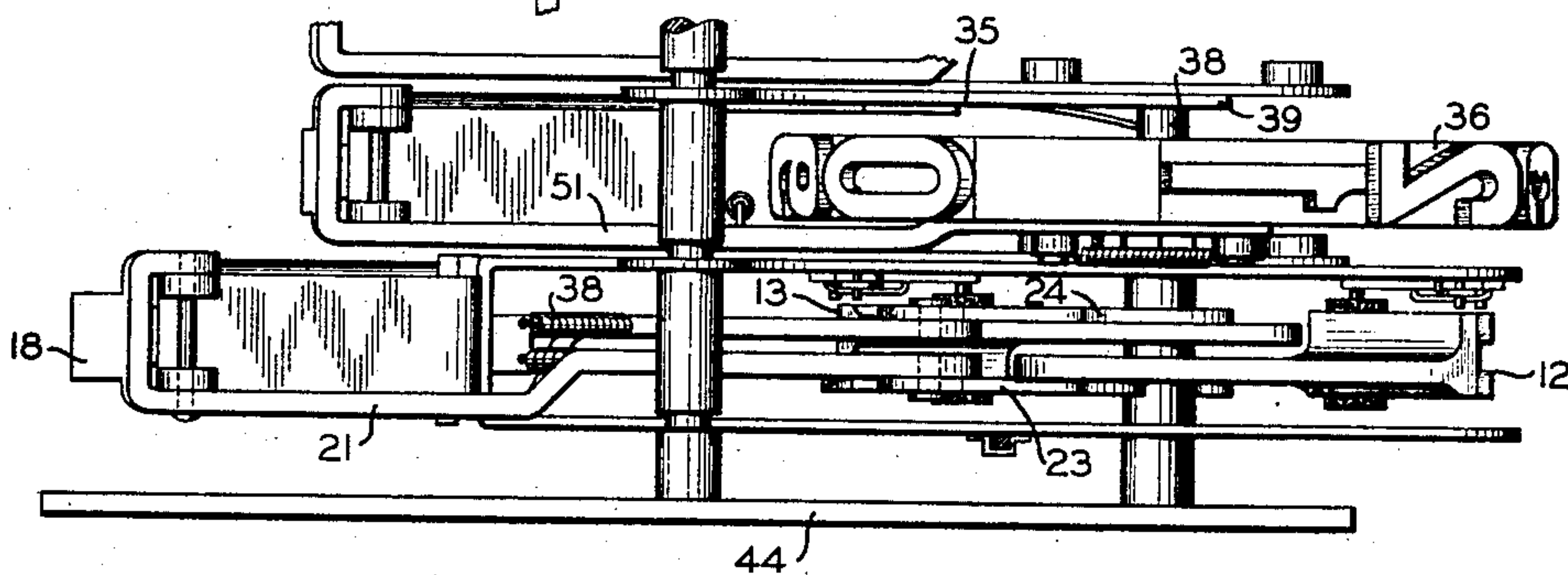


FIG. 5



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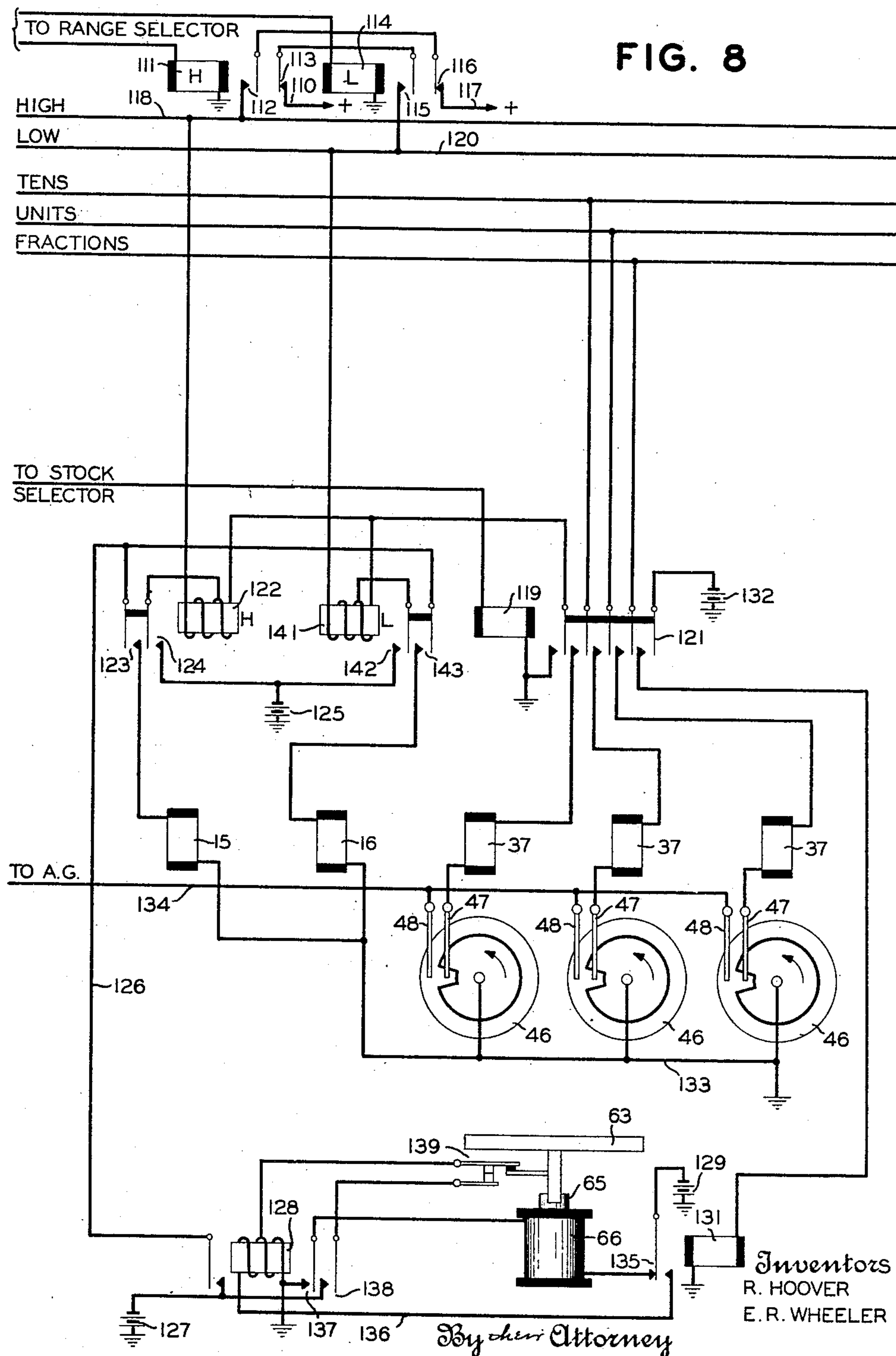
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QUOTATION BOARD PRINTING UNIT

