

March 15, 1938.

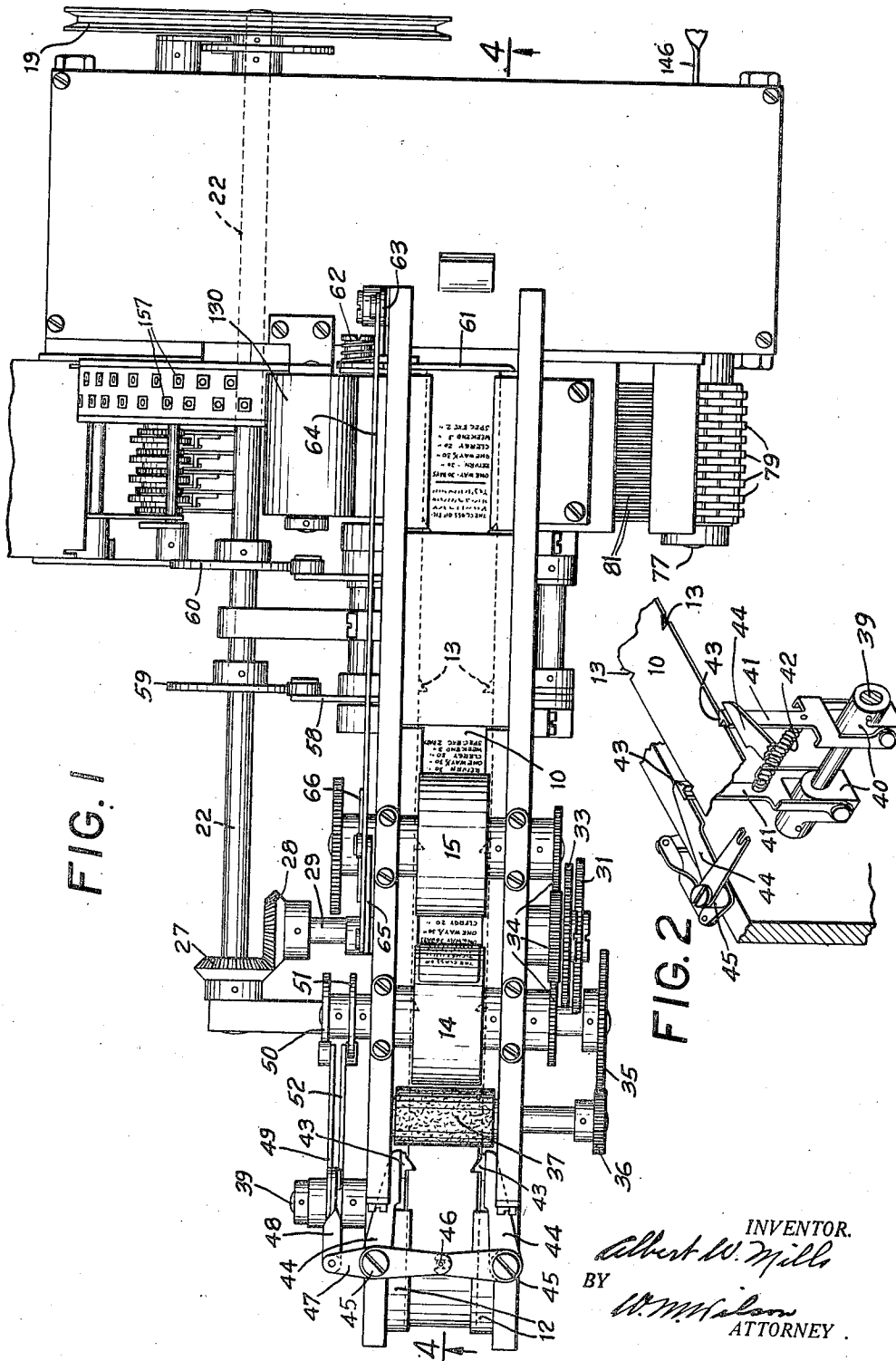
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2,111,121

PRINTING MECHANISM

Filed Dec. 22, 1936

11 Sheets-Sheet 1



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March 15, 1938.

