

Feb. 9, 1932.

L. L. RUSTAD ET AL

1,844,686

APPARATUS FOR RECORDING ELECTRICALLY TRANSMITTED SIGNALS

Filed March 1, 1929

11 Sheets-Sheet 1

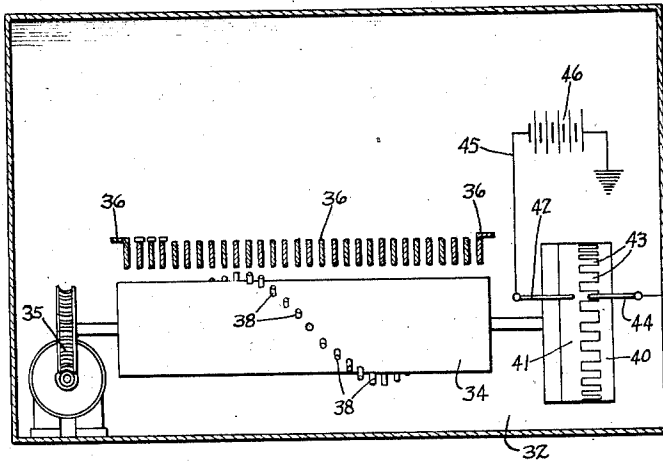


FIG. 1

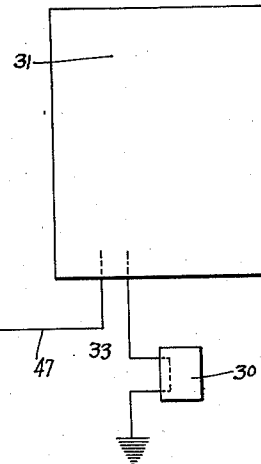
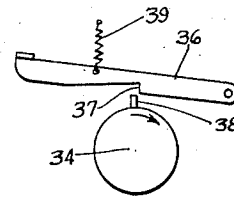


FIG. 3

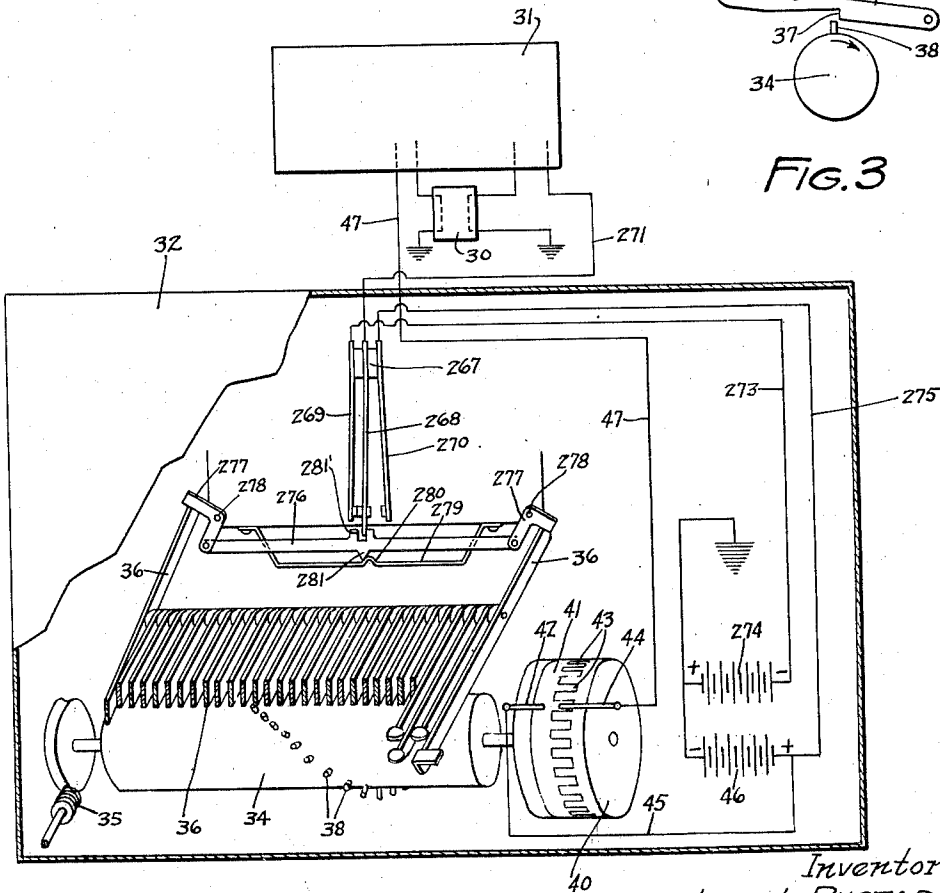


FIG. 2

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11 Sheets-Sheet 2

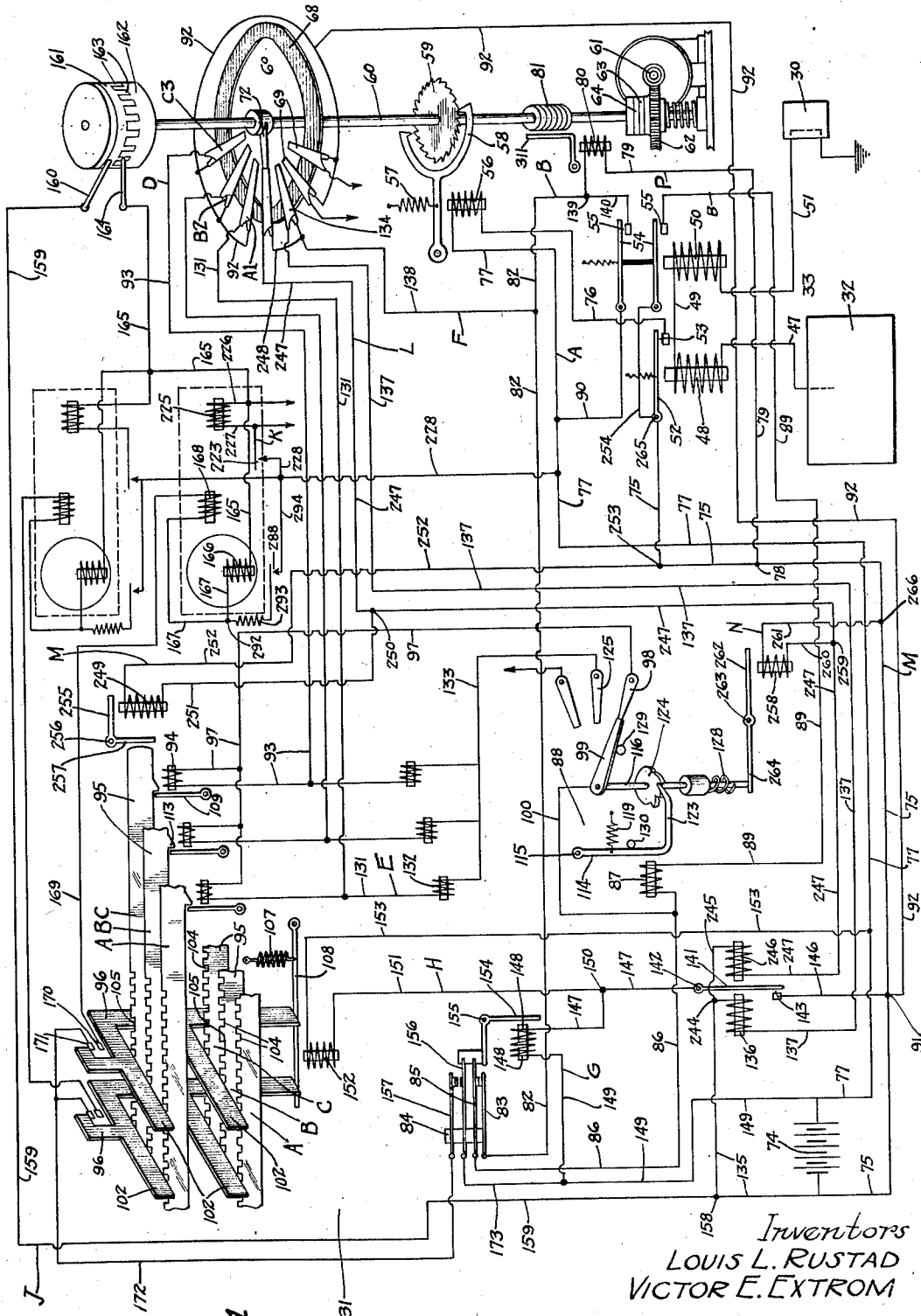


FIG. 4

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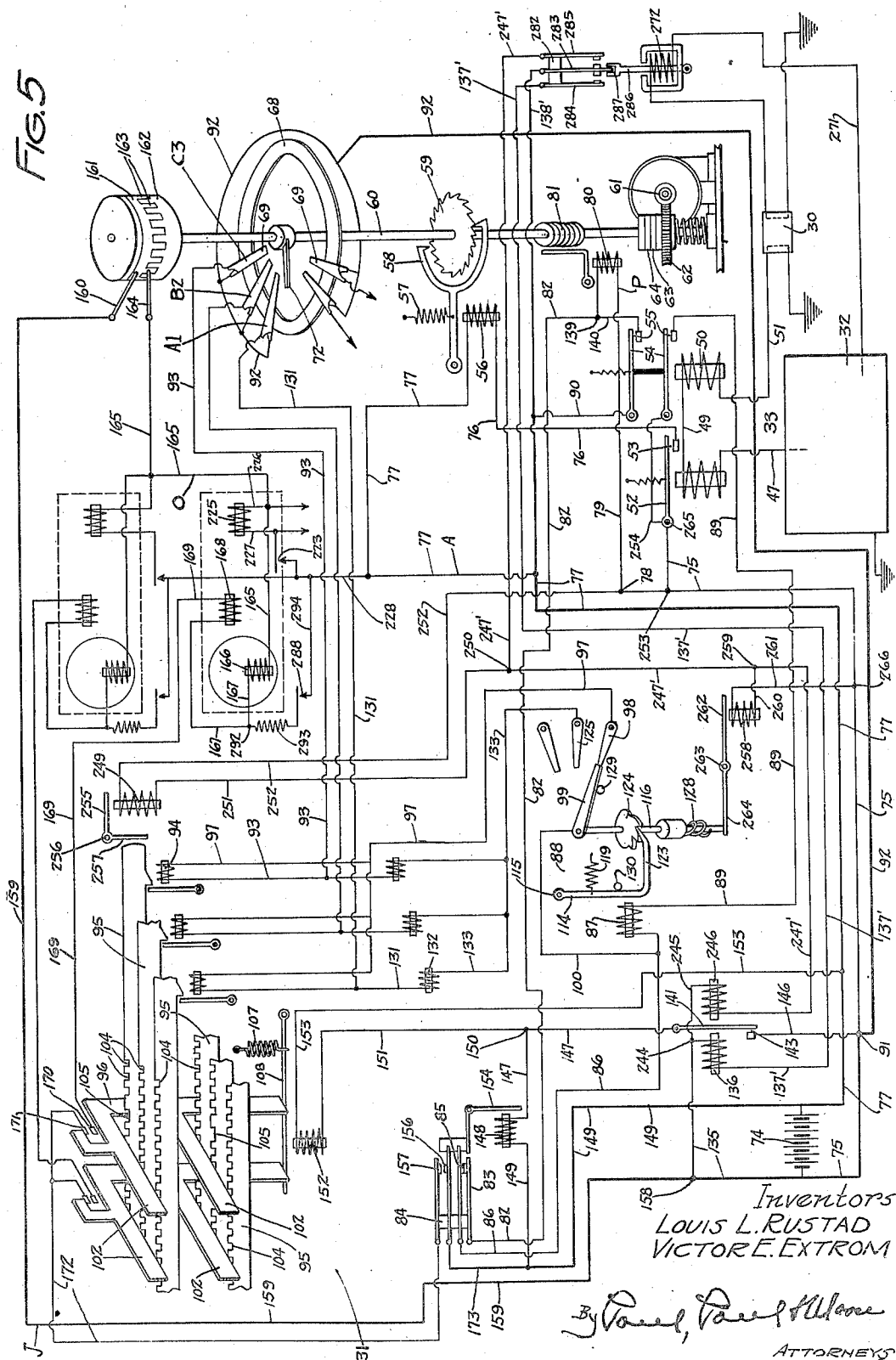
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NEW YORK STOCK											
STOCK O H L						STOCK O H L					
ABITIBI	43	45	41			41 42 1/4 41	CA	27	35	26	32 31
ADAMS EX.	341	351	341			345 346					
ATLAS	11	12	11			11 1/2 11 12 11 1/2 11 1/8					
BARKER	30	30	29			29 1/2					
BEACON	22	23	21								
CITY S	105	107	105								
DEERE	124	127	121								
ERIE R	56	58	54								
FISK R	11	13	11								
GEN. ML	87	88	86			102 102 1/2 103 102					
GEN. MO.	82	83	80			80					
HOWE	68	69	67			68					
HAVANA											
LEHIGH											
MAYTAG											
NATIONL											
OTIS											
RADIO											
REOM.											
U.S. ST.											