Filed May 4, 1931

4 Sheets-Sheet 4



## UNITED STATES PATENT OFFICE

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## QUOTATION BOARD PRINTING UNIT

Application filed May 4, 1931. Serial No. 535,065.

This invention relates to a quotation board mechanism for automatically printing in visible form information concerning different items, such as stock, bond, and commodity quotations in response to telegraphic signals, and more particularly to apparatus which in addition to displaying information of the usual character, such as quoted market value, can, when desirable be operated to indicate the fact that the information is of an unusual character, for example that a quotation represents a high or low value for the day; and it has for an object to provide a combined display unit with means for selectively displaying both types of information with one group of indicators. According to our invention, such indicators may be in the form of a printing unit arranged to display the information in printed form on a sheet or tape of paper, or other material.

A system now in commercial use for automatically posting stock quotations at a plurality of separate places, such as brokers' offices and banks, from a common transmitting point, involves the use of four channels of communication extending between the transmitting station and the receiving station embodying the quotation board apparatus, separate channels being employed to transmit signals corresponding to each of the hundreds, tens, units, and fractions (in eighths) value or digits of the quotations. The four transmitting channels may comprise four separate line wires or two line wires, each having battery of positive and negative polarity applied alternately thereto in a series of impulses, in conjunction with polarized relays at the receiving station for responding to the polarity of the current transmitted over each of the lines. One form of such system is described and claimed in the co-pending application of Ray Hoover entitled "Electrical selecting and indicating system" filed November 11, 1929, Ser. No. 406,357 and assigned to The Western Union Telegraph Company. In another form the transmission from a distant initial or sending station may be accomplished over a single wire to a local decoder or repeater station from which the various channels or impulses

are separated and sent out to the various quotation boards. Or again the single wire may go directly to the subscriber's cabinet where a decoder separates signal channels and transmits them to the quotation board mechanism in the usual manner.

Quotation boards as heretofore constructed employ a group of four indicating units, each having a dial or drum bearing the numerals 1 to 9, 0 and a blank, four units being disposed side by side behind suitable apertures so that when properly set up the numerals on the dials may be directly observed to give the quotation. Ordinarily, five of such groups of indicators are provided for each stock or item, corresponding to the quotation "ranges" chosen to be posted, such as "yesterday's close", "open", "high", "low", and "last" quotations of the stock, and signals are transmitted to the quotation board to operate these at appropriate times. On the other hand, the number of range signals transmitted is by no means limited to five. Other signals representing any combination of the above ranges or signals to indicate "bid", "ask", "up", and "down" or any other desirable "range" or other information may be transmitted.

In an arrangement described and claimed by Ray Hoover and Evan R. Wheeler in an application entitled "Quotation board system and apparatus", filed May 9, 1930, Ser. No. 451,140, and assigned to Western Union Telegraph Company, it has been proposed to use, in place of one or more of the five "range" groups of indicators provided for each stock, a printing unit which shall make the information visible in printed form on a paper tape or other sheet material. Ordinarily the group of indicators corresponding to the "last" quotation will be displaced by the printing unit. This arrangement enables the consecutive quotations to be kept in view for an extended length of time as new quotations are being printed on the tape, and thus indicate what is termed the "trend" of the stock being quoted upon.

It will be observed that in the quotation board system as above described, there is included among the groups of indicators for

the various stock "ranges" a group for the "high" and "low" ranges. However, when consecutive quotations occur in printed form, as for instance, on a strip or tape of paper, a person referring to the information displayed thereon in order to ascertain the trend of the stock being quoted upon, would find that the information would be more useful if there were means printed on the tape for indicating such quotations as represented a new "high" or a new "low" a "bid" or "asked" or other special value. Although each new "high", "low", "bid", or "asked" or other value could be indicated in a system having the required number of stock range indicators such as referred to above, their position with respect to other quotations of the stock would not be shown. In addition, in the printing unit of the type described in our aforesaid application, the various range quotations would occur printed on the tape, but they could not be readily identified without making a comparison between the printed quotations and the range indicators of the quotation board.

It is obvious that one or more of the five groups of range indicators of the system just referred to may embody the improved features for indicating that the quotation displayed represents a "high", "low", or other special value. For accomplishing this a suitable arrangement may be employed for displaying a character indicating such information along with the characters indicating the value of the quotation.

More particularly, therefore, it is an object of our invention to provide a quotation board unit adapted to be used in a system such as described in the above mentioned applications which will have means to display an indication along with the quotation displayed by such unit, which will signify that the quotation is of an unusual character, for example, that it represents a new "high" a new "low", a "bid", or "asked" or other quotation of special significance or value.

This may be accomplished in a printing unit by providing an arrangement for mounting an "H", an "L", a "B" or an "A" or other character so that they may be moved into printing position and by providing electromagnetic actuating means responsive to the "high", "low" or other special range selecting signal to selectively bring any desired character into printing position.

Therefore another object of our invention is to provide in a printing unit means to print an "H", "L", "B", "A" or other special character with or as a part of the quotation, and which may be selectively brought into action to print a predetermined one of the special characters to designate the range or any other special characteristic of the quotation displayed.