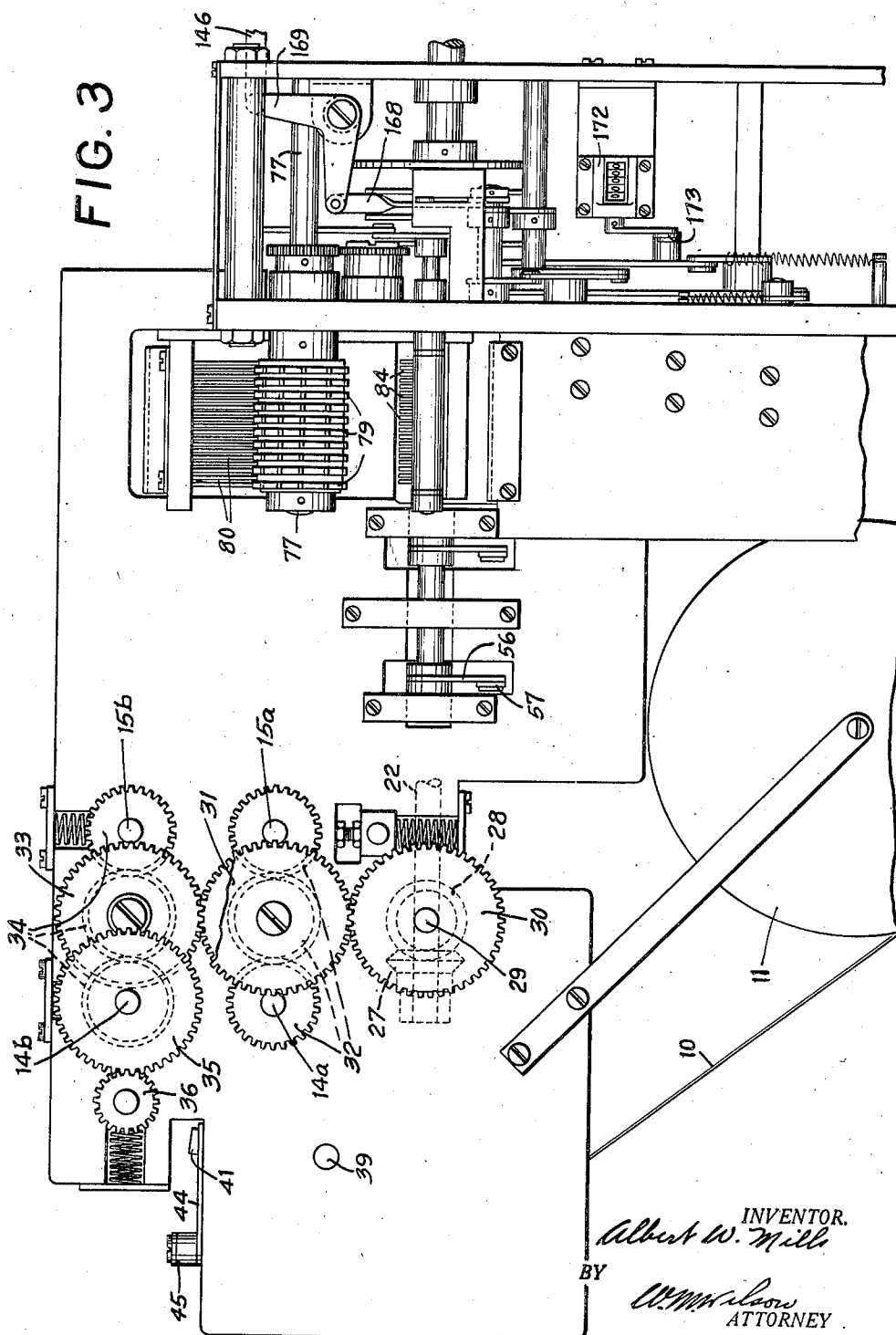
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PRINTING MECHANISM

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11 Sheets-Sheet 2



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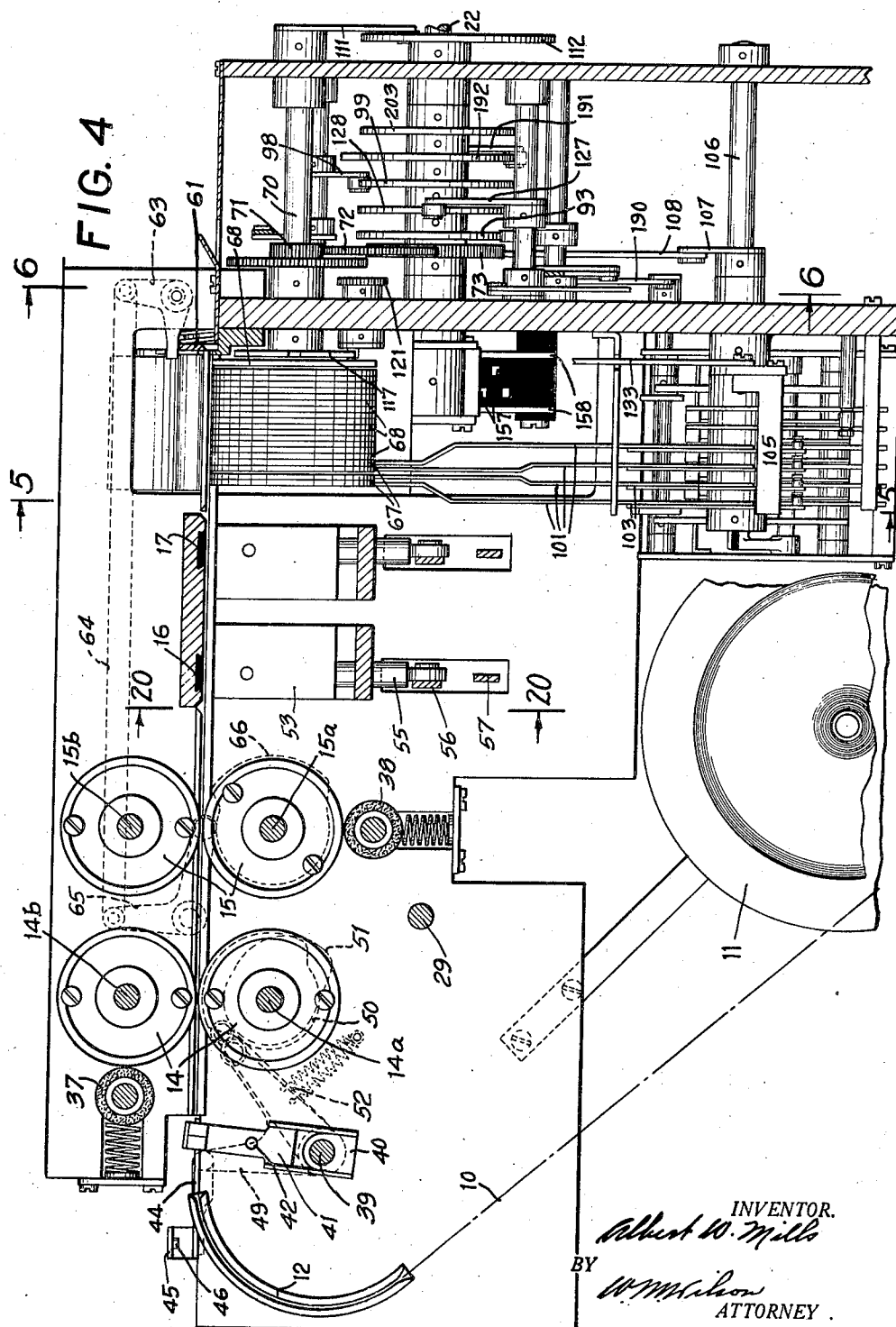
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FIG. 5