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FIG. 6

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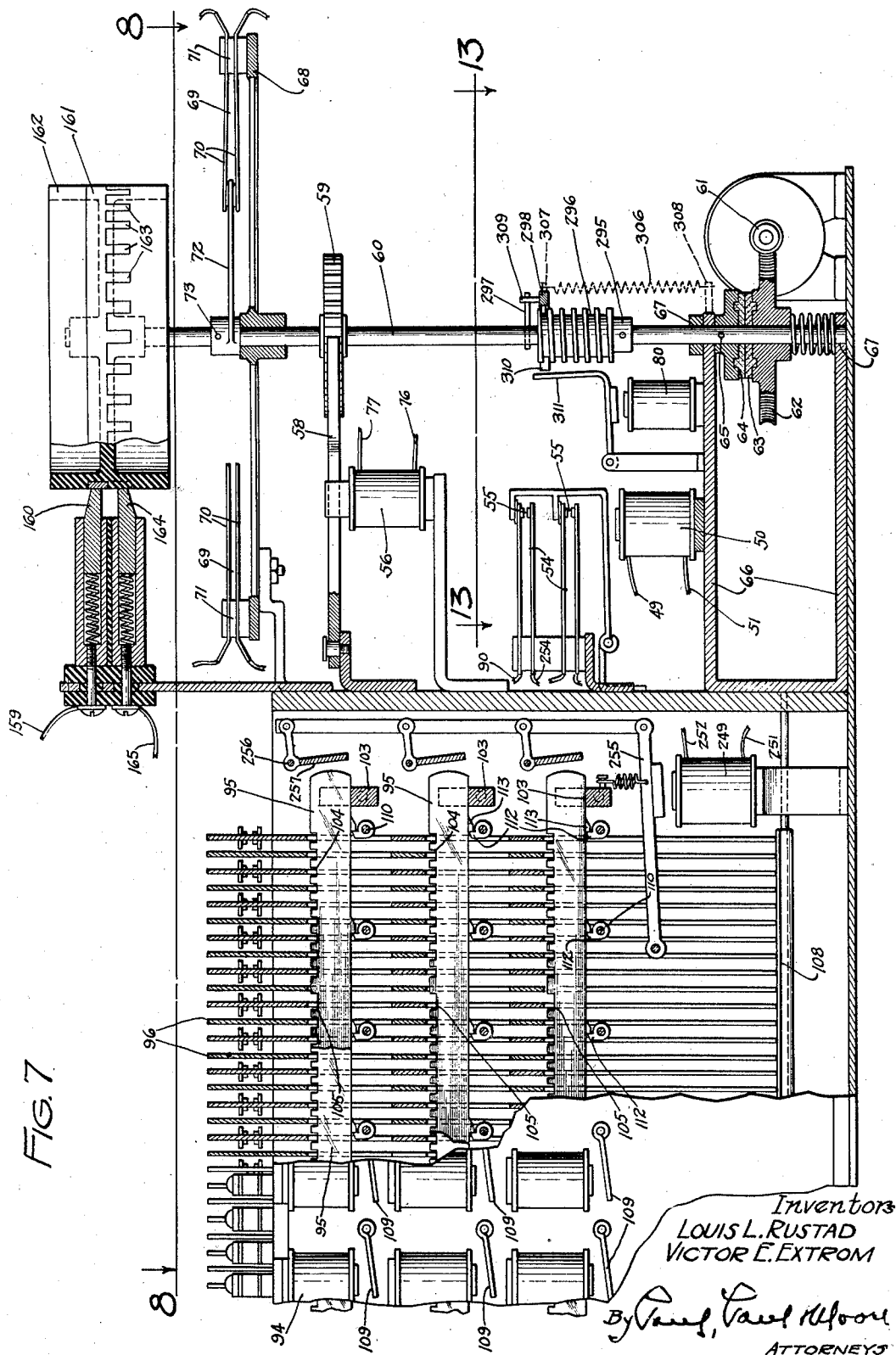
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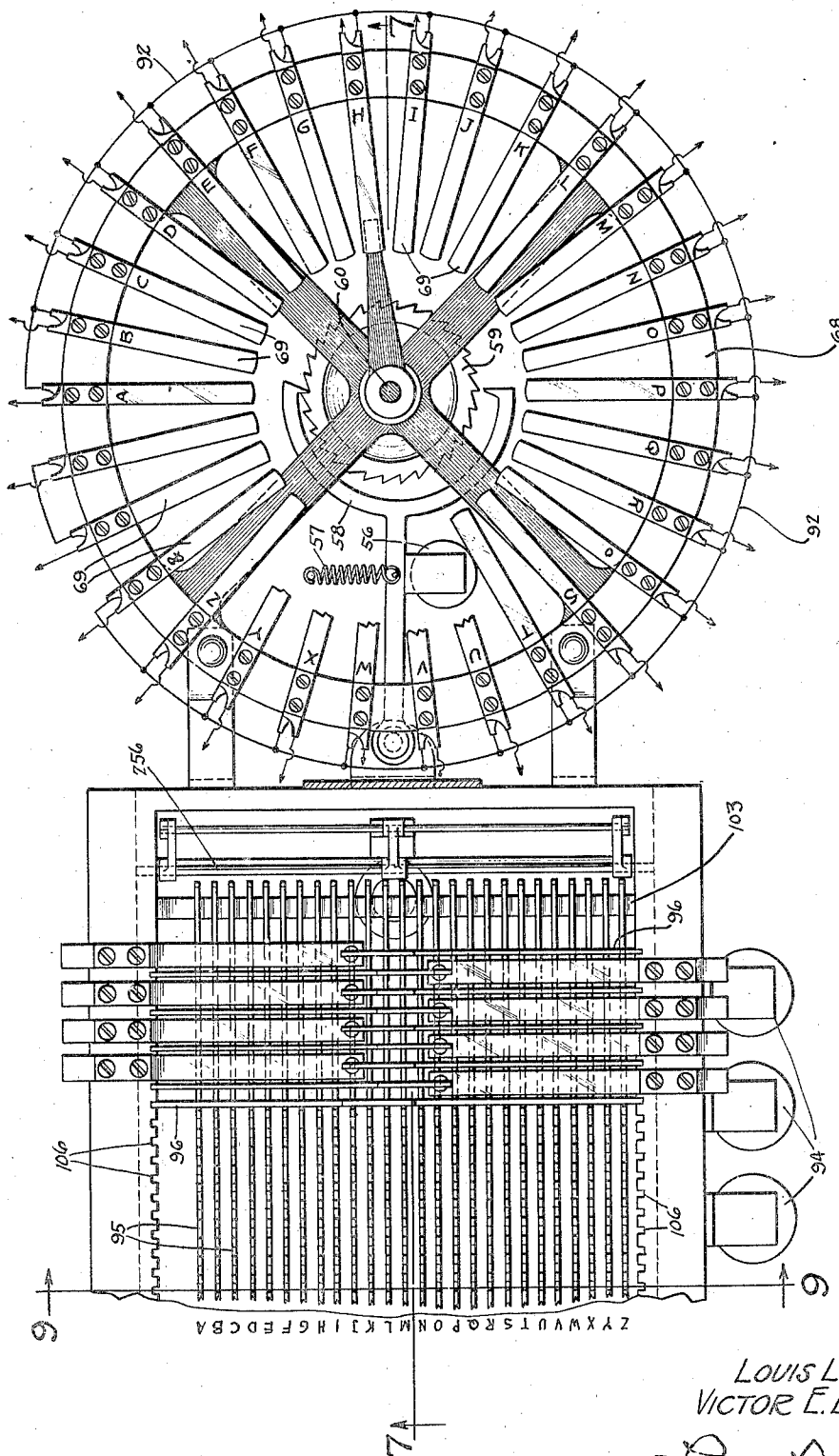
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APPARATUS FOR RECORDING ELECTRICALLY TRANSMITTED SIGNALS

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11 Sheets-Sheet 6



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Filed March 1, 1929

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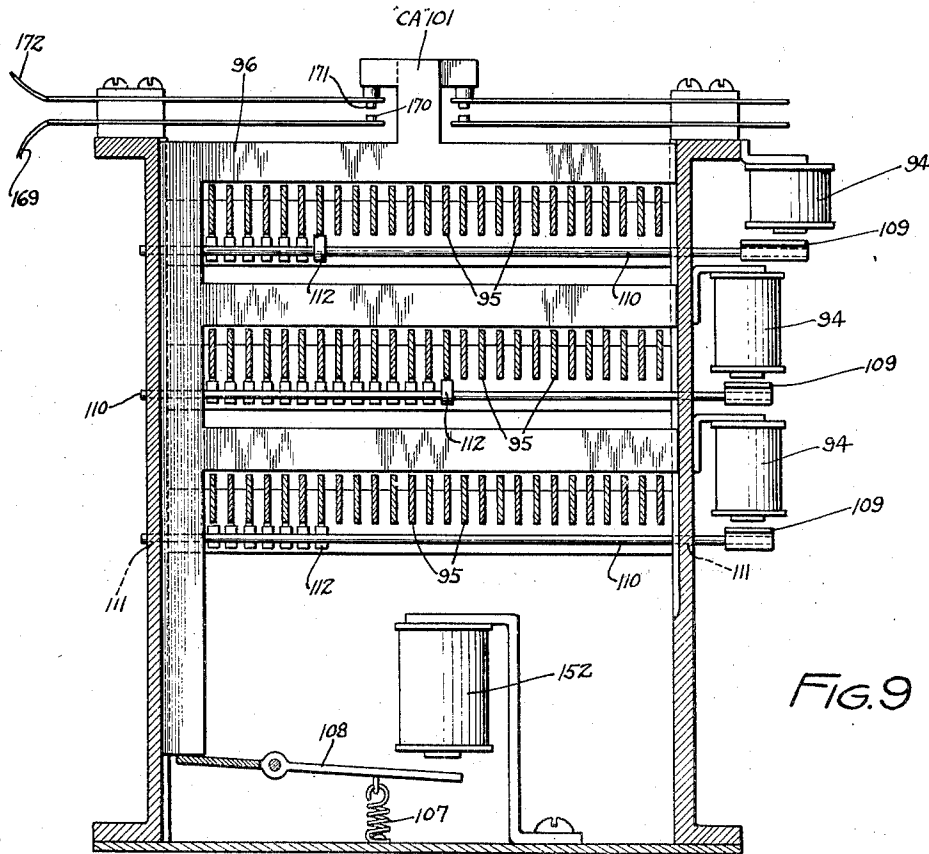