Still another object is to provide a mecha-

nism responsive to certain selective signal impulses for causing a predetermined special character to be printed.

A still further object is to provide a special control arrangement which will act in response to certain range signal impulses to effect printing from the special characters simultaneously with the printing of the numerical characters.

These and other objects are effected by our invention, as will be apparent from the following description and claims taken in connection with the accompanying drawings which form a part of this application, in which:

Fig. 1 is a view in elevation of the front of the type-printing unit showing the tape carrying elements;

Fig. 2 is a view in elevation of the side of the printing unit showing the mechanism employed to print the special type characters;

Fig. 3 is a side elevation of the type wheel unit employed for printing the numerical characters;

Fig. 4 is a side elevation of the opposite side of the type wheel to that shown in Fig. 3, showing the control commutator arrangement;

Fig. 5 is a view in plan of a part of the type wheel unit showing the relation of the special character mechanism to the adjacent type wheel unit;

Fig. 6 is a diagrammatic view in elevation of a modification of our invention showing the special type characters carried on a single element;

Fig. 7 is a diagrammatic view of a section of a quotation board illustrating the quotations as they are printed on the tape; and

Fig. 8 is a circuit diagram for the printing unit showing only the portion immediately associated therewith.

In the quotation board system described in our aforesaid copending application entitled, "Electrical selecting and indicating system", a train of signal impulses comprising three groups is employed to operate the quotation board apparatus for properly posting each quotation. The signal train comprises a "selector" group which selects the group of indicators in the quotation board allotted to the stock or commodity being quoted upon and which further selects the proper range indicator, such as "yesterday's close", "high", "low" etc., a "restoration" group for bringing the selected indicators to a unison position, and an "answer" group for setting up the quotation on the indicators. According to the present invention we propose to use the same type of signal train to operate the printing unit. One or more of the digits representing the numerical part of a quotation is set up and printed by a group of type wheels in substantially the same manner as described in the aforesaid Hoover et al. ap-

plication, where the printing unit is substituted for the last range indicator. For setting up the mechanism to print one of the special characters, we employ the signal included in the selector group of the signal impulse train for the purpose of selecting the "high", "low" or other set of range indicators in the system described in our aforesaid application. In our present invention this signal selects, in addition to the indicators, a circuit which will cause the special type character to be set up in printing position, according to whether the selecting signal is one which selects the "high", "low" or other set of indicators. After being set up the special type character remains in printing position until after printing is effected. In the description of our invention a quotation board arrangement using special characters to designate the "high" and "low" range values only has been chosen as illustrative of the principles involved. The characters most commonly used are the letters "H" and "L" and these are used in the description. It is to be understood, however, that any other agreed symbols may be used instead of "H" and "L" to designate the range values.

Referring now to the drawings we show in Figs. 1, 2, and 5 the preferred form of the printing unit 10 in which a plurality of type wheel units 11 are employed for printing the numerical value of the quotation, and a special arrangement employing type carrying sectors 12 and 13 for printing H or L, in addition to the numerical characters when such quotation represents a high or low value.

For the purpose of illustrating our invention, we have shown in the drawings three similar type wheel units 11 which are arranged to print the tens, units and fractions digits of the quotation, the hundreds digits being interpolated from familiarity with the items being quoted upon or by referring to the indicator section of the quotation board. The position ordinarily occupied by the hundreds digit will be occupied by the mechanism employed for printing the "H" and "L". This mechanism includes, in its preferred form, the pair of sectors 12 and 13 pivotally mounted on the shaft 14, which shaft also passes through the axis of the type wheels. The sector 12 is arranged to carry the letter "H" on a face formed at the outer end thereof and the sector 13 the letter "L" on a face at the outer end thereof. The sectors are arranged to carry their characters in line with characters on the rim of the type wheels, or in such position that when the sectors are set in printing position, the characters will be on substantially an even line with the characters presented by the type wheels. A pair of operating magnets 15 and 16, one for each sector, are supported at the outer end of a framework 17 and are arranged to swing the type carrying sectors

into and out of printing position. The magnets 15 and 16 each have similar pivotally mounted armatures 18 and 19 joined respectively to arms 21 and 22 extending back toward the axis of the sectors 12 and 13. The sectors have arms 23 and 24 extending from the pivotal axis of the sectors to engage the actuating arm of the respective magnets. The actuating arm of each magnet and the arm of the corresponding sector are operatively connected together by a pin 25 and slot 26 or other suitable connection.

The "H" type character is carried by the sector 12 normally held toward the front of the quotation board when out of printing position and is connected through the arms 23 and 21 to the actuating armature 18 of the upper magnet. The type character "L" is carried by the sector 13 normally held away from the front of the quotation board when it is in non-printing position and is connected through the arms 24 and 22 to the actuating armature 19 of the lower magnet.

The arrangement is such that when one of the magnets is selected, it receives an operating impulse which causes the armature to be drawn inwardly toward the core of the magnet carrying the actuating arm upward or downward, as the case may be, which moves the connected arm projecting from the corresponding type carrying sector with it and rotates the sector about its pivoted axis to bring the same into vertical position presenting the type character on line with the characters of the type wheels. At the outer end of each type sector is a projecting lug or arm 27 which engages a notch 28 in a dog 29 carried by a rack member 31 and held down by a spring 32. The notched dog 29 is arranged to hold the type carrying sector 12 or 13 in a vertical position against the tension of a spring 33 tending to return the actuating arm 21 or 22 to normal position. The dog is arranged to maintain the sector in a vertical position until the rack 31 is moved upward against the tension of the spring 32 allowing the lug 27 to escape. This rack is moved to disengage the dog by the printing mechanism at the end of each printing operation, as will be presently explained.