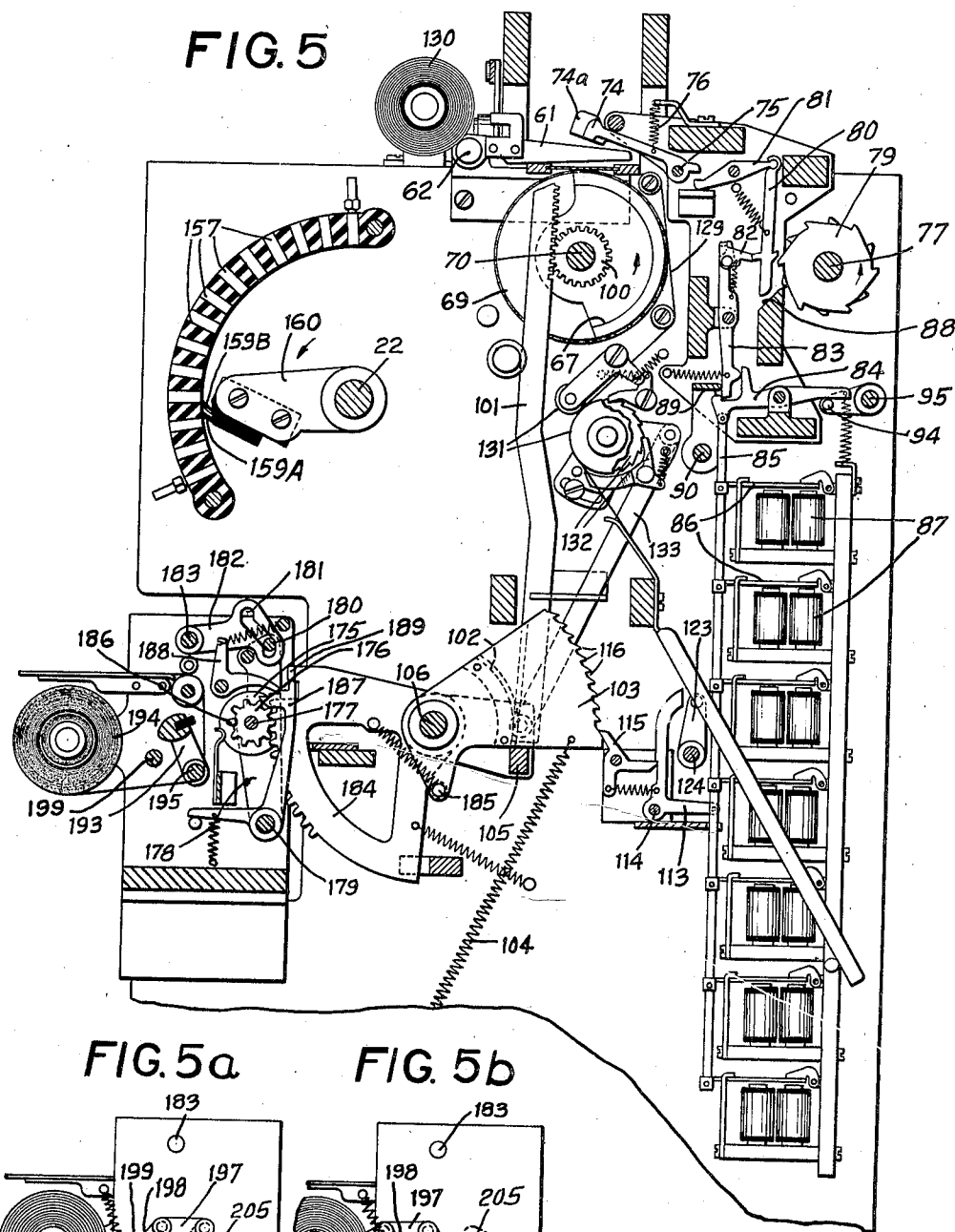


FIG. 5a

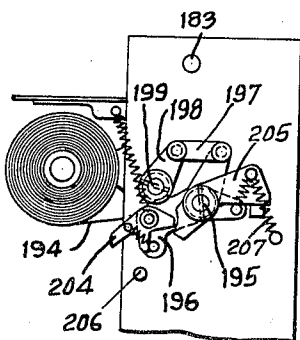
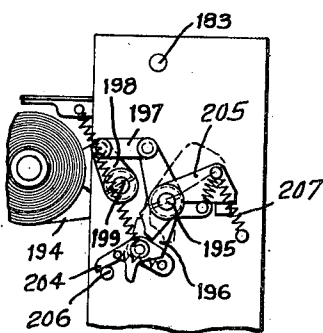


FIG. 5b