FIG. 9

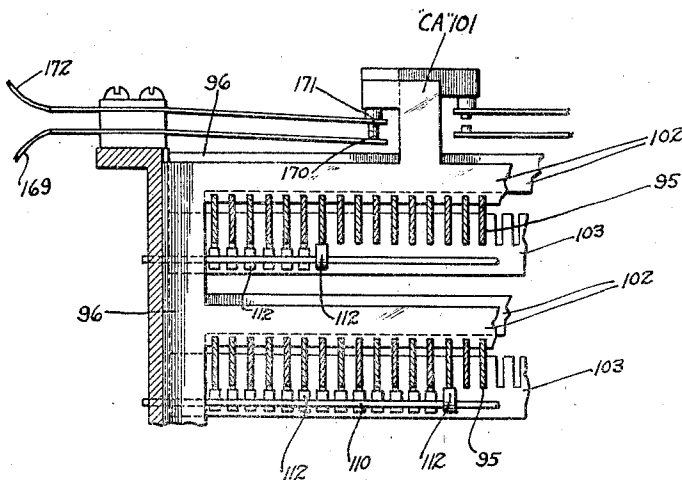


FIG. 10

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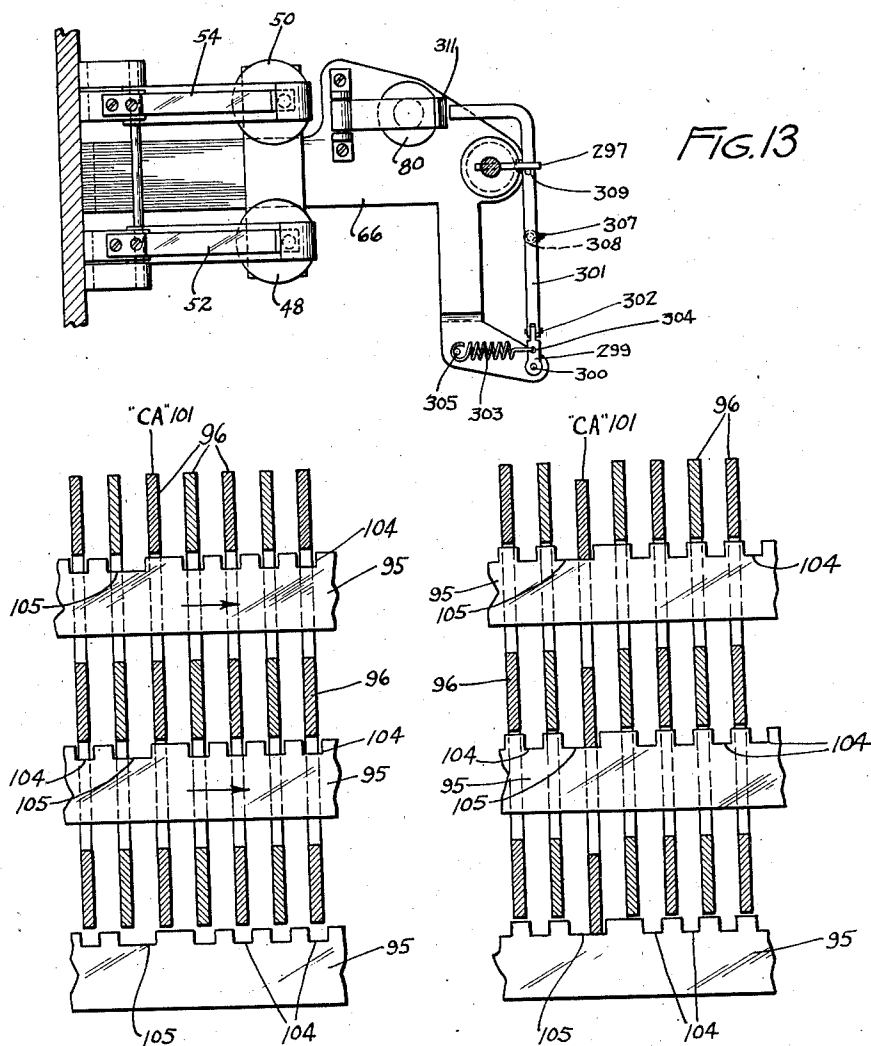


FIG. 11

FIG. 12

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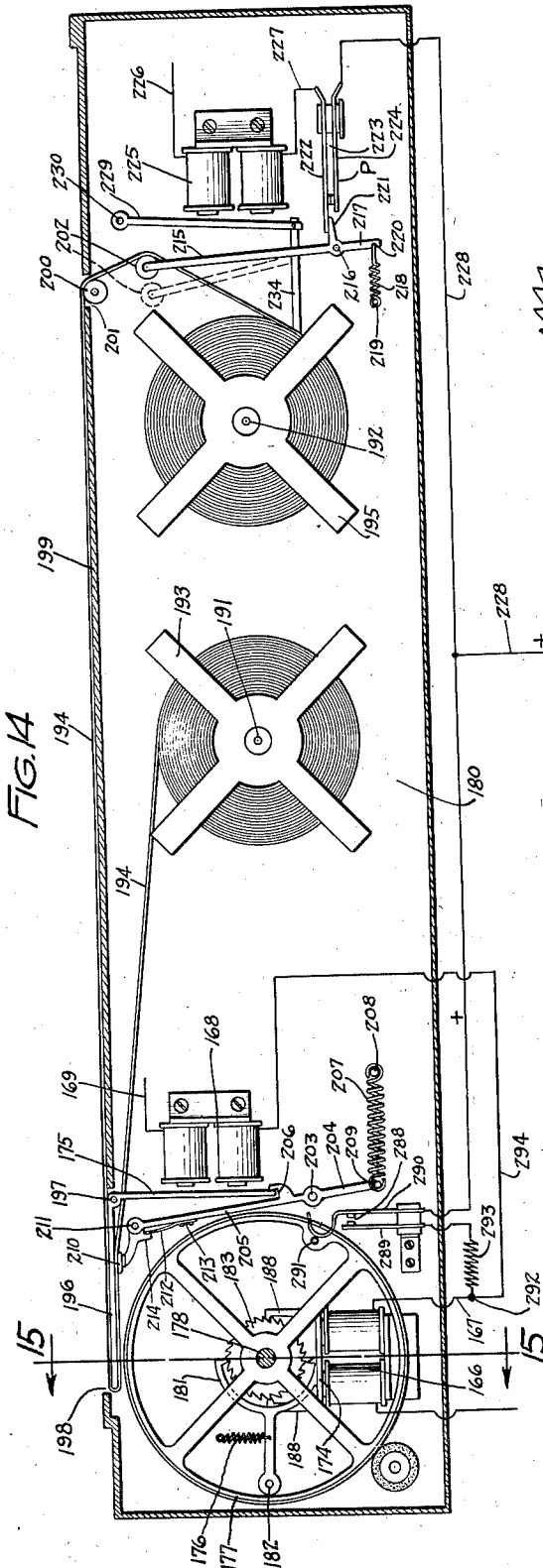


FIG. 14

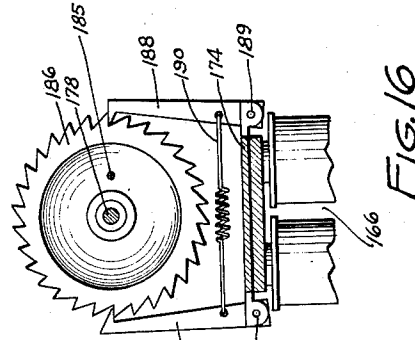


FIG. 16

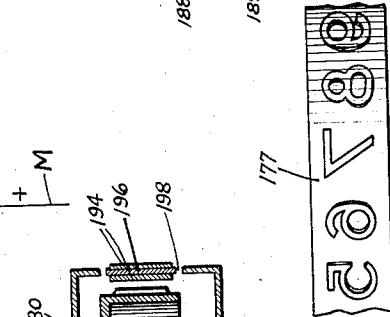


FIG. 17

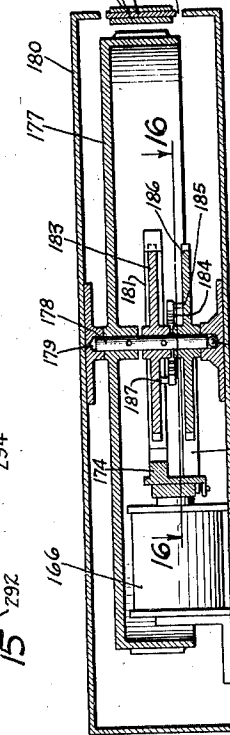


FIG. 18

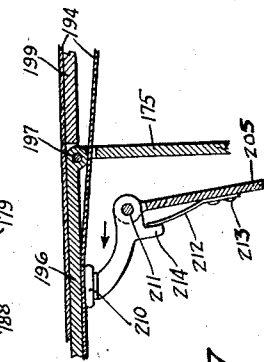


FIG. 19

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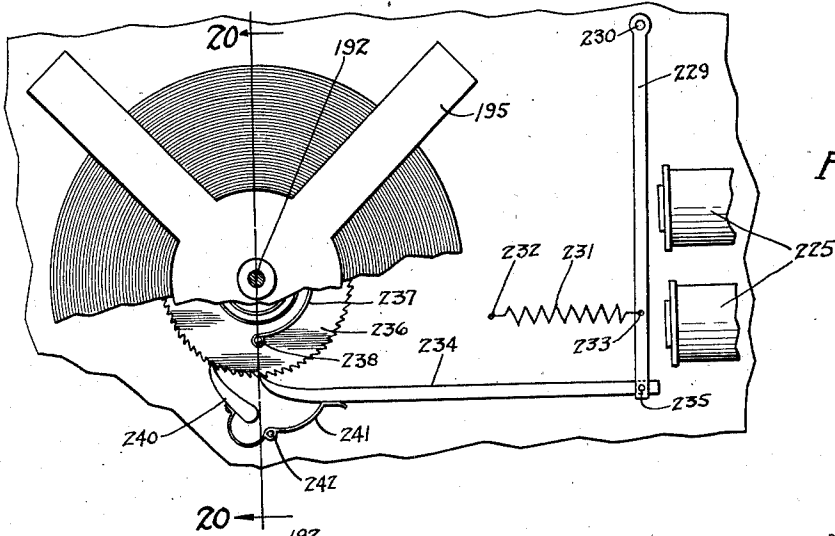