Any suitable type of type wheel may be employed for printing numerical part of the quotation. For the purpose of illustration, we have shown in Figs. 1, 3, 4 and 5, type wheel units similar to that described and claimed in the copending application of R. Hoover entitled "Stock quotation boards", filed April 3, 1931, Serial No. 527,588, and assigned to The Western Union Telegraph Company. Each unit comprises a framework 35, a type wheel 36 carried at one end of the framework, and an operating magnet 37 carried at the other end of the framework. The type wheel 36 is rotatably supported on a hollow sleeve member 38 ex-

tending between the sides 39 and 41 of the framework. The sleeve member 38 surrounds the shaft or stay rod member 14 extending between the sides 43 and 44 of the printing unit housing. The stay rod 14 also forms the pivotal axis of the special type carrying sectors 12 and 13. A ratchet wheel 45 is mounted co-axially with the type wheel at one side thereof and a control commutator 46 (Fig. 4) with suitably connected brushes 47 and 48 at the other side thereof, both being operatively connected to the type wheel.

Each type wheel has eleven flat faces formed on its rim. Ten of the faces bear the numerical characters 1 to 9 and 0, one of the faces being blank. The type wheel rotates in a counter-clockwise direction as viewed in Fig. 3, and is rotated in a step by step movement produced by means of a pawl arm 57 operated by the actuating magnet 37 and a pair of pallets 52 and 53 carried by the pawl arm which alternately engage the teeth on opposite sides of the ratchet wheel 45.

When it is desired to print from the type wheels, they may be first restored to a predetermined unison position, which is, preferably, with the blank face of the type wheel in printing position, and then set in the correct position for printing the desired character by transmitting to each operating magnet a number of impulses equivalent to the number of the digit which it is desired to print from the corresponding type wheels.

It is obvious that the mechanism as heretofore described for supporting the various characters and moving them into printing position, such mechanism including type wheels bearing the numerical characters and the sectors bearing the letters H and L, will serve equally to bring the desired characters into display position before apertures provided in a display panel as for setting the characters into printing position in a printing unit. To employ the mechanism in a display or indicator unit it would be necessary merely to dispose the special type carrying sectors or bars so that the desired special character will be moved into position before an aperture in a display panel when operated by the proper signal. The type wheels also can be adapted for such use by merely so disposing the commutator and character wheel that when the wheel is set in the unison position of the wheel and the display position of the characters, there will occur suitable apertures in the display panel instead of before the printing platen of the printing unit as hereinafter described.

The quotations are printed on a record tape 54, shown in Figs. 1 and 2. It is preferably a strip of paper of sufficient width to receive the desired number of characters representing the quotation. It may be sup-

plied from a supply roll 55 suitably mounted between the sides of the printing unit housing. From the supply roller it passes over a metering roller 56, thence over an idler roller 57, through an opening or slot 58 to the front of the quotation board. The metering roller and idler roller are arranged to hold a section of the tape 54 in a substantially horizontal position between the printing position of the type characters and the printing mechanism below. At the end of each printing operation control mechanism, which will be presently explained in further detail, permits the metering roller to make one complete revolution.

The metering roller performs two functions with each complete revolution. Its primary function is that of feeding out a suitable length of the record tape after each printing operation and is accomplished by means of the roller being provided with a circumference of a suitable size to feed out the tape until the last quotation imprinted thereon appears in view at the front of the quotation board. The other function of the metering roller is that of lifting the rack 31 to unlock the special type carrying sector arm 27, from the notched dog 29 when either H or L has been printed. This is accomplished by means of a pin 59 carried by the metering roller which strikes the lower end 61 of the rack 31 as the metering roller begins to revolve.

The printing mechanism, referred to above, comprises a series of platen blocks 63 engaged by a universal bar 64 which is in turn secured to the plunger 65 of the solenoid 66 supported on a plate 67 carried by the housing. When the solenoid is actuated the core or plunger raises the universal bar and causes the platens to carry the record tape 54 up against the type characters, which have been set in printing position, and imprint the quotation from the type characters on the tape. After imprinting the quotation on the record tape, the platen and plunger of the solenoid are returned to their normal position by means of a retractable spring 68.

During the return of the plunger 65 to its normal position a series of mechanisms, shown in Figs. 1 and 2, is operated which releases the metering roller and permits it to rotate a complete revolution in response to tension set up in a lower section of the tape by means of the take-up or receiving roller of a winding mechanism not shown. It will be observed, by referring to Fig. 2, that the metering roller is provided at one end with a stop cam 71 which is arranged to permit the metering roller to make only one revolution at a time. The cam has an inclined face portion 72 terminating with a shoulder 74.

A stop arm 75 is provided to rest against the shoulder 74 and restrain the movement of the metering roller against the tension

maintained in the paper tape by a take-up or receiving roller of a winding mechanism not shown. The stop arm is pivotally mounted at 76 on a bracket 77. The lower end of the stop arm extends beyond the pivotal mounting and terminates with an inclined face 78. A shoulder 79 is formed at the inner extremity of the inclined face. A spring 81 holds the stop arm normally in contact with the cam.

A lever 82 is mounted on the bracket 77, pivoted at 83, and is arranged to be actuated by the movement of the solenoid plunger 65 as it carries the platens upward during the operation of printing. The left end of the lever 82 has a pivotally mounted click or dog 84 secured thereto and held against a stop pin 85 by means of a spring 86. The outer end of the dog is arranged to normally rest in the notch or shoulder 79 of the lower end of the stop arm.

Upon an upward movement of the solenoid plunger, the left end of the lever 82 will swing downward and the dog or click 84 will slide off the shoulder 79 and click over into contact with the inclined face 78 of the stop arm. Upon the downward movement of the plunger, the left end of the lever will move upward and, the dog, being now held rigid with respect to the lever by means of the pin 85, will slide up the inclined face of the stop lever and force the same to rotate in a clockwise direction around its pivot point, and cause the upper end to slide outward off the shoulder 74 of the metering roller.