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FIG. 6

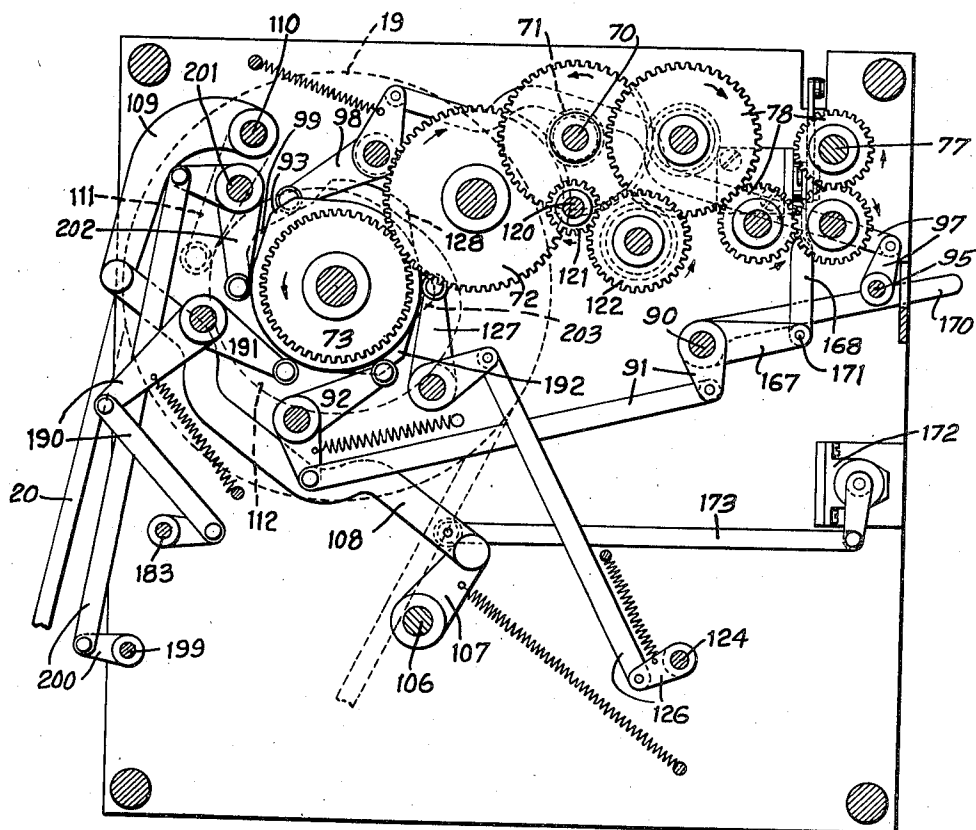


FIG. 7

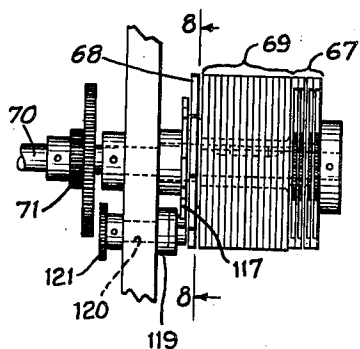
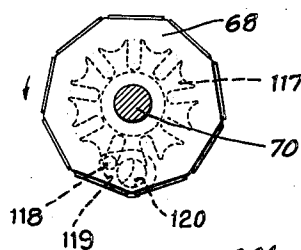