FIG. 19

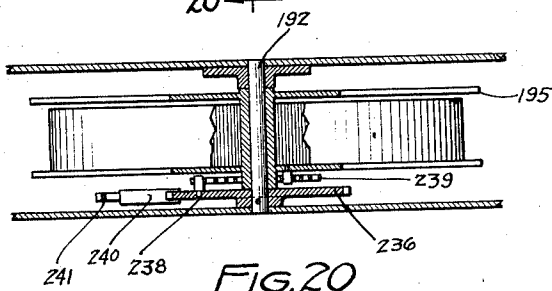


FIG. 20

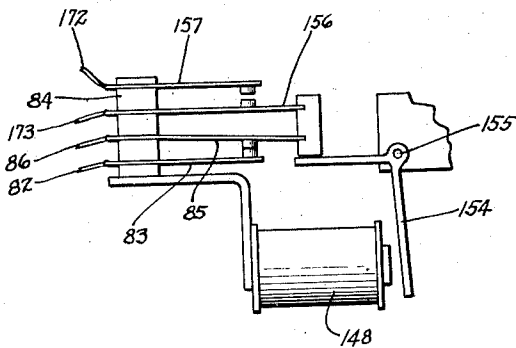


FIG. 21

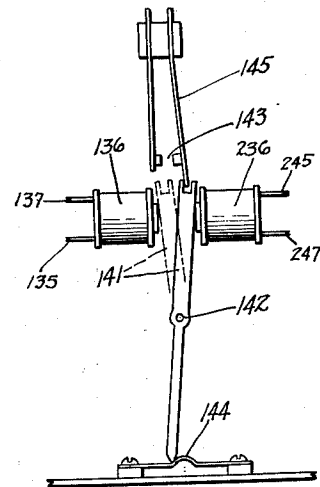


FIG. 22

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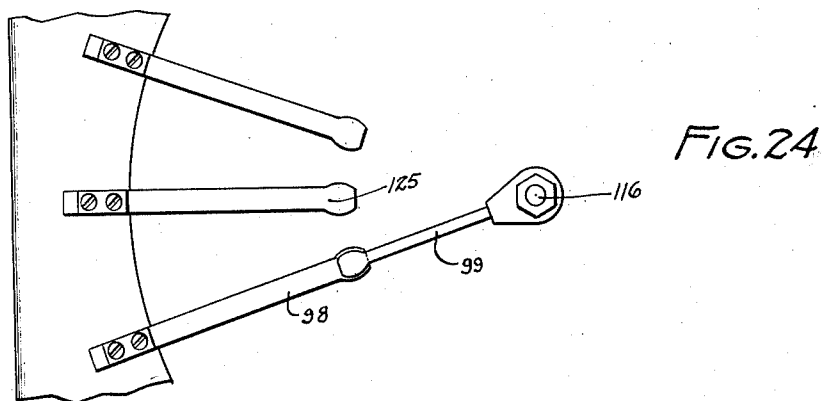
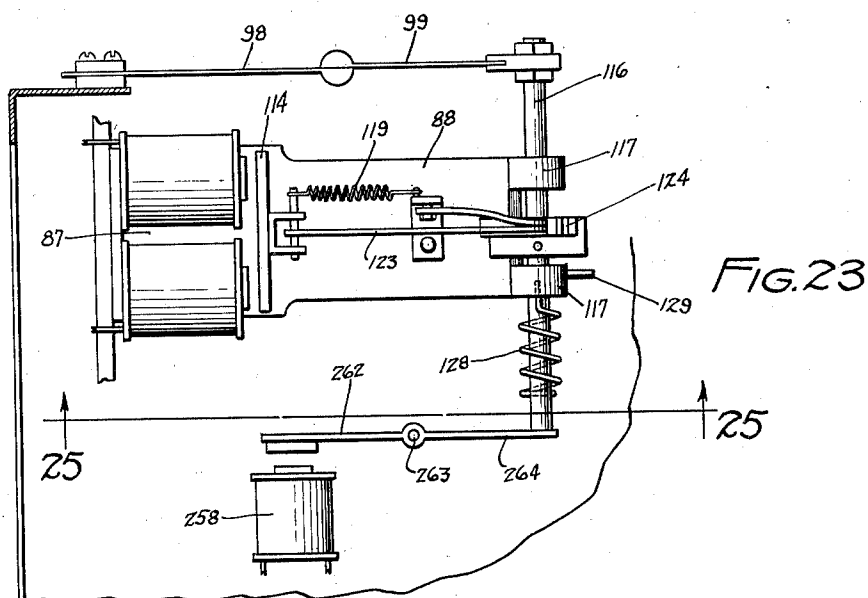
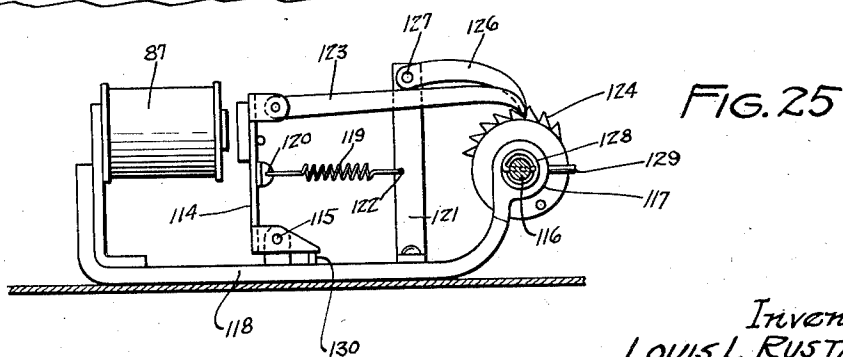
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11 Sheets-Sheet 11



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APPARATUS FOR RECORDING ELECTRICALLY TRANSMITTED SIGNALS

Application filed March 1, 1929. Serial No. 343,806.

This invention relates to an apparatus adapted to receive electrically transmitted signals and to transform such signals into visible, intelligible and permanent form, and the invention has reference to an apparatus which may be used for various purposes, but which is more particularly adapted to the purpose of posting stock-market quotations, as received at a broker's office, opposite the respective stocks on a "board" which may be similar in general appearance to the blackboards now in common use.

A system now in vogue of receiving and publishing stock-market quotations employs an electrical printing device known as a "ticker" which records the incoming signals on a tape or narrow ribbon of paper; this paper tape usually being torn off as it issues from the "ticker" and the abbreviated quotations on the tape being subsequently written on a large blackboard opposite the names of the corresponding stocks.

An object of the present invention is to provide an apparatus for selecting individual quotations or items of information from a group of quotations or items of information successively signalled electrically, and for posting each separate quotation or item of information selected opposite an appropriately designated stock or heading to which the said selected quotation or item of information relates.

A further object is to provide an apparatus for selecting stock-market quotations as received at a broker's office, and for posting each selected quotation upon a "ticker board" opposite a designated stock to which the selected quotation relates.

A still further object is to provide an apparatus of the present character wherein will be incorporated novel and improved features and characteristics of construction designed to render the apparatus efficient, dependable and satisfactory in the performance of its several intended functions.

Other objects and advantages of the invention will become apparent as the full description thereof proceeds, it being understood that the disclosure herein is merely illustrative of the principles of the invention and

is meant in no way in a limiting sense, changes in details of construction and arrangement of parts being permissible so long as within the spirit of the invention and the scope of the claims which follow.

In the accompanying drawings forming a part of this specification,

Fig. 1 is a diagrammatic view showing a "ticker", an apparatus having the features of the invention, so much of an instrument for electrically transmitting signals to the "ticker" and apparatus as is necessary to a full understanding of our invention, and wiring connections from said instrument to said "ticker" and apparatus;

Fig. 2 is a diagrammatic view corresponding generally with the disclosure of Fig. 1, but showing an apparatus of variant form made in accordance with the invention designed to be responsive to the modified type of sending instrument illustrated;

Fig. 3 is a detail view disclosing a manner in which a lever bar in Fig. 1 or Fig. 2 can be depressed to stop the rotation of the cylinder of the sending instrument;

Fig. 4 is a diagrammatic view detailing the improved apparatus of Fig. 1 and showing the relation of said apparatus to the sending instrument and the "ticker";

Fig. 5 is a diagrammatic view detailing the improved apparatus of Fig. 2 and showing the relation of said apparatus to the sending instrument and the "ticker";

Fig. 6 is a front elevational view of a board for posting stock-market quotations;

Fig. 7 is a vertical longitudinal sectional view of the main selecting mechanism of the apparatus taken as on line 7—7 in Fig. 8;

Fig. 8 is a horizontal sectional view taken as on line 8—8 in Fig. 7;

Fig. 9 is a vertical transverse sectional view taken as on line 9—9 in Fig. 8;

Fig. 10 is a fragmentary sectional view corresponding with the disclosure of Fig. 9, but showing a tumbler as having dropped to close the printing unit or number circuit.

Fig. 11 is a fragmentary sectional view detailing keys and tumblers, disclosing all of the tumblers in elevated position;

Fig. 12 is a view similar to Fig. 11, but dis-

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closing the keys actuated to allow a tumbler to fall to close the printing unit or number circuit, the said tumbler being shown as having dropped;

5 Fig. 13 is a sectional view taken as on line 13—13 in Fig. 7, detailing the rectifying device of the apparatus;

Fig. 14 is a longitudinal sectional view detailing a printing unit of the apparatus;

10 Fig. 15 is an enlarged sectional view taken as on line 15—15 in Fig. 14;

Fig. 16 is a sectional view taken as on line 16—16 in Fig. 15;

15 Fig. 17 is a detail view of the feed for the printing unit tape;

Fig. 18 is a detail view of the printing wheel;

Fig. 19 is a detail view of the device for taking up slack in the printing unit tape;

20 Fig. 20 is a sectional view taken as on line 20—20 in Fig. 19;

Fig. 21 is a detail view of the switch for controlling the secondary selector;

25 Fig. 22 is a detail view of the switch for controlling the switch just mentioned and for also controlling the drop and elevation of the tumblers;

Fig. 23 is an elevational view detailing the group switch of the apparatus;

30 Fig. 24 is a plan view of said group switch; and

Fig. 25 is a sectional view taken as on line 25—25 in Fig. 23.

35 The selecting and posting apparatus of the present invention is as disclosed dependent in its operation upon the reception of both temporarily continuous and rapidly varying flows of electric current by the apparatus, and comprises mechanisms some of which are
40 responsive in the performance of their functions to rapidly varying current flow and others of which are responsive only to temporarily continuous current flow.

45 Speaking generally, our invention contemplates the assembly in operative relation to each other, of an instrument for transmitting electrical signals, as for example, to an ordinary "ticker", including means for at times
50 emitting temporarily continuous flows of electric current and for at times producing rapid variations in the flow of current, and an apparatus which will be responsive to said temporarily continuous and rapidly varying
55 flows of current and which will operate in synchronism with the said instrument to both select a quotation or other item of information from a group of successively transmitted quotations or items of information and cause
60 the selected quotation or item of information to be posted opposite an appropriately designated stock or other heading.

65 In Figs. 1, 3 and 4 we have disclosed a "ticker" 30, an apparatus 31 having the principles of our invention, an instrument 32 for electrically transmitting signals to the "tick-

er" and apparatus, and wiring connections 33 from said instrument to said "ticker" and apparatus.

The instrument 32 for electrically transmitting signals is illustrated in a more or less
70 conventional manner. It may include a rotatable cylinder 34 driven in any suitable manner, as at 35, and key levers 36 each having a shoulder 37 adapted to engage a pin 38 upon the cylinder when the key lever is de-
75 pressed, as when actually sending a signal, to stop the rotation of the cylinder. Any convenient arrangement (not necessary to be disclosed) may be utilized to release the pin from the shoulder, or otherwise allow the cylinder
80 to advance, after each signal is transmitted and before the key levers are released to be returned to their normal or elevated positions, as by a coil spring 39 attached to each key lever and supported by a fixed part of the
85 instrument. Each pin 38 has a predetermined relation to all of the other pins upon the cylinder and to its corresponding key lever so that when the cylinder is released from a key lever the said cylinder will rotate a
90 predetermined distance before again being stopped by the next selected key lever. A dial 40 rotatable with the cylinder 34 has a surface including a circumferential contact
95 portion 41 continuously wiped by a contact 42 as the dial rotates, and uniformly spaced apart contact portions 43 intermittently wiped by a contact 44 as said dial advances, there being a contact portion 43 for each key
100 lever 36, and hence corresponding to each signal to be electrically transmitted by the instrument 32. A wire 45 leading from the contact 42 connects with a battery 46 which is grounded as shown, and a wire 47 leading
105 from the contact 44 connects with the apparatus 31. When a signal is being transmitted, the cylinder 34 being in stationary position at this time, the contacts 42 and 44 are in electrical connection as shown in Fig. 1, and the instrument 32 transmits what we choose
110 to term a temporarily continuous flow of electricity to the apparatus. When the cylinder is rotating between signals so that the contact 44 intermittently wipes over the spaced
115 apart contact portions 43, the instrument is producing rapid variations in the flow of current to the apparatus. A key lever at each end of the group of key levers 36 may be for the purpose of shifting to letters or shifting to numbers, in which event each contact por-
120 tion 43 would correspond to a different letter character when the shift-to-letters key lever was in operative position, and would correspond to a different number character when the shift-to-numbers key lever was in opera-
125 tive position. That is to say, the group of key levers, excepting the end levers, would be set up to transmit one set of characters when the shift-to-letters key lever was operative and a different set of characters when
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the shift-to-numbers key lever was operative. In either event, the corresponding contact portion 43 is opposite the contact 44 at the time the intended signal is transmitted and a temporarily continuous flow of electricity is being emitted by the apparatus, and while the said contact portion 43 is reaching its proper position, the contact 44 wipes over a predetermined number of contact portions 43 corresponding to the distance through which the cylinder 34 is required to be rotated from its position at the time the shift-to-letters or to numbers is made, until stopped by the next selected key lever, to thus produce a number of rapid variations in the flow of current equal to the number of spaces between the contact portions 43 passed over, corresponding to the letter or number spaces through which the cylinder 34 is rotated. The apparatus 31 includes mechanism responsive to the temporarily continuous flows of current from the instrument 32 for posting or recording characters corresponding to the signals transmitted by said instrument, and also includes mechanism, which operates in synchronism with the dial 40, responsive to the temporarily continuous flows of current and to the rapid variations in the flow of current from the instrument, to select the said character to be posted or recorded. In other words the mechanism of said apparatus which is responsive in the performance of its functions to the temporarily continuous flows of current and to the rapid variations in the flow of current is caused to operate in synchronism with the movements of said dial 40 in order that a character to be posted or recorded will have reached its proper location when the corresponding contact portion 43 becomes positioned at the contact 44, and in order that the temporarily continuous flow of current occurring at this time can cause the mechanism responsive to the temporarily continuous flows of current to post or record the said character.

While we have disclosed an instrument for electrically transmitting signals which contemplates rapid variations in current flow, temporarily continuous current flows, and periods or intervals between the mentioned flows of current when the instrument is transmitting no current to the apparatus, it is here called to attention that the variations in current flow at the sending instrument for operating our apparatus could be between (what may be termed) a maximum voltage capable of producing a temporarily continuous flow of current or a rapidly varying flow of current, and (what may be termed) a minimum voltage, of insufficient capacity to operate the apparatus.