As the stop arm 75 slides off the shoulder 74 the metering roller is released and begins to rotate permitting the tape to move forward and down the front of the quotation board. As the metering rollers rotates the pin 59 comes against the inclined face 61 of the lower portion of the rack 31 and forces the rack 31 upward which simultaneously raises the dog 59 lifting the notched portion thereof from engagement with the arm 27 of such one of the type sectors 12 or 13, as had been set into printing position. As soon as the arm 27 is released one of the retractable springs 33 connecting through the pawl arm of the corresponding type sector magnet swings the sector out of printing position into the position shown in Fig. 2 of the drawings.

As the metering roller 56 continues its revolution the upper end of the stop arm 75 is held in contact with the inclined face 72 of the stop cam and follows the face of the cam as the same rotates with the metering roller until the upper end of the arm is again brought in engagement with the shoulder 74, arresting the metering roller in this position. It will be observed, therefore, that the metering roller is automatically brought into action at the end of each printing operation and performs the two functions as outlined

above, that of unlocking either of the special type carrying sectors 12 or 13 that may have been set into printing position and of permitting, at the same time, a definite predetermined amount of the tape to be fed out toward the front of the quotation board in order to bring the last printed quotation into view.

Referring to Fig. 6, we have shown another embodiment of our invention in which both of the special type characters, H and L, are carried by one sector 90 which takes the place of the two sectors 12 and 13 in the embodiment already described. The sector 90 is provided with two protruding faces, 91 and 92 separated by a recessed portion. Upon the faces 91 and 92 the characters H and L respectively are mounted. At the upper part of the sector 90 are provided two arms 27 which are arranged to engage the notch 28 in the dog 29 as the type character disposed opposite the respective arms is carried into printing position. The type characters are carried into printing position by the cooperating arms 93, on the sector 90, and 94 pivoted at 95 which act to rotate the sector in a clockwise direction to bring the character H into printing position and in a counter-clockwise direction to bring the character L into printing position. The arm 94 is secured at its pivotal axis 95 to an extension 98 of the framework 17, and has the double armature 96—97 formed on its outer end. A pair of magnets 101 and 102 are provided for actuating the armatures 96 and 97 respectively to move the arm 94 up or down. The magnet 101 is arranged to be energized in response to the "high" range signal to attract the armature 96 and carry the arm 94 upward to bring the face 91 bearing the character H into printing position, simultaneously locking the arm 27 in the notch 28. As the arm 94 is moved upward it carries with it the outer end of the leaf spring 103 which bears on its upper side. Upon release of the sector 90 the spring 103, which was carried upward when the sector was set in printing position, will now act to return the arm 94 to its normal or central position. This position is determined by pin 105 set in the framework 17 and arranged so that leaf springs 103 and 104 come to rest on opposite sides of the pin thereby holding the arm 94 in a normal position substantially in alignment with the pin.

A signal impulse received by the magnet 102 will actuate the armature 96 and through the lever 94 act to set the L character on the face 92 of the sector 90 in printing position. To accomplish this the arm 94 swings downward carrying with it the outer end of the leaf spring 104 and rotates the sector 90 in a counter-clockwise direction to a position where the corresponding arm 27 of the sector engages in notch 28 of the dog 29.

At the end of the printing operation which follows the dog 29 will be raised to release the arm 27 and the leaf spring 104 will act to bring the sector 90 again to normal position.

A sequence of operations of the mechanism of the printing unit during the printing of a typical quotation will now be described. As an example of a typical quotation we will choose the quotation shown in Fig. 7 under the stock column A in the third line from the top, which is H27.3. In Fig. 8 the printing mechanism is shown diagrammatically in connection with the portion of the circuit in the system relating particularly to a printing unit such as we have described. The three type wheels employed for printing the ten, units and fractions digits of the quotation are represented by the control commutators 46 in the lower portion of the diagram. The type wheel operating magnets 37 are connected through the commutators by means of brushes 47 and 48. The special type carrying sectors are represented in the diagram by actuating magnets 15 and 16, the magnet 15 representing the H type sector, and the magnet 16 the L type sector.

For setting up the assumed quotation a train of signal impulses comprising three groups are transmitted to the printing unit. In the first group of impulses in the train an impulse will be transmitted to the main high relay 111 which closes the contacts 112 and opens the contacts 113. This connects the plus potential from the line 117 through the normally closed contacts 116 to the high bus line 118. Simultaneously, with the selection of the H relay 111 the stock relay 119 will be closed by other signals in the signal train to close the multi-contact switch 121. The closing of this switch connects the high bus line with the auxiliary H relay 122. The H relay 122 closes the switch contacts 123 and 124. The closing of the contacts 124 establishes a locking circuit through the relay 122 from the battery 125. Through the contacts 123 the H type sector actuating magnet 15 is connected to the line 126. The line 126 is supplied with battery potential from battery 127 through the contacts operated by relay 128 which was actuated by means of battery potential through the contacts of the relay 129, which was supplied with battery potential from battery 120 at the time the multi-contact switch 121 was closed. The battery potential supplied from the battery 127 causes the actuating magnet 15 to bring the type sector 12, carrying the H character, into printing position, in which position it is locked, as heretofore described, until after printing has been effected.

After the selector group of signals has been transmitted the restoration group follows next in the train of signals. Signals from the restoration group are transmitted

from the tens, units and fractions bus lines through the contacts of the multi-contact switch 121 to the actuating magnets 37 of the several type wheels. Each of the type wheels respond to the restoration impulses in a similar manner and, therefore, it will be sufficient to trace the operation of only one of the type wheels. The fractions type wheel will be taken as an example. Let it be assumed that the commutator 46, instead of being in the position shown in Fig. 8 which corresponds to unison or blank position, is in some other position such as shown in Fig. 4. In such a case the inner brush 47 is in contact with the inner conducting segment of commutator and the circuit is completed through the commutator shaft and the grounded wire 131 as shown. Let it be assumed further that the type wheel and commutator are set with the numeral 4 in printing position. The first seven of the ten restoration impulses, comprising the restoration signal group, steps the type wheel around to bring the numerals 5, 6, 7, 8, 9, 0, and the blank portion, successively, into printing position. At the moment the blank portion of the type wheel reaches printing position the inner brush 47 engages inwardly the projecting sector of the outer conducting segment of the commutator 46 which is insulated from the inner grounded segment. The outer segment is ungrounded at this time, the actuating ground not having been applied, and consequently, the ground circuit from the magnet 37 is interrupted and the magnet remains unresponsive during the transmission of the three remaining impulses. The type wheel, therefore, remains set in its unison or blank position at the end of the transmission of the restoration impulses. In like manner the type wheels for printing the tens and units digits will be restored to their respective blank positions from whatever prior position they might have been set, leaving all three type wheels in a corresponding position, or in other words, in a unison position.