FIG. 8



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FIG. 9

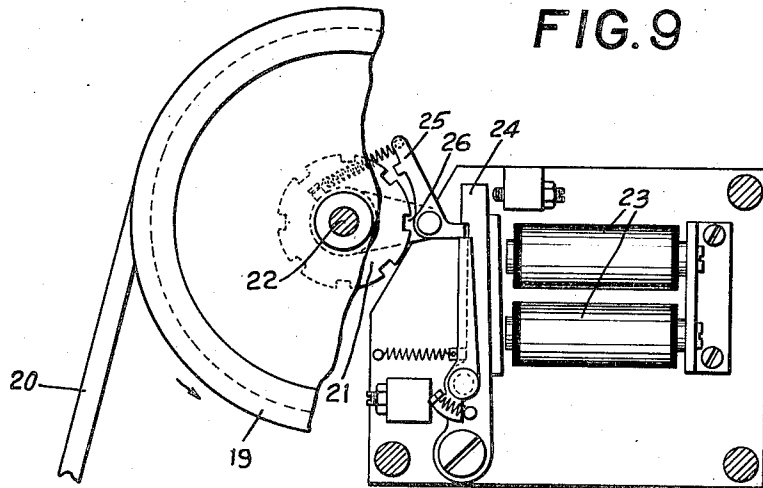


FIG. 10

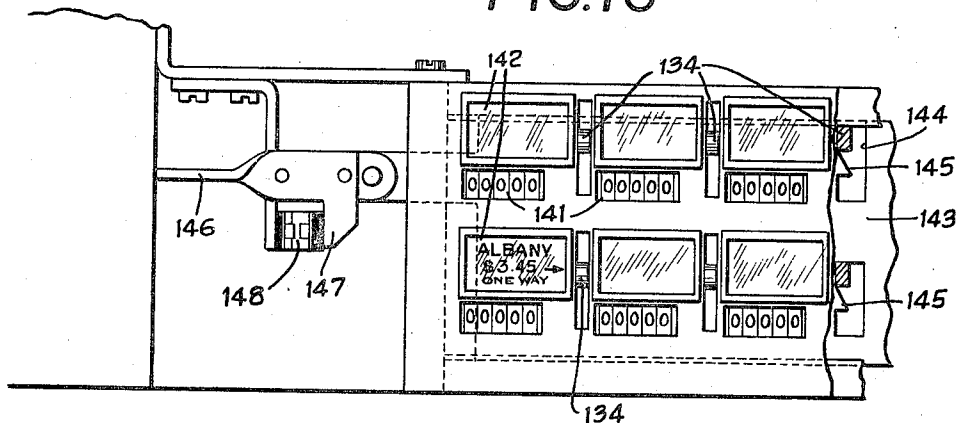
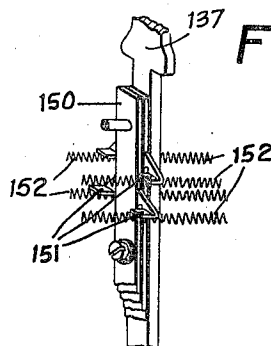


FIG. 11



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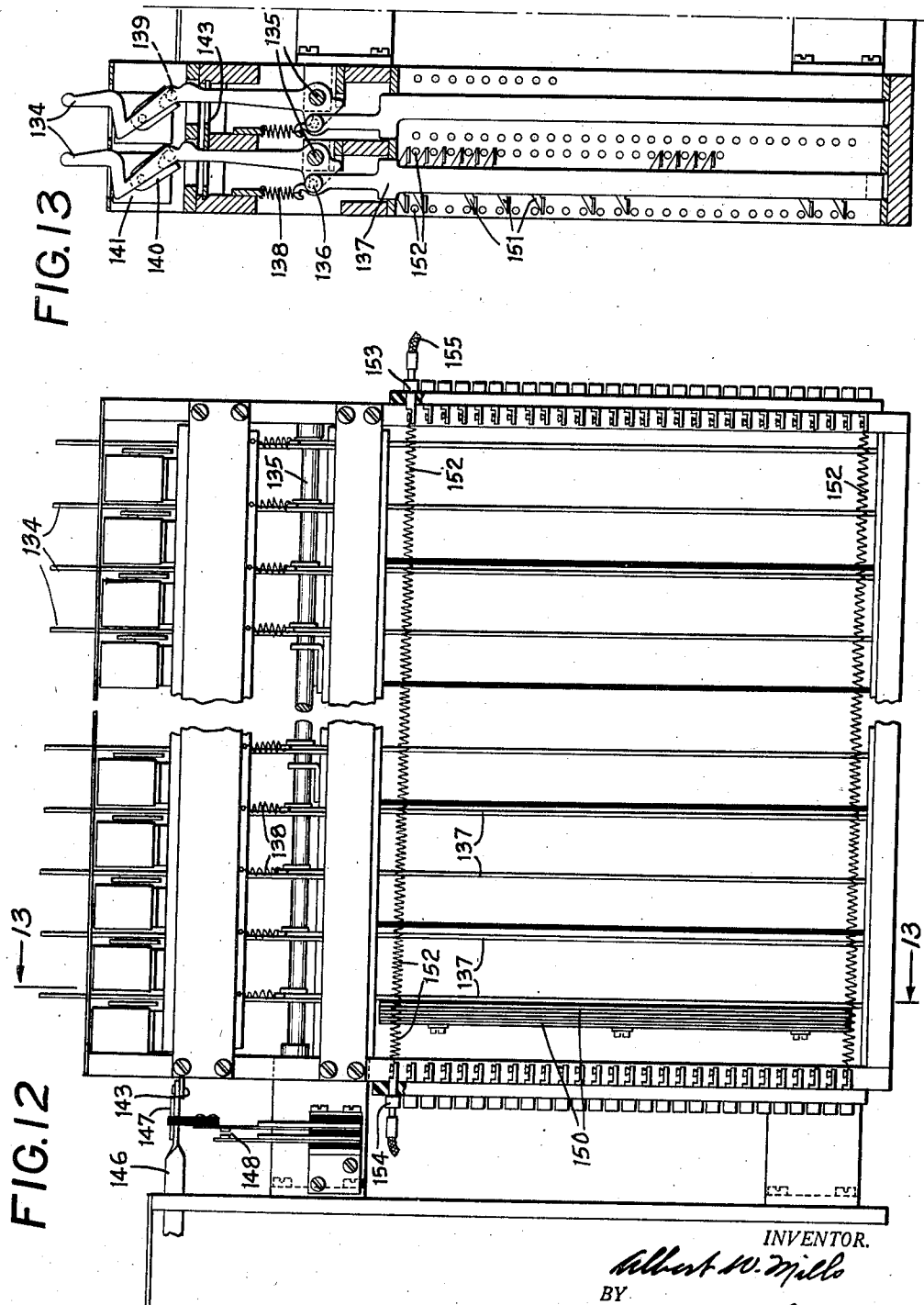
A. W. MILLS