The apparatus 31 (Fig. 4) includes a magnet 48 with which the lead wire 47 connects, a lead wire 49 extending from said magnet 48

to a magnet 50, and a ground lead wire 51 which may connect with the ticker 30.

The magnet 48 is so constructed that its armature 52 responds to the rapid variations of current at the instrument 32 to cause the switch 53 in the circuit A to close and open with each rapid variation of current at said instrument, while the magnet 50 is so constructed that its armatures 54 do not respond to the rapid variations of current but only act to cause the switches 55 in the circuit B to close when the rapid variations cease and a temporarily continuous current flows, the said magnet 50 releasing its armatures and thus allowing the switches 55 to open when temporarily continuous current flow ceases and rapidly varying current flow is resumed.

The circuit A may include a magnet 56 co-operating with a coil spring 57 to operate an escapement lever 58. This escapement lever controls the rotation of a toothed wheel 59 which is keyed to a shaft 60, said shaft being rotated, when not prevented from rotating by engagement of the escapement lever with the toothed wheel, by means of a suitably driven worm 61 engaging a worm wheel 62 freely mounted upon said shaft and fixedly carrying a friction disc 63 yieldably engaging a similar friction disc 64 fixed to the shaft as at 65. The shaft 60 may be mounted in a support 66 in any suitable manner, as indicated at 67 in Fig. 7.

A selecting dial 68 supported upon the frame contains contact units 69 each corresponding to a single letter, number, or other character, arranged in definite standardized order corresponding with the order as in the transmitting instrument 32, and each tooth on the wheel 59 has correspondence to a certain contact unit 69. As disclosed more clearly in Fig. 7, each contact unit 69 consists of inwardly extending, spaced apart contact arms 70 fixed upon the dial and insulated therefrom and from each other as at 71, and a rotatable contact bar 72 fixed upon the shaft 60 as at 73 is adapted to wipe between said arms 70 to electrically connect them to each other.

Suppose, for example, that a quotation or item of information has just been selected and posted, that the shift-to-letters key lever of the instrument 32 has been operated so that the contact bar 72 is at the point as indicated in Fig. 4, corresponding to the shift-to-letters position of the transmitting instrument, and that the apparatus is ready to begin selecting a new series of characters, which are CA 31. Upon rotation of the cylinder 34 away from its shift-to-letters position, the current of the transmitting instrument varies rapidly as the contact portions 43 and the spaces therebetween pass under the contact 44. Suppose the key lever corresponding with the letter C is now de-

pressed and the cylinder 34 rotates through three letter spaces until stopped by engagement of the shoulder of said key lever with the pin 38 on said cylinder corresponding with the letter C. This will, evidently, cause three rapid variations of current at the sending instrument, and each of these variations will be responded to by magnet 48 to cause the switch 53, and hence the circuit A having magnet 56, to be closed and opened three times. The course of the circuit A is as disclosed from a battery 74 via a lead wire 75, through the switch 53, a lead wire 76, the magnet 56, and a lead wire 77 back to the battery. The magnet 56 and coil spring 57 will cooperate to release the toothed wheel 59 one tooth for each make and break of the circuit A, and consequently, the contact bar 72 will be revolved through three letter spaces, to engage between the spaced arms 70 of the contact unit 69 corresponding with the letter C, which is as shown in Fig. 4 just three character or letter spaces from the shift-to-letters contact unit 69.

A contact portion 43 now engaging with the contact 44, a continuous current temporarily flows in the service wires, holding switch 53 closed and actuating armatures 54 to close switches 55, thus making circuit B, traced from the battery 74 by lead wire 75 to point 263, thence by a lead wire 254 through lower switch 55, thence by a lead wire 89 to magnet 87 for controlling group switch 88, thence by a lead wire 86 to lower movable contact arm 85 of switch 84 for controlling the secondary selector, thence to lower fixed contact arm 83 of said switch 84, thence by a lead wire 82 to point 139, thence by a lead wire 140 to upper switch 55, and thence by lead wires 90 and 77 back to the battery. The making of circuit B also makes a circuit including a magnet 80 for controlling a rectifying device 81, which circuit and rectifying device will be hereinafter described.

The engagement of the contact bar 72 with the spaced arms 70 of the contact unit 69 corresponding with the letter C completes a circuit, designated D, traced from the battery 74 by lead wire 75 to the point 91, thence by a lead wire 92 to an arm of said contact unit 69, thence to the other arm of said contact unit through contact bar 72, thence by a lead wire 93 to a magnet 94 for operating a group-one key 95 assisting in the control of a tumbler 96, thence by a lead wire 97 to group one fixed contact 98 of group switch 88, thence through movable contact arm 99 of said group switch which is at this time in engagement with fixed contact 98, thence by a lead wire 100 to lead wire 86 of circuit B, and back to the battery 74 via lower movable contact arm 85, lower fixed contact arm 83, lead wire 82, lead wire 140, upper switch 55,

lead wire 90, and lead wire 77 back to the battery.

The apparatus incorporates a plurality of tumblers 96, one for each stock or heading opposite which a quotation or item of information is adapted to be posted, and each tumbler controls an electric circuit leading to a printing mechanism, one for each of said stocks or headings, of a printing unit presently to be described. The apparatus also incorporates a plurality of groups of keys 95, there being a key group under each of the arms of the tumblers 96, and each key of each group is operated by a magnet 94 controlled by a circuit such as the circuit D which is adapted to operate the group one key for assisting in the control of the "CA" tumbler 101.

Each tumbler 96 will have as many arms 102 as there are call letters, as, for example, of a stock, in the particular call combination, each group of keys 95 may desirably include twenty-six keys, one for each letter of the alphabet, and the arrangement will be such that no tumbler can be dropped to close its corresponding printing mechanism circuit until a notch in the proper key under each of its arms has been moved into alignment with the tumbler.

As disclosed, the opposite ends of each key 95 of each group are supported to be slid horizontally and are guided in any suitable manner, as indicated at 103, and notches 104 in the keys normally align with all of the tumblers except the particular tumbler controlled by a key, which includes a notch 105 situated at one side of the tumbler. The tumblers are guided, as indicated at 106, for vertical movement. A coil spring 107 normally holds a support or armature 108 in elevated position against the lower extremities of the tumblers to insure that each tumbler will normally remain in elevated position. The notches of the keys are so spaced that when a key moves into alignment with its corresponding tumbler or tumblers, all other tumblers will be out of alignment with the notches of the key which has moved.

When the circuit D, having the magnet 94 for operating the group one key assisting in the control of the "CA" tumbler 101, is closed by contact bar 72 engaging between the arms 70 of the contact unit 69 corresponding to the letter C as above described, the said magnet attracts pivoted pole piece 109 turning shaft 110, suitably mounted as at 111, having cam 112, and the cam engages a lug 113 upon the corresponding key 95, sliding said key endwise to bring its notch 105 into alignment with the upper arm of the corresponding tumbler 101. There may be other stocks or headings beginning with the letter C, and, if so, the group one key assisting in the control of the "CA" tumbler will include a notch 105 for each of such stocks or headings.

While temporarily continuous current flows in the service wires and in circuit D, or any other similar circuit which may be selected, magnet 87 will, evidently, be energized to attract pole piece 114, suitably mounted as at 115, for actuating movable contact arm 99 of group switch 88. As disclosed very clearly in Figs. 4, 23, 24 and 25, movable contact arm 99 is fixed upon a short shaft 116 mounted, as at 117, to be rotatable and longitudinally slidable in a conveniently supported frame 118 which carries the magnet 87 and the pole piece 114. When the cylinder 34 is released and commences to advance to rotate the dial 40, to thus break circuit D and cause the resumption of rapidly varying current flow in the same manner as already described, magnet 87 releases pole piece 114, and coil spring 119, attached to said pole piece as at 120 and to an upright 121 as at 122, causes a pawl 123 of said pole piece to push against a tooth of a ratchet 124 fixed upon the short shaft 116 to rotate movable contact arm 99 to a position where it engages group-two fixed contact 125. A detent finger 126 pivoted upon upright 121 as at 127 holds the ratchet against the action of a coil spring 128, attached to the frame and to the short shaft, tending to urge the pole piece back to its position of engagement with the fixed contact 98, or against the stop 129. A stop 130 is for controlling the distance the coil spring 119 can move the pole piece 114 when released by the magnet 87, as will be understood.

The group two fixed contact is in all circuits for the second group of keys, which circuits are similar to circuit D.

Supposing that upon release of the "C" key lever of the transmitting instrument that the next key lever depressed corresponds to "A", the dial 40 rotates until the "A" lever stops its corresponding pin 38, and the rapidly varying flow of current causes the contact bar 72 to advance a corresponding distance to stop at the contact unit 69 corresponding to "A" upon the selecting dial 68. Temporarily continuous current again flows in the service wires and in circuit B, and also flows in a circuit, designated E, traced from the battery 74 via lead wires 75 and 92 to an arm 70 of the contact unit 69 corresponding to the letter "A", thence to the other arm of said contact unit through contact bar 72, thence by a lead wire 131 to a magnet 132 (see Fig. 4) of the magnets 94 for operating group-two key 95 assisting in the control of the tumbler, or tumblers, the second call letter of which is "A", as for example the "CA" tumbler as disclosed, thence by a lead wire 133 to group two fixed contact 125 of group switch 88, thence through movable contact arm 99 of said group switch which is at this time in engagement with fixed contact 125, and thence back to the battery via lead wire 100, lead wire 86, lower movable contact arm 85, lower fixed contact

arm 83, lead wire 82, lead wire 140, upper switch 55, lead wire 90, and lead wire 77.

Provided the "CA" tumbler has but two arms 102 controlled by keys of two groups of keys 95, a notch 105 of each corresponding key will now be aligned with each arm of said "CA" tumbler, but all other tumblers will be engaged by flat surfaces of the corresponding keys between the notches 104. The "CA" tumbler cannot yet drop, however, because it, as well as the other tumblers, is held in elevated position by the cooperation of the armature or support 108 and the coil spring 107.

The "A" key of the second group will also include a notch 105 for each stock or heading whose second call letter is "A", as will each key of each group have a notch 105 to correspond with each stock or heading having a corresponding call letter.

Assuming that a key lever upon the transmitting instrument is now depressed to cause the contact bar 72 to be advanced, in the manner as before set forth, and stopped at the contact unit 69 constituting the shift-to-numbers position 134 on the dial 38, again causing a temporarily continuous flow of current, a shift to numbers circuit, designated F, is made, the said circuit being traced from the battery 74 by a lead wire 135 to a magnet 136, thence by a lead wire 137 to an arm of the contact unit 69 at the position 134, thence to the other arm of said contact unit through contact bar 72, thence by a lead wire 138 to lead wire 82, thence by lead wire 82 to point 139, thence by lead wire 140 to upper switch 55, and by lead wires 90 and 77 back to the battery.

The energizing of magnet 136 causes pole piece 141, suitably pivoted at 142 to be attracted to close a relay switch 143 for controlling the secondary selector. As disclosed more clearly in Fig. 22, the lower end of pivoted pole piece 141 is adapted to ride over a suitably supported resilient hump 144 when moved to close relay switch 143, whereby the said relay switch will remain in closed position until the pivoted pole piece is positively revolved, in a manner to be set forth, to be forced in direction away from the magnet 136. As shown, the free end of a resilient contact arm 145 of relay switch 143 is situated in the slotted upper end of the pole piece 141.

The closing of relay switch 143 makes a circuit, designated G, traced from the battery 74 by lead wire 75 to point 91, thence by a lead wire 146 to said relay switch, thence by a lead wire 147 to a magnet 148, and thence by a lead wire 149 back to the battery.

The closing of relay switch 143 also makes a circuit, designated H, traced from the battery 74 by lead wire 75 to point 91, thence by lead wire 146 to the relay switch, thence by lead wire 147 to point 150, thence by a lead wire 151 to a magnet 152, and thence by a

lead wire 153 to lead wire 77 and back to the battery.

Energization of magnet 152 causes armature 108 to be attracted against the action of coil spring 107, and removal of the support from beneath the "CA" tumbler allows this, or any other tumbler all of the arms of which align with key slots, to drop.