The answer group of impulses follows the restoration group to set the type wheels with the proper digits in printing position. However, before the type wheels can be moved from their unison position it is necessary to establish a ground circuit for the magnets. This is accomplished by means of a relay not shown, which connects the wire 134 to the actuating ground or to a grounded contact. This establishes a ground circuit from the magnets through the brushes 47, the outer segments of the commutators 46, and the brushes 48 which are connected to the line 134. Actuating ground is applied just before the answer group of signals are transmitted. As a result, as soon as the answer signals begin the several type wheels will be stepped around by means of the actuating magnets 37. It will be observed by reference to Fig. 8

that each of the magnets is provided with a separate signal channel and that by means of such a provision the required number of answer signal impulses may be transmitted to each type wheel. For each answer signal impulse the type wheel and commutator are stepped around the space of one character. As soon as the type wheels have been stepped through the space of the first character the inner brushes 47 are again brought in contact with the inner grounded segment of the commutators and will thereafter be grounded through the commutator axes and the grounded wire 133.

For setting up our assumed quotation H27.3, three answer impulses are transmitted to the stepping magnet of the fractions type wheel which steps it around to place the digit 3 in printing position. Similarly, seven answer impulses are transmitted to the units type wheel to step it around to place the digit 7 in printing position. Two answer signal impulses are transmitted to the tens type wheel to set the digit 2 in printing position. The H character having been set into printing position by the rotation of the H type character as described above, the printing unit will have been set up to print the assumed quotation.

The printing operation is accomplished by the platen 63 being brought up against the faces of the type characters to simultaneously print all the characters on a suitable paper tape. The actuation of the platen is brought about by means of the completion of a prepared circuit, which takes place upon the release of stock relay 119, accomplished at the end of the transmission of the train of signal impulses. The circuit was prepared at the beginning of the transmission of the quotation when the stock relay 119 closed the multi-contact switch 121, thereby actuating relay 131 by applying battery 132 thereto. The actuation of relay 131 connects its tongue 135 with the line 136 to apply battery 129 through relay 128. When relay 128 is actuated it closes contacts 137 and 138. The closing of the contact 138 establishes a locking circuit from battery 127 through the relay to the ground. The closing of the contacts 137 establishes a ground circuit through the windings of the platen actuating solenoid 66. The other wire leading to the solenoid 66 normally connects through the tongue 135 to battery 129. However, when the relay 131 was actuated and tongue 135 connected with the wire 136, the circuit from the solenoid to the battery was opened. On the other hand, at the end of the transmission of the train of signal impulses when the relay 131 is released, the circuit is reestablished to the battery 129 and, ground having been applied to the other terminal of the windings of the solenoid 66, the solenoid is then actuated to raise the

plunger 65 and bring the platen 63 with the interposed record tape up against the face of the type characters to effect printing. The quotation having been printed the solenoid is deenergized to permit the platen to lower again to its normal position. This is accomplished by interrupting the circuit through the solenoid windings and battery 129. A switch 139 is provided in the holding circuit for the relay 128 and means are provided for the plunger 65 to open the switch and release the relay 128 as the plunger 65 makes its upward stroke. The release of the relay 128 opens the contacts 137 which interrupts the ground circuit to the solenoid, thereby disconnecting the battery 129 and opens the contacts 138 which interrupts the holding circuit of the relay 128 at another point to maintain the circuit open after switch 139 is permitted to close as the solenoid plunger returns to normal position.

The platen having made its upward stroke to imprint the quotation on the tape and returned to normal or rest position, there remains the additional operation of releasing the type sector which was set in printing position by the actuating magnet 15, before the printing unit is in condition for the reception of the next train of signals for posting the succeeding stock quotation. This release is accomplished, as already described, by the action of the metering roller at the end of the printing operation when it is rotated to feed the tape forward to bring the printed quotation into view at the front of the quotation board.

The operation of the printing unit to print a quotation including the special character L, is accomplished substantially in the same manner, as just described in connection with a quotation including the letter H. For printing a quotation including L, the main L relay 114 will be actuated to apply potential from the line 110 through normally closed contacts 113 and contacts 115 closed when the relay was actuated to the low bus line 120. From the low bus line 120 the auxiliary L relay 141 is actuated, applying a locking circuit for the former through contacts 142 and connecting the line 126 through contacts 143 with the actuating magnet 16. As already explained in connection with the actuation of the auxiliary H relay 122, the line 126 has battery potential applied thereto which energizes the actuating magnet 16 to set the L type sector into printing position. The setting up of the type wheels for printing the remaining part of the quotation and the printing operation will be accomplished in the same manner as described in connection with the quotation assumed above.

The quotation of a printing unit embodying the modified form of the special type carrying element shown in Fig. 6, will be identical

tical, so far as the circuit operation is concerned, with that just described in connection with the preferred form of our invention. The actuating magnets 15 and 16 will be replaced by the actuating magnets 101 and 102 shown in Fig. 6, and the operation of these in response to the signal impulses intended to select the proper relays for setting H and L into printing position, will be accomplished substantially as heretofore set forth in connection with the description of this modified form of type carrying element.

It is obvious from the foregoing that the printing unit might be equipped with special sectors carrying the letters "B" and "A" or other symbols to designate "bid" and "ask" quotations. Likewise, special sectors carrying symbols designating or indicating any other information about the quotations can be employed. It is obvious also that the special type sectors need not be limited to one or one pair, but that a printing unit may be equipped with any desired number of special sectors by suitably modifying the structures of the printing unit.