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FIG. 14

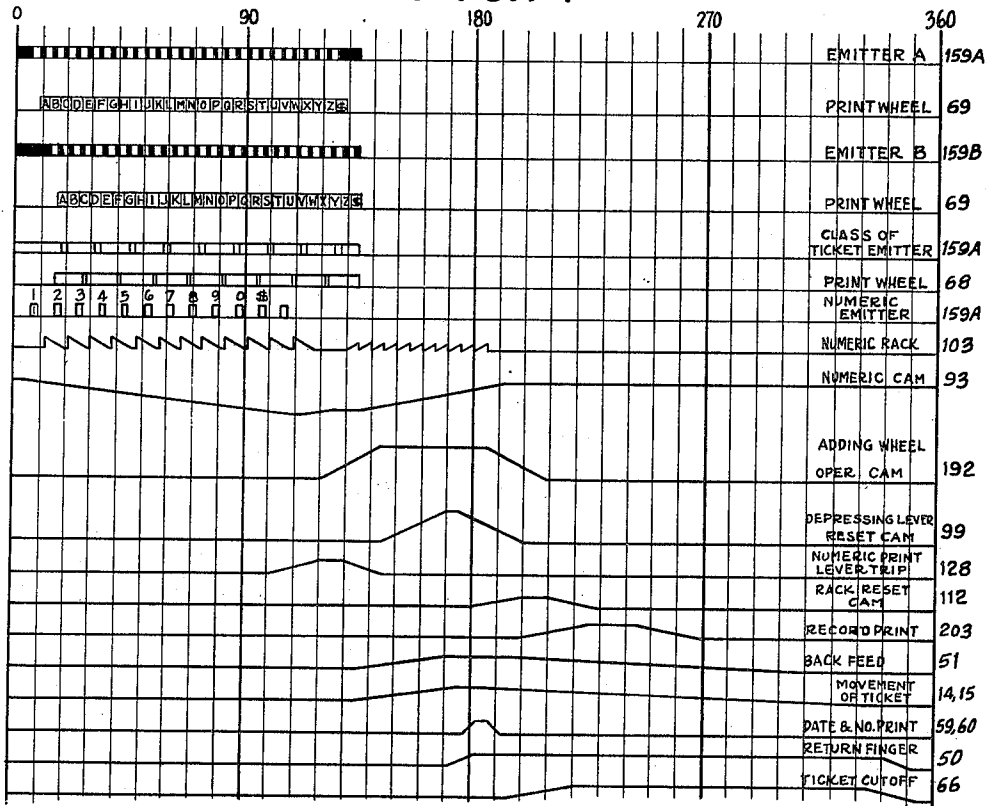
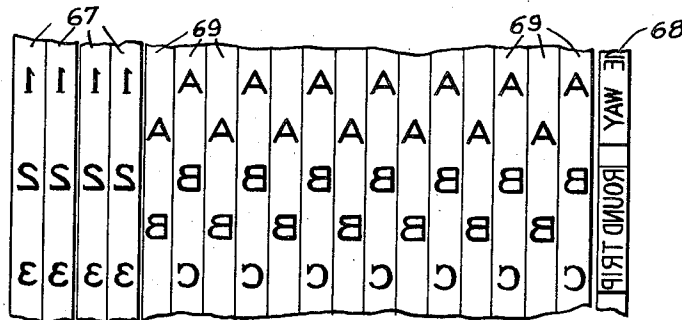