Energization of magnet 148 causes armature 154, pivoted as at 155, to be attracted to remove lower movable contact arm 85 away from lower contact arm 83 of switch 84 and to cause upper movable contact arm 156 to engage upper fixed contact arm 157 of said switch. Thus is made a circuit, designated J, traced from the battery 74 by lead wire 135 to the point 158, thence by a lead wire 159 to contact 160 engaging a circumferential contact portion 161 of the surface of a dial 162 fixed upon the shaft 60 and similar to the circumferential contact portion 41 of the dial 40, thence by one of spaced apart contact portions 163 of said surface and similar to contact portions 43 of said dial 40, thence through contact 164, thence by a lead wire 165 to a magnet 166 of the corresponding printing unit, thence by a lead wire 167 to a magnet 168 of said printing unit, thence by a lead wire 169 to fixed contact 170 engaged by contact 171 upon a fallen tumbler, as in Fig. 10, thence by a lead wire 172 to upper fixed contact arm 157 of switch 84, thence to upper movable contact arm 156 of said switch, and thence by lead wire 173 and lead wire 149 back to the battery.

When a number is being printed, the contacts 160 and 164 are in electrical connection and the temporarily continuous flow of electricity from the instrument 32 is, evidently, transmitted to the magnets 166 and 168 of the corresponding unit of the printing mechanism. When the dial 162 is rotating with the shaft 60 so that the contact 164 intermittently wipes over the spaced apart contact portions 163, rapid variations in the flow of current are being transmitted to said printing unit, as will be obvious. The magnet 166 is so constructed that its armature 174 responds to the rapid variations of current, while the magnet 168 is so constructed that its armature 175 does not respond to the rapid variations of current but only acts when the rapid variations cease and a temporarily continuous current flows, the said magnet 168 releasing its armature when temporarily continuous current flow ceases and rapidly varying current flow is resumed.

It will be obvious that the dial 162 will rotate in synchronism with the contact bar 72 and that when said contact bar has reached its shift to numbers position, the contacts 160 and 164 will be situated at corresponding position upon the contact surface of said dial 162. Assume that the cylinder 34 has been released from its shift to numbers position

and the key lever controlling the number "3" has been depressed to allow said cylinder to rotate until stopped by engagement of the shoulder of the "3" key lever with the corresponding pin on the cylinder. Concurrently, the dial 162 rotates to cause the contact 164 to intermittently wipe over the spaced apart contact portions 163 to make and break the circuit J a corresponding number of times, as will be evident, and the magnet 166 responds to the rapid variations of current flow to cooperate with a coil spring 176 in bringing the number "3" on a printing wheel 177 to proper printing position, while it is the function of the magnet 168 to accomplish the printing when the dial 162 is brought to rest and the contacts 160 and 164 are in engagement with each other to produce a temporarily continuous flow of current in the circuit J.

Referring more particularly to Figs. 14 to 18, we have there shown a printing wheel 177 fixed upon a shaft 178 suitably mounted as at 179 to be rotatable in a housing 180 for the printing wheel unit, and we have disclosed an escapement lever 181 pivotally supported in the housing as at 182 and suitably connected with the armature 174. The coil spring 176 has one of its ends attached to the escapement lever and its other end attached to a fixed part. The escapement lever controls the rotation of a toothed wheel 183 which is keyed to the shaft 178, said shaft being rotated, when not prevented from rotating by engagement of the escapement lever with the toothed wheel, by means of a coil spring 184 about the shaft, the said coil spring being attached at one of its ends 185 to a ratchet wheel 186 rotatably mounted upon said shaft and at its other end 187 to said toothed wheel. The ratchet wheel 186 is rotated at each actuation of the armature 174, to hold the coil spring 184 under tension, by means of pawls 188 pivotally supported upon the armature 174 as at 189 and held in yielding engagement with teeth at opposite sides of the ratchet, as by an extensible member 190 between said pawls, the arrangement being such that one of the pawls, the one at the right in Fig. 16, will rotate the ratchet in counter clockwise direction to wind the coil spring 184 when the coil spring 176 acts to withdraw the armature 174 from the magnet 166, and that the other pawl, the one at the left in Fig. 16, will rotate the ratchet in the same direction when said magnet 166 acts to attract its armature against the action of said coil spring 176, the pawl which is not acting to rotate the ratchet sliding over its teeth in a usual manner.

The housing 180 also supports a pair of shafts 191 and 192, the former carrying a rotatable reel 193 which supports tape 194 fed to the printing wheel, and the latter carrying a rotatable take-up reel 195 which

eventually receives all of the printed tape. The course of the tape 194 from the reel 193 is about a printing element 196 pivoted as at 197 in an opening 198 in the housing adjacent the printing wheel, across a face 199 of said housing, over a roller 200 suitably mounted in an opening 201 of said housing, thence over a tensioned roller 202, and thence to the reel 195.

The printing element 196 is connected with the armature 175 of the magnet 168, and when said armature is attracted by said magnet, said printing element is forced against the printing wheel to thus cause a portion of the tape to receive an imprint of a character of the printing wheel at that time in proper position adjacent said portion of the tape.

The means for feeding the tape from the reel 193 to the printing element 196 may include a lever pivoted in the housing 180 at a point 203 intermediate its ends to provide a short arm 204 and a long arm 205. As disclosed more clearly in Fig. 14, the long arm 205 includes a slot 206 receiving the free end of the armature 175. A coil spring 207 attached to the housing as at 208 and to the free end of the short arm 204 as at 209 normally urges the long arm 205 away from the magnet 168, but when said magnet is energized to attract the armature 175, said armature, by reason of its engagement in the slot 206, causes said long arm to be moved toward the magnet. Upon release of armature 175 from the magnet, coil spring 207 promptly moves the long arm 205 and the armature away from said magnet, thus removing the printing element 196 from the printing wheel and at the same time causing a feeding pad 210, pivotally supported upon the upper end of long arm 205 as at 211, to firmly engage against the portion of the tape adjacent the inner face of the printing element, to grasp the tape between said pad and element and cause it to be fed ahead with the pad as this slides relatively to the printing element. A leaf spring 212 attached to the long arm 205 of the lever as at 213 and having its upper end situated to engage a lug 214 carried by the feeding pad, holds the pad in resilient engagement with the tape during the feeding movement and allows said pad to ease away from the printing element upon the return movement of the pad, when the magnet 168 causes the long arm 205 to recede, to slide freely over the tape, back to position for starting a new feeding movement when the coil spring 207 is again allowed to act.

The tensioned roller 202 is conveniently rotatably supported upon the long arm 215 of a lever, pivoted intermediate its ends, as at 216, on the housing 180, having a short arm 217 the free end of which is normally urged, by a coil spring 218 secured to the housing as at 219 and to said short arm as at 220, in direction to move said roller 202

away from the reel 195. A lug 221 upon said lever adjacent its axis is adapted to engage a resilient movable contact arm 222 of a switch 223, and the arrangement is such that when the tape is under no tension, the coil spring 218 will act to allow said movable contact arm 222 to engage a fixed contact arm 224 of said switch 223, but when said tape is tensioned, it causes the long arm 215 to be swung against the action of said coil spring 218, to break contact between said arms 222 and 224, to thus open said switch 223. The switch 223 when closed is in an electric circuit, designated K, also including a magnet 225 suitably supported in the housing 180, said circuit K being traced from the battery 74 by lead wire 135 to point 158, thence by lead wire 159 to contact 160, thence to contact 164, thence by lead wire 165 to a lead wire 226, thence through magnet 225, thence by a lead wire 227 to switch 223, thence by a lead wire 228 to lead wire 77, and back to the battery.

The magnet 225 is constructed to respond to the rapid variations in current flow when the dial 162 is rotating beneath the contact 164, as already set forth, to intermittently attract an armature 229 pivoted upon the housing as at 230, and a coil spring 231, attached to the housing at 232 and to the armature at 233 (see Fig. 19) is adapted to withdraw said armature from said magnet each time the circuit K is broken. A pawl or link 234 pivoted upon the armature 229, as at 235, includes a free pointed end adapted to engage teeth of a ratchet 236 rotatable upon the shaft 192, and a coil spring 237 about said shaft and attached to said ratchet as at 238 and to the reel 195 as at 239 provides a resilient connection between the ratchet and reel. A suitable detent 240 attached to the pawl or link 234, as by a spring 241 supported upon the housing as at 242, prevents return movement of the ratchet. See Figs. 19 and 20.

It will be evident that when the tape 194 becomes slack and the coil spring 218 is allowed to act to permit the switch 223 to close, to thus make the circuit K, intermittent energization of the magnet 225 will intermittently actuate the armature 229 which will, in turn, actuate the pawl 234 to cause the reel 195 to wind until the tape is sufficiently taut to actuate the long arm 215 against the action of the coil spring 218, to thus cause the lug 221 to open said switch 223. The magnet 225 will thus become de-energized, and the feed of tape to the reel 195 will cease until said tape is again slack, whereupon the switch 223 will close, and the action as described will be repeated.

Supposing the contact bar 72 to be situated to engage the shift to numbers contact unit 69 at the position 134 in Fig. 4, and a key lever of the transmitting instrument corresponding to the number "3" to be depressed so that said contact bar 72 rotates through

four character spaces to the contact unit 69 corresponding to the numeral "3", then the dial 162 also rotates through four character spaces, and the magnet 166 causes the printing wheel 177 to be rotated through a corresponding distance, to position numeral "3" upon said wheel adjacent the printing element 196. Upon the stopping of the dials 40 and 162 at the position corresponding to numeral "3", the resulting temporarily continuous flow of current energizes the magnet 168 to actuate the armature 175 and thus force the tape at the printing element 196 against said numeral "3" upon the printing wheel. Upon movement of the dials 40 and 162 ahead, away from the position corresponding to numeral "3", the magnet 168 is deenergized and the coil spring 207 acts to remove the printing element 196 away from the printing wheel and to feed the tape ahead in the manner as already set forth.

Supposing that the next key lever of the transmitting instrument depressed corresponds to numeral "1", the dial 162 rotates ahead to position numeral "1" on the printing wheel adjacent the printing element, and upon the stopping of said numeral "1" at proper position, the printing of the numeral and the feeding of the tape are accomplished in the same manner as heretofore fully described. Additional numerals can clearly be posted in precisely the same way.

Supposing that with the selecting and posting of numeral "1", the quotation to be set opposite a heading "CA" on a board, such as indicated at 243 in Fig. 6, is complete, and it is desired to reset the apparatus to select and post an additional quotation or item of information opposite a stock or heading, as, for example, one of the stocks on said board 243, the shift to letters key lever is again depressed to bring the contact bar 72 back to the position as disclosed in Fig. 4, to make a circuit, designated L, traced from the battery 74 by lead wire 135 to point 244, thence by a lead wire 245 to a magnet 246, thence by a lead wire 247 to an arm of contact unit 69 at the shift to letters position upon the dial 68, thence through the contact bar 72 to the other arm of said contact unit, thence by a lead wire 248 to lead wire 138, thence by lead wire 138 to lead wire 82, lead wire 82, and thence by lead wire 140, upper switch 55, lead wire 90, and lead wire 77 back to the battery. Energization of magnet 246 attracts pole piece 141 and causes the lower end of said pole piece to ride over hump 144, so that relay switch 143 will remain open until magnet 136 is again energized, as will be evident. The opening of the said relay switch 143 deenergizes magnet 152 and allows coil spring 107 to elevate the "CA" tumbler, and also deenergizes magnet 148 and allows contacts 156 and 157 of switch 84 to separate and contacts

83 and 85 of said switch 84 to come together. The making of circuit L also produces a circuit, designated M, including magnet 249, the said circuit M being traced from the battery 74 by lead wire 75 to point 253, thence by lead wire 252 to magnet 249, thence by lead wire 251 to point 250, thence by a lead wire 247 to an arm of contact unit 69 at the shift to letters position upon the dial 68, thence through the contact bar 72 to the other arm of said contact unit, thence by a lead wire 248 to lead wire 138, thence by lead wire 138 to lead wire 82, and thence by lead wire 82, lead wire 140, upper switch 55, lead wire 90, and lead wire 77 back to the battery.

Energization of magnet 249 causes armature 255, suitably pivoted at 256, to be attracted, and an arm 257 of said armature, (there being an armature 255 with arm 257 for each group of keys 95), to return keys which were actuated by magnets 94, as, for example, the "C" key in group one and the "A" key in group two, to their normal positions.