From the foregoing description of our invention it will be observed that we have devised a printing unit arranged to print characters which will designate the "high", "low", "bid" or "ask", or other special quotations as they occur in the stock sales or other commodity reports, and, by this means, enable the printing unit to display other information in addition to the "trend" of a stock or commodity being posted. In this manner quotation boards are rendered more effective and more complete to better enable an observer to associate the immediate trend of stock with the progress of the day's quotations.

Also it will be apparent that, when desirable, the designating characters may be selectively printed as a part of certain quotations which are being posted or the quotations may be printed with the characters omitted.

In addition, it will be apparent that we have devised a printing unit which will set up the whole of the quotation, including the special type character when such is to be printed, and simultaneously print the whole quotation on a record tape, resulting in an extremely rapid mechanism for printing stock quotations.

It is obvious that our invention may be utilized to print any other character having any special significance instead of or in addition to the characters stated heretofore, and it will further be apparent to those skilled in the art that while we have shown our invention as embodied in and applied to a printing unit, the principles set forth might be embodied in a unit utilizing indicator wheels or other means to display the type characters to direct view instead of in printed form.

While we have shown our invention in but two forms, it will be obvious to those skilled in the art that it is not so limited but is susceptible to various other changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereon as are imposed by prior art or as specifically set forth in the appended claims.

We claim as our invention:

1. In an indicator system, the combination of a set of character carriers, including one or more carriers carrying numerical characters and at least one special character carrier, independent means to operate each character carrier in response to electric signal impulses, means to selectively operate the numerical character carriers alone to form an indication or to operate both a numerical character carrier and a special character carrier to form an indication in conjunction with each other.

2. In an electrical indicating system for displaying a series of items of information in response to a series of trains of electric signal impulses embodying signals selectively included in certain trains to indicate additional information regarding special items, the combination of indicator means actuated by successive trains of impulses to display the series of items, and indicator means actuated by the selectively included signals to indicate the additional information.

3. In quotation board systems, a printing unit for printing quotations and embodying in combination, means arranged for printing characters to represent the quantity value of the quotations, and means arranged to selectively print, in connection with certain quotations, one of a plurality of special characters to designate a quality value of the quotations.

4. In quotation board systems, a printing unit for printing successive quotations in consecutive order on a paper tape or other material, said printing unit embodying means including one or more type wheels operable in response to telegraphic signals for printing numerical characters to represent the quantity value of a quotation, and means provided independent of the type wheels and operable in response to special telegraphic signals for selectively printing one of a plurality of special characters designed to designate a quality value of the quotation.

5. In quotation board apparatus for displaying the "open", "high", "low", "last", "bid", "ask", or other special values for the day in connection with the displaying of the quotations of a plurality of commodities, a printing mechanism embodying means for displaying consecutively in printed form the quotations as they occur during the day, and means embodied in the printing mechanism

for selectively printing a character in connection with the printing of the quotations to designate any of the special values as they occur.

5 6. In a quotation board system for displaying a range of values for a plurality of commodities in response to a train of telegraphic signal impulses embodying signals to identify certain values, a printing mechanism, said printing mechanism embodying  
10 means for displaying the values in printed form in consecutive order as they occur during the day, and means responsive to the identifying impulses accompanying the  
15 "high" and "low" values for printing a character along with the value which will indicate whether it is "high" or "low".

7. In quotation board apparatus for displaying the range of values for the day of a  
20 plurality of commodities, a printing mechanism embodying means for displaying consecutively in printed form the values as they occur during the day, and means embodied  
25 in the printing mechanism for selectively printing symbols simultaneously with the printing of the values to designate certain "range" values as they occur.

8. In quotations board systems, a printing unit for printing successive quotations in  
30 consecutive order on a paper tape or other material, said printing unit embodying means including one or more type wheels carrying numerical characters, and operable  
35 in response to telegraphic signals for printing the value of a quotation, and means for supporting various symbols or letter characters independent of the type wheels and  
40 operable in response to special telegraphic signals for selectively printing these symbols to designate the "range" or indicate other information about certain quotations.

9. In a quotation board printing unit having type carrying means to set up quotations to be printed, the combination of an auxiliary  
45 type carrying element arranged to be moved into and out of printing position, a printing mechanism, means to operate the printing mechanism to print each quotation as set up, means to normally hold the auxiliary type  
50 carrying element out of printing position, and electromagnet means operative to bring the auxiliary type carrying element selectively into printing position.

10. In a quotation board printing unit having type carrying means to set up quotations to be printed, the combination of a pair of  
55 auxiliary type carrying elements, a type character carried by each of said elements, a printing mechanism, means to operate the printing mechanism to print each quotation  
60 as set up, means to normally hold the auxiliary type carrying elements out of printing position, and means operative to bring either of the type carrying elements selectively into  
65 printing position.

11. In a quotation board printing unit, one or more type wheels disposed to print the numerical characters of a quotation to be posted, means operable in response to a group of telegraphic signal impulses for rotating  
70 the type wheels into printing position, and means including a movable bar carrying symbols and operable in response to special impulses in the group to selectively print one of the symbols as a range denoting character  
75 in the quotation.

12. In a printing unit for quotation boards, the combination of a type carrying element, two type characters carried by said element, a printing mechanism, means to operate the  
80 printing mechanism, means to normally hold the type carrying element with both of the type characters out of printing position, and means selectively operative to effect the setting of either of the type characters in printing  
85 position during certain operations of the printing mechanism.

13. In a quotation board printing unit for displaying successive quotations in response to corresponding trains of impulses, the combination of one or more type wheels disposed  
90 to print the numerical digits of the quotation, means operable in response to each train of impulses for rotating the type wheels into printing position, a pair of movable bars each  
95 carrying a character thereon and each disposed to print the character thereon as a range denoting part of the quotation, and independent means associated with each of the bars selectively operable in response to  
100 signal impulses optionally included in the signal train to cause a predetermined one of the bars to print the character thereon.