FIG.15



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2,111,121

PRINTING MECHANISM

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11 Sheets-Sheet 9

FIG. 16

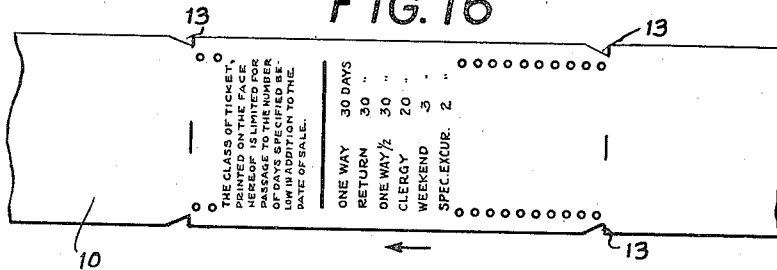


FIG. 17

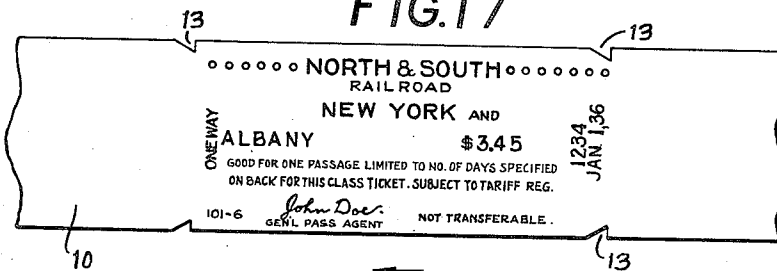
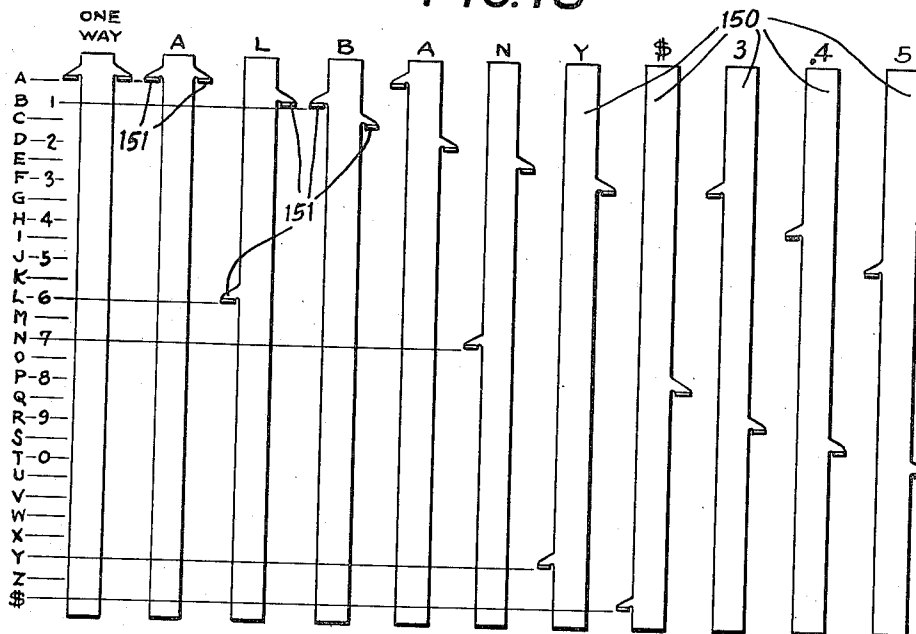


FIG. 18



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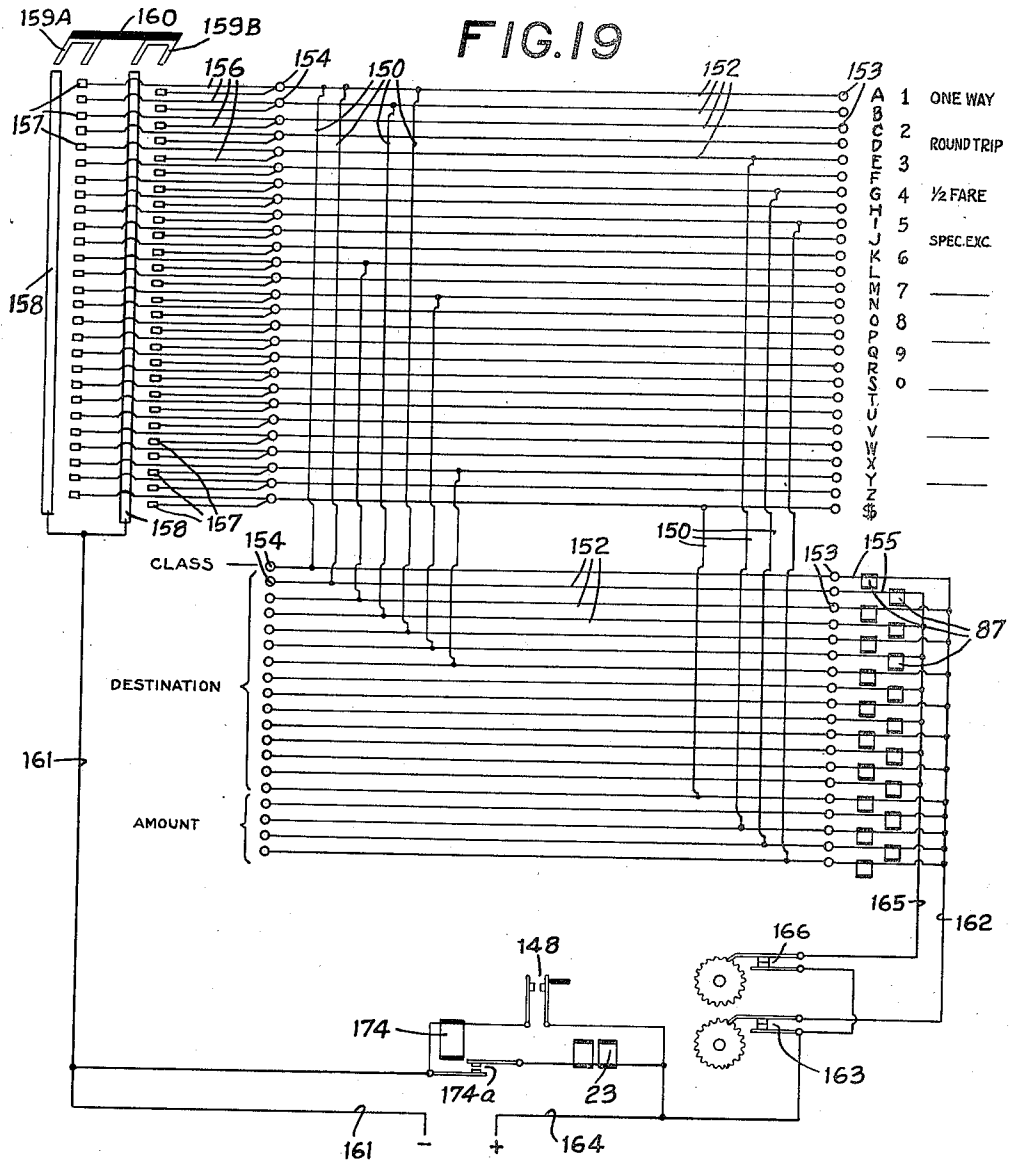
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PRINTING MECHANISM