It is to be understood that each corresponding magnet 94 was deenergized when the contact bar 72 was removed from the contact unit to break the circuit, such as the circuit D, which energized the corresponding magnet 94, so that said magnets 94 will offer no interference to the action of magnets 249 returning the actuated key 95 in each group to normal position.

The making of circuits L and M also completes another circuit, designated N, having a magnet 258, the said circuit N being traced from the battery 74 by lead wire 75 to point 266, thence by a lead wire 261 to magnet 258, thence by a lead wire 260 to point 259, thence by lead wire 247 to an arm of contact unit 69 at the shift to letters position upon the dial 68, thence through the contact bar 72 to the other arm of said contact unit, thence by lead wire 248 to lead wire 138, thence by lead wire 138 to lead wire 82, and thence by lead wire 82, lead wire 140, upper switch 55, lead wire 90, and lead wire 77 back to the battery.

Energization of magnet 258 causes armature 262, suitably pivoted at 263, to be attracted, and an arm 264 of said armature to slide the shaft 116 in its bearings to release the ratchet 124 from the pawl 123, to thus allow coil spring 128 to rotate movable contact arm 99 of switch 88 back to position against stop 129, whereby said arm 99 will engage group one fixed contact 98 when the mechanism advances from the shift to letters position to deenergize the magnet 258 and thus allow spring 128 to longitudinally slide the shaft 116 back to its normal position. See Figs. 4 and 23.

When then the mechanism is actuated from the shift to letters position, the operations as described are repeated.

Assuming that this entire apparatus is being used for receiving and posting stock-market quotations, then each stock will have its name preferably permanently located on a board, such as the board 243 in Fig. 6, and the printing mechanism circuits will be duplicated to include a printing unit of the general construction as described for each stock. The tape for each printing unit will be arranged in about the manner as disclosed in Figs. 6 and 14, so that each quotation as posted, or directly thereafter, will desirably be opposite the heading designating the stock to which the quotation relates.

The transmitting instrument and the selecting and posting apparatus of Figs. 2 and 5 are of about the same construction as the instrument and apparatus hereinbefore fully described, except that whereas the transmitting instrument of Fig. 1 is adapted to shift from letters to numbers and from numbers to letters only at predetermined points, one for letters and one for numbers, the transmitting instrument of Fig. 2 is adapted to shift from letters to numbers and from numbers to letters at any time, as, for example, before or after the transmission of each and every character. The variant form of apparatus of Fig. 5 includes equivalents of all of the circuits as in Fig. 4, but incorporates an arrangement synchronizing the present form of apparatus with the transmitting instrument of Fig. 2. As disclosed, said transmitting instrument has a switch 267 including a resilient movable contact arm 268 at the opposite sides of and in spaced and insulated relation to which fixed contact arms, designated 269 and 270, respectively, are situated. Movable contact arm 268 is connected by a lead wire 271 to a polarized magnet 272, fixed contact arm 269 is connected by a lead wire 273 to the minus side of a battery 274, and fixed contact arm 270 is connected by a lead wire 275 to the plus side of the battery 46. A suitable shifting device includes a shift bar 276 having its opposite ends pivoted to bell crank levers 277 which are in turn pivotally supported in convenient manner as at 278. Shift key levers 36, one at each end of the group of key levers, are adapted to engage the bell crank levers to move the shift bar toward one side or the other. A suitably supported resilient member 279 includes a hump 280 over which a lug 281 upon the shift bar is adapted to ride in such manner that said shift bar will remain at either position to which shifted until intentionally shifted to the other position, as will be understood. A slot 281' in the shift bar 276 receives the free end of the movable contact arm 268, so that when said shift bar is moved toward the left, as it is shown, the contact arms 268 and 269 will be in engagement to cause a current to flow from battery 274 by lead wire 273, contact arm 269, contact arm 268, and lead wire 271 to polar-

ized magnet 272, and when the shift bar is moved toward the right the contact arms 268 and 270 will be in engagement to cause a current of opposite polarity to flow from battery 46 by lead wire 275, contact arm 270, contact arm 268, and lead wire 271 to said polarized magnet 272.

The apparatus 31 of Figure 5 has a switch 282 including a resilient movable contact arm 283 at the opposite sides of and in spaced and insulated relation to which fixed contact arms, designated 284 and 285, respectively, are situated. Armature 286 of polarized magnet 272 includes a slot 287 receiving the free end of movable contact arm 283. The arrangement is such that when the shift to numbers key lever 36 is operative, the armature 286 will be actuated toward the left to cause the contact arms 283 and 284 to engage each other, and when the shift to letters key lever is operative, said armature will be actuated toward the right to cause the contact arms 283 and 285 to engage each other. When said contact arms 283 and 284 engage, a shift to numbers circuit, the equivalent of the circuit in Figure 4 for a similar purpose, is made, the said circuit being traced from the battery 74 by lead wire 135 to point 244, thence through magnet 136, thence by lead wire 137' to contact arm 284, thence through contact arm 283, and thence by lead wire 138' and lead wire 77 back to the battery. Energization of magnet 136 will perform the functions as hereinbefore fully described, and said magnet will remain energized until the shift to letters key lever of the transmitting instrument is operated, as will be obvious. When the contact arms 283 and 285 engage, a shift to letters circuit, the equivalent of the circuit in Figure 4 for a similar purpose, is made the present circuit being traced from the battery 74 by lead wire 135 to point 244, thence by lead wire 245 to magnet 246, thence by lead wire 247' to contact arm 285, thence through contact arm 283, and thence by lead wire 138' and lead wire 77 back to the battery. Energization of magnet 246 will perform the functions as hereinbefore set forth, and this magnet will remain energized until the shift to numbers key lever of the transmitting instrument is operated.

It will be evident that, in the instance of the form of the invention of Figures 2 and 5, the contact bar 72 and the dial 162 will synchronously follow the movements of the dial 40, but that unless special provision is made for the purpose, the printing wheel 177 will not necessarily remain in synchronism with the said dials 40 and 162, for the reason that the shift to numbers can be effected when a contact portion 163 having relation to some particular number to be printed is situated at any one of various locations relatively to the contacts 160 and 164 during the travel of the said contact portion 163 about the shaft 60.

It is apparent that when the first number of a quotation or other item of information is to be printed, after actuation of the mechanism of the apparatus of either Figure 4 or Figure 5 to its shift to numbers position, the different contact portions 163 of the dial 162 bear predetermined relations to the contacts 160 and 164, the relations in the instance of the apparatus of Figure 4 having reference to the contact unit 69 at the shift to numbers position, and the relations in the instance of the apparatus of Figure 5 having reference to the positions of the different contact portions 43 relatively to the contacts 42 and 44. That is to say, in the case of the apparatus of Figure 4, when a call letter combination has been selected and the shift to numbers key lever 36 has been operated, the contact bar 72 stops at the position 134 and the contact portions 163 all stop at fixed points, having in the meantime actuated the printing wheel 177 step by step, in the manner as described, to a predetermined position from which it will be actuated, when the next key lever controlling a number is selected, to properly position said number for printing upon the tape, while in the case of the apparatus of Figure 5, when a call letter combination has been selected and the shift to numbers key lever 36 has been operated, (naturally without advancing the cylinder 34 and the dial 40), the dial 162 will rotate to advance the printing wheel step by step while said dial 40 is moving from its position transmitting the last letter of a call letter combination to its position for posting the number selected to be first posted.

To the accomplishment of synchronization of the movements of each printing wheel 177 with the movements of the dials 40 and 162, we make provision for causing the printing wheel of each printing unit to come to rest with each of its numbers at a predetermined relation to the printing element at the completion of the posting of a quotation or item, the said predetermined location where each number stops bearing that direct reference to the positions of the different contact portions 43 relatively to the contacts 42 and 44 insuring that the dial 162, in advancing from its position when the last letter of a call letter combination is being transmitted to its position for posting the number selected to be first posted, will cause the printing wheel to be actuated step by step, in the manner as described, to situate the said number first selected to be posted adjacent the printing element. For example, supposing the last letter of a call letter combination is "A" and that the first number to be posted is "3"; that the contact units 69 corresponding to "A", "B", and "C" also correspond to "1", "2" and "3", respectively; that when the said last call letter "A" is selected the shift bar 276 is actuated to shift to numbers position; and

that the key lever 36 corresponding to "3" is depressed, so that the dial 162 rotates through two character or number spaces to rotate or advance the printing wheel two steps or through two character or number spaces; then, the printing wheel of the corresponding unit of the apparatus would be caused to come to rest at the completion of a quotation or item so that the said number "3" is two character or number spaces in advance of the printing position when the next shift to numbers affecting the said unit occurs, as will be understood.

The specific manner of causing each printing wheel to become stationary at the completion of a posting operation and so that its numbers have predetermined relation to the printing element is best disclosed in Figures 4, 5 and 14. As there shown, numeral 288 designates an auxiliary switch having a fixed contact arm 289 and a resilient movable contact arm 290 adapted to normally engage said fixed contact arm 289, but to be removed therefrom by a pin 291 upon the printing wheel when rotated to position to engage said movable contact arm. When the contact arms 289 and 290 engage, a circuit, designated O, is made, traced from battery 74 by lead wire 135 to point 158, thence by lead wire 159 to contact 160, thence to contact 164, thence by lead wire 165 to magnet 166, thence by lead wire 167 to point 292, thence through resistance 293, thence through switch 288, thence by a lead wire 294 to lead wire 228, and thence by lead wire 228 and lead wire 77 back to the battery.

When circuit J is broken, current will flow in circuit O, as will be obvious, to intermittently actuate magnet 166 until the pin 291 strikes the movable contact 290 to break said circuit O. Immediately, the printing wheel will come to rest and will remain at rest until circuit J is again made.

The rectifying device 81 is for the purpose of insuring that the shaft 60 can be adjusted to have proper position relatively to the mechanism of the transmitting instrument, should said shaft for any reason get out of adjustment. The setting of the shaft is accomplished by the repeated transmission of rapidly varying flow of current at said instrument to the exclusion of temporarily continuous flows of current.

Of the said rectifying device, disclosed more clearly in Figures 7 and 13, numeral 295 denotes a sleeve fixed upon the shaft 60 and having a thread 296, and 297 represents a pin projecting from said shaft. A rectifying element 298 includes a short arm 299 suitably pivoted upon the frame of the apparatus, as at 300, to have horizontal movement, and a longer arm 301 pivoted to the short arm, as at 302 to have vertical movement. The said longer arm 301 is adapted to ride in the thread 296 of the sleeve 295, being normally

held to said thread by a coil spring 303 attached to the short arm 299 as at 304 and to the frame as at 305. A coil spring 306 attached to the longer arm 301 as at 307 and to the frame as at 308 normally urges said longer arm 301 downwardly. An upstanding pin 309 upon said longer arm is adapted to be engaged by the pin 297 projecting from the shaft 60. The longer arm 301 is of L-shape and its shorter portion 310 extends past the shaft to be engaged by an armature 311 of the magnet 80.

The said magnet 80 is in a circuit, designated P, when the magnet 50 is actuated to close the switches 55, the said circuit P being traced from the battery 74 by lead wire 75 to point 78, thence by lead wire 79 to said magnet 80, thence by lead wire 140 to upper switch 55, and thence by lead wire 90 and lead wire 77 back to the battery.

Each time the magnet 80 attracts the armature 311, this strikes the portion 310 of the rectifying element 298 and causes said element to be pushed away from the thread 296 of the sleeve 295, at which time coil spring 306 acts to draw arm 301 downwardly. Coil spring 303 draws said arm 301 back to engagement with the thread 296 and so long as shaft 60 is rotated, as by magnet 48 acting upon escapement lever 58 to allow worm 61 to advance said shaft step by step, without energization of magnet 80, the said arm 301 rides upwardly in said thread. But as soon as the magnet 80 is energized, its armature 311 again removes the element 298 from the thread and the action as described is repeated. When the shaft 60 is rotated a sufficient number of times by the repeated transmission of rapidly varying current flow to the exclusion of temporarily continuous flows of current, the rectifying element 298 rides upwardly in the thread 296 until the pin 309 on said element is engaged by the pin 297 on the shaft 60. Thus is the rotation of the shaft stopped, and thus is the shaft set with respect to the mechanism of the transmitting instrument.