14. In a printing unit, a pivotally mounted type carrying member, a type character carried by said member, said type carrying member being operable to move the type character  
105 into printing position, means to normally hold the member with the type character out of printing position, means responsive to telegraphic signal impulses to set the type member with the type character into printing  
110 position, means to effect printing, and means operative after the printing operation to release the type member and permit the same to return to normal position.  
115

15. In a quotation board printing unit, one or more type wheels carrying numeral type characters, means independently associated with each type wheel and responsive  
120 to a train of quotation transmitting signals for rotating the type wheels to selectively bring characters into printing position, a pivotally mounted sector normally out of printing position and carrying range denoting  
125 characters operable to present any one of the characters in printing position, actuating means associated with the sector operable in response to certain impulses in the train to selectively set the bar with a pre-  
130

determined range denoting character in printing position, means to effect printing, and means initiated by the printing operation to restore the sector to normal position.

16. In a quotation board printing unit, one or more type wheels carrying numeral type characters, means independently associated with each type wheel and responsive to a group of quotation transmitting signals for rotating the type wheels to bring selected characters into printing position, a pair of pivotally mounted sectors each carrying a range denoting character and each being pivotally mounted and arranged to be independently set into printing position, means to normally hold them out of printing position, and actuating means associated with each sector operable in response to certain signal impulses in the group to selectively set either of the sectors in printing position, means to effect printing, and means initiated upon completion of the printing operation to release the sector and permit it to return to normal position.

17. In a quotation board printing unit, operable in response to a train of telegraphic signal impulses to print a quotation, means for supporting a special type character adapted to be printed as a part of the quotation in such a manner that the same may be set into and out of printing position, means for holding the type character normally out of printing position, means operable in response to one of a predetermined set of selective signal impulses which may be included optionally in the impulse train for setting the type character into printing position, means to effect printing, and means to release the type character from its printing position and permit the same to return to its normal position.

18. In a quotation board printing unit, operable in response to a train of telegraphic signal impulses to print a quotation, means for supporting a plurality of special type characters adapted to be printed optionally as a part of the quotation, means for setting any one of the special type characters into printing position, means for holding the type characters in a normal non-printing position, means cooperating with each special type character for operating the setting means in response to one of a set of selective signal impulses which may be included optionally in the signal train, means to effect printing, and means to release the type characters from printing position and permit the same to return to normal position.

19. In a printing unit, a pair of pivotally mounted type carrying members each carrying a special type character, said members being operable to be set into printing position, means to normally hold the type characters in a non-printing position, means associated with each type carrying member selectively responsive to telegraphic signal impulses to

set the type members into printing position, means to lock the type members as they are set in printing position, means to effect printing, and means initiated upon completion of the printing operation to release the type carrying members and permit the same to return to normal position.

20. In a printing unit for quotation boards, the combination of a type carrying element, a printing mechanism, means to operate the printing mechanism, retractable means to normally hold the type carrying element out of printing position, an electro-magnet operative by a selecting current pulse to set the type carrying element into printing position, means to lock the type carrying element against said retractable means independently of said selecting current pulse and maintain the same in printing position during the period in which printing is effected, and means initiated at the end of the printing operation to unlock the type carrying element and to permit the same to return to normal position.

21. In a printing unit quotation board, the combination of a pair of pivotally mounted type carrying elements, a printing mechanism, means to operate the printing mechanism to effect printing, independent retractable means to hold each of the type carrying elements in a normal non-printing position, an electro-magnet operatively connected with each type carrying element to set the same in printing position in response to signal impulses selectively included in a group of signal impulses adapted to operate the printing mechanism, means brought into engagement with each type carrying element as it is set into printing position for maintaining the same in position during the operation of the printing mechanism, and means to unlock the locking means upon completion of the operation of the printing mechanism for permitting the retractable means to return the type carrying elements to normal position.

22. In quotation board systems, a printing unit for printing quotations and embodying, in combination, means arranged for printing characters to represent the value of the quotations, and means arranged to selectively print, in connection with certain quotations, one of a plurality of special characters to indicate additional information concerning the quotation.

23. In a printing unit for quotation boards, the combination of an element carrying one or more special type characters, a printing mechanism, means to operate the printing mechanism, means to normally set the type carrying element and printing mechanism out of printing relation with each other, means operative during certain printing operations to set the type carrying element and printing mechanism into printing relation

to print a special type character, and means operative to automatically reset said element and said mechanism out of printing relation before the next printing operation.

5 24. In a printing unit for quotation boards, the combination of a type carrying bar, a type character carried by said bar, a printing mechanism, means to operate the printing mechanism, means to normally hold  
10 the type carrying bar with the type character out of printing position, means selectively operative to effect the setting of the type character into printing position during certain printing operations, and means for  
15 automatically returning the type character to its out of printing position after printing therefrom has been effected.

25 25. In an electrical indicating system, the combination of a printing unit embodying a set of type carrying elements, including one  
20 or more type wheels carrying at their periphery a series of regular type characters, and a special element carrying one or more special type characters, electro-magnetic means for operating each of said type elements, circuit closing means for rendering  
25 the operating means responsive to certain "restoration" impulses in a train of signal impulses to operate the type wheels, circuit  
30 interrupting means for controlling the response of the operating means to stop the type wheels carrying the regular characters in a predetermined unison position, control means operable in response to impulses selectively included in the train for causing  
35 the operating means of the special type carrying units to move the same to a position displaying a predetermined special type character, means operable to render the operating means of the regular character type  
40 wheels responsive to answer impulses in the signal train for advancing them to a position which will display predetermined regular type characters, and means for rendering the  
45 special type carrying elements unresponsive to the answer group of impulses.

26. In a printing unit for quotation boards, a main type carrying element, an auxiliary type carrying element, a platen,  
50 means for invariably bringing the platen against the main type carrying element and means for effecting engagement of the platen with the auxiliary type carrying element during selected printing strokes.

55 In testimony whereof we affix our signatures.

RAY HOOVER.  
EVAN R. WHEELER.