Filed Dec. 22, 1936

11 Sheets-Sheet 10



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PRINTING MECHANISM

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FIG. 20

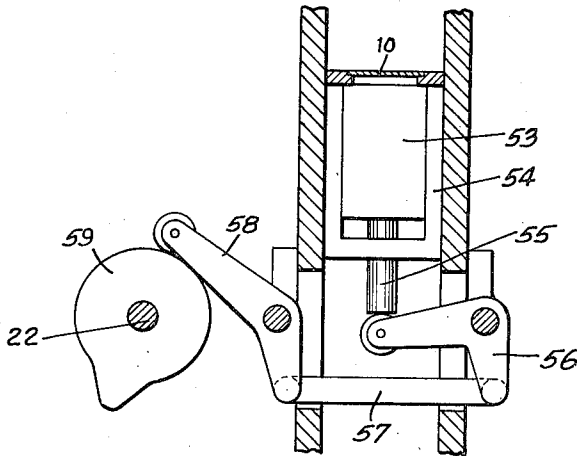


FIG. 21

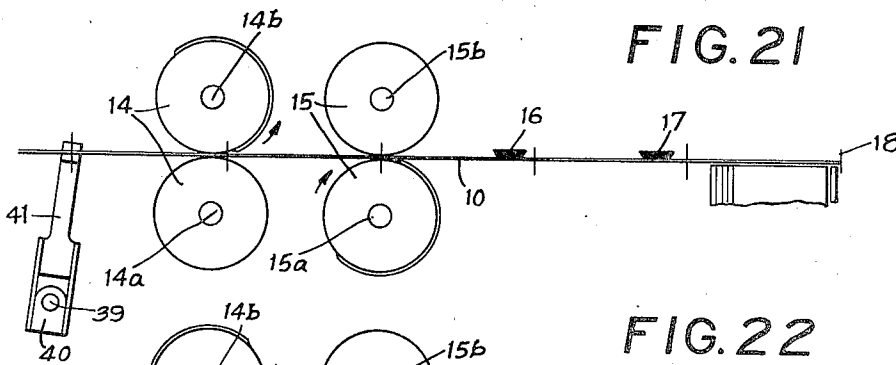


FIG. 22

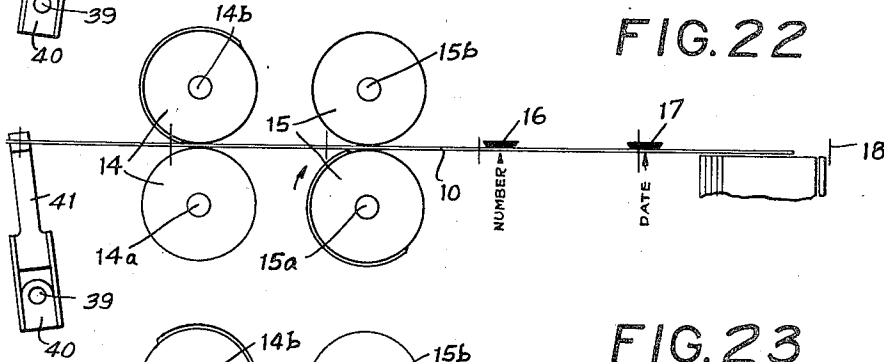