We claim as our invention:

1. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting an item of information from a group of items of information transmitted by said mechanism, and means responsive to a temporarily continuous flow of current for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

2. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting an item of information relating to one of said headings from a group of items of information successively transmitted by said mechanism and relating to a plurality of said headings, and means responsive to a temporarily continuous flow of current for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

3. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism, and means responsive to temporarily continuous flows of current for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates.

4. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, means responsive to temporarily continuous flows of current for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates, and means for resetting the means responsive to temporarily continuous flows of current and rapid variations

of current flow in position whence the said means can be again actuated to select an item of information.

5 5. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to
10 which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of
15 current flow for selecting an item of information from a group of items of information transmitted by said mechanism, and means responsive to a temporarily continuous flow of current for causing a posting unit to post
20 the selected item of information opposite the heading corresponding to said posting unit and to which said selected item of information relates.

25 6. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which
30 different signals transmitted by said mechanism are adapted to have reference, and a posting unit corresponding to each of said headings, of means responsive to temporarily continuous flows of current and rapid
35 variations of current flow for selecting an item of information relating to one of said headings from a group of items of information successively transmitted by said mechanism and relating to a plurality of said head-
40 ings, and means responsive to a temporarily continuous flow of current for causing a posting unit to post the selected item of information opposite the heading corresponding to said posting unit and to which said
45 selected item of information relates.

50 7. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to
55 which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of
60 current flow for selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by
65 said mechanism, means responsive to temporarily continuous flows of current for causing a posting unit to post each item of information as selected opposite the heading corresponding to said posting unit and to

which said selected item of information specifically relates, and means for resetting the means responsive to temporarily continuous flows of current and rapid variations of current flow in position whence the said means can be again actuated to select an item of information.

75 8. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which
80 different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting items of
85 information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, and means responsive to
90 temporarily continuous flows of current for causing a posting unit to post each item of information as selected opposite the heading corresponding to said posting unit and to which said selected item of information specifically relates.

95 9. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which
100 different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting an item of information
105 from a group of items of information transmitted by said mechanism, devices associated with a posting unit and with said last mentioned means for causing said posting unit to be actuated in synchronism with
110 said means, means responsive to a temporarily continuous flow of current for causing the said posting unit to post the selected item of information opposite the heading to which
115 said selected item of information relates, and means for resetting the means responsive to temporarily continuous flows of current and rapid variations of current flow in position whence the said means can be again actuated to select an item of information.

120 10. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which
125 different signals transmitted by said mechanism are adapted to have reference, and a
130

posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, devices for associating each posting unit with said last mentioned means for causing the printing units to be actuated in synchronism with said means, and means responsive to temporarily continuous flows of current for causing a posting unit to post each item of information as selected opposite the heading corresponding to said posting unit and to which said selected item of information specifically relates.

11. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting a call character combination from a group of call character combinations transmitted by said mechanism, devices for causing a posting unit to be in electrical connection with said transmitting mechanism when said means responsive to temporarily continuous flows of current and rapid variations of current flow has selected a call character combination, means responsive to a temporarily continuous flow of current for causing the said posting unit in electrical connection with the transmitting mechanism to post an item of information transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates, and means for resetting the means responsive to temporarily continuous flows of current and rapid variations of current flow in position whence the said means can be again actuated to select an item of information.

12. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting call character combinations relating specifically to

different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, devices for causing one of said posting units to be in electrical connection with said transmitting mechanism when said means responsive to temporarily continuous flows of current and rapid variations of current flow has selected a call character combination, and means responsive to temporarily continuous flows of current for causing a posting unit in electrical connection with the transmitting mechanism at times when temporarily continuous flows of current are produced to post an item of information concurrently transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates.

13. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for selecting a call character combination from a group of call character combinations transmitted by said mechanism, devices for causing a posting unit to be in electrical connection with said transmitting mechanism when said means responsive to temporarily continuous flows of current and rapid variations of current flow has selected a call character combination, means responsive to a temporarily continuous flow of current for causing the said posting unit in electrical connection with the transmitting mechanism to post an item of information transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates, and means for breaking electrical connection between said transmitting mechanism and said posting unit and for concurrently resetting said means for selecting a call character combination in position whence the said means can be again actuated to select a call character combination.

14. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of cur-

rent flow for successively selecting call character combinations relating specifically to different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, devices for causing one of said posting units to be in electrical connection with said transmitting mechanism when said means responsive to temporarily continuous flows of current and rapid variations of current flow has selected a call character combination, means responsive to temporarily continuous flows of current for causing a posting unit in electrical connection with the transmitting mechanism at times when temporarily continuous flows of current are produced to post an item of information concurrently transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates, and means for breaking electrical connection between said transmitting mechanism and said posting unit and for concurrently resetting said means for selecting call character combinations in position whence the said means can be again actuated to select a call character combination.

15. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting call character combinations relating specifically to different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, the last mentioned means including an element having spaced apart contact units, and a contact member actuatable over said element step by step in response to rapid variations of current flow and adapted to selectively engage said contact units to successively energize magnets when temporarily continuous current flows to selectively cause one of said posting units to be in electrical connection with said transmitting mechanism, means responsive to temporarily continuous flows of current and rapid variations of current flow for causing a posting unit in electrical connection with the transmitting mechanism to post items of information concurrently transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted items of information relate, and means for breaking elec-

trical connection between said transmitting mechanism and said posting unit and for concurrently resetting said means for selecting call character combinations in position whence the said means can be again actuated to select a call character combination.

16. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting call character combinations relating specifically to different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, the last mentioned means being adapted to the purpose of causing a selected one of said posting units to be in electrical connection with said transmitting mechanism, means responsive to temporarily continuous flows of current and rapid variations of current flow for causing the said posting units to be actuated in synchronism with the said transmitting mechanism, and means responsive to temporarily continuous flows of current for causing a posting unit in electrical connection with the transmitting mechanism to post an item of information concurrently transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates.

17. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting call character combinations relating specifically to different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, the last mentioned means being adapted to the purpose of causing a selected one of said posting units to be in electrical connection with said transmitting mechanism, means responsive to temporarily continuous flows of current and rapid variations of current flow for causing the said posting units to be actuated in synchronism with the said transmitting mechanism, means responsive to temporarily con-

tinuous flows of current for causing a posting unit in electrical connection with the transmitting mechanism to post an item of information concurrently transmitted by said mechanism opposite the heading corresponding to said posting unit and to which said transmitted item of information relates, and means for breaking electrical connection between said transmitting mechanism and said posting unit and for concurrently resetting said means for selecting call character combinations in position whence the said means can be again actuated to select a call character combination.

18. The combination with mechanism for transmitting electrical signals, having means for at times emitting temporarily continuous flows of electric current and for at times producing rapid variations of electric current flow, separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, and a posting unit for each of said headings, of means responsive to temporarily continuous flows of current and rapid variations of current flow for successively selecting call character combinations relating specifically to different ones of said headings from a group of call character combinations transmitted by said mechanism relating generally to a plurality of said headings, the last mentioned means including a tumbler for each of said call character combinations, each tumbler having an arm for each character of the call character combinations to which said tumbler corresponds, a group of keys under each of said arms, a magnet for each key, a dial having spaced apart contact units, a contact member actuatable over said dial in response to rapid variations of current flow and adapted to selectively engage said contact units to successively and temporarily energize a magnet to actuate a key in each of a plurality of said groups of keys to first align a slot in a key with each arm of a tumbler and to then allow the said tumbler to drop, devices for causing one of said posting units to be in electrical connection with said transmitting mechanism when said tumbler drops, means responsive to temporarily continuous flows of current and rapid variations of current flow for causing a posting unit in electrical connection with the transmitting mechanism to post items of information concurrently transmitted by said mechanism opposite the heading corresponding to said printing unit and to which said transmitted items of information relate, and means for breaking electrical connection between said transmitting mechanism and said printing unit and for concurrently resetting said means for selecting call character combinations in position whence the said means can be again actuated to select a call character combination.

19. The combination with mechanism for

transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for selecting an item of information from a group of items of information transmitted by said mechanism, and means for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates and adjacent a before selected item of information.

20. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for selecting an item of information relating to one of said headings from a group of items of information successively transmitted by said mechanism and relating to a plurality of said headings, and means for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates and adjacent a before selected item of information.

21. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism, and means for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates and adjacent a before selected item of information.

22. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of a device for successively selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, means for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates and adjacent a before selected item of information, and means for resetting said device in position whence it can be again actuated to select an item of information.

23. The combination with mechanism for transmitting electrical signals, separately designated headings to which different signals transmitted by said mechanism are

adapted to have reference, and a printing unit for each of said headings, of means for selecting an item of information, from a group of items of information transmitted by said mechanism, and means for causing a printing unit to post the selected item of information opposite the heading corresponding to said printing unit and to which said selected item of information relates.

24. The combination with mechanism for transmitting electrical signals, and separately designated stock quotation headings to which the different signals transmitted by said mechanism are adapted to have reference, of means for selecting items of information from a group of items of information transmitted by said mechanism, and means for causing a plurality of selected items of information to be posted and remain visible opposite any predetermined one of said designated stock quotation headings to which the selected items of information respectively relate.

25. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for selecting items of information relating to one of said headings from a group of items of information successively transmitted by said mechanism and relating to a plurality of said headings, and means for causing a plurality of selected items of information to be posted adjacent to each other opposite the one of said separately designated headings to which said selected items of information relate.

26. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for successively selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism, and means for causing a plurality of items of information each as selected to be posted adjacent to each other opposite the one of said separately designated headings to which said selected items of information relate.

27. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of a device for successively selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, means for causing a plurality of items of information each as selected to be

posted adjacent to each other opposite the one of said separately designated headings to which said selected items of information specifically relate, and means for resetting said device after the selection of each item of information in position whence the device can be again actuated to select an item of information.

28. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to flow of electric current from said transmitting mechanism for selecting an item of information from a group of items of information transmitted by said mechanism, and means responsive to flow of electric current from said transmitting mechanism for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

29. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means directly responsive to flow of electric current from said transmitting mechanism for selecting an item of information relating to one of said headings from a group of items of information successively transmitted by said mechanism and relating to a plurality of said headings, and means directly responsive to flow of electric current from said transmitting mechanism for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

30. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted to said mechanism are adapted to have reference, of means directly responsive to flow of electric current from said transmitting mechanism for selecting items of information relating specifically to different ones of said headings from a group of items of information successively transmitted by said mechanism, and means directly responsive to flow of electric current from said transmitting mechanism for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates.

31. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of a device directly responsive to flow of electric current from said transmitting mechanism for successively selecting items of information relating specifically

cally to different ones of said headings from a group of items of information successively transmitted by said mechanism relating generally to a plurality of said headings, means directly responsive to flow of electric current from said transmitting mechanism for causing each item of information as selected to be posted opposite the one of said separately designated headings to which said selected item of information specifically relates, and means for resetting said device in position whence it can be again actuated to select an item of information.

32. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means dependent in its operation upon the reception of electrical impulses for selecting an item of information from a group of items of information transmitted by said mechanism, and means dependent in its operation upon the reception of electrical impulses for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

33. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means for selecting an item of information from a group of items of information transmitted by said mechanism, and means dependent in its operation upon the reception of a plurality of electrical signals for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

34. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means dependent in its operation upon the reception of a plurality of different electrical impulses for selecting an item of information from a group of items of information transmitted by said mechanism, and means for causing the selected item of information to be posted opposite the one of said separately designated headings to which said selected item of information relates.

35. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means dependent in their operation upon the reception of electrical impulses for selecting an item of information from a group of items of information transmitted by said mechanism and for posting each different item of information as

selected opposite the one of said separately designated headings to which said selected item of information relates.

36. The combination with mechanism for transmitting electrical signals, and separately designated headings to which different signals transmitted by said mechanism are adapted to have reference, of means responsive to current flow impulses for selecting an item of information from a group of items of information transmitted by said mechanism and for posting each different selected item of information opposite the one of said separately designated headings to which said selected item of information relates.

In witness whereof, we have hereunto set our hands this 27th day of February, 1929.

LOUIS L. RUSTAD.
VICTOR E. EXTROM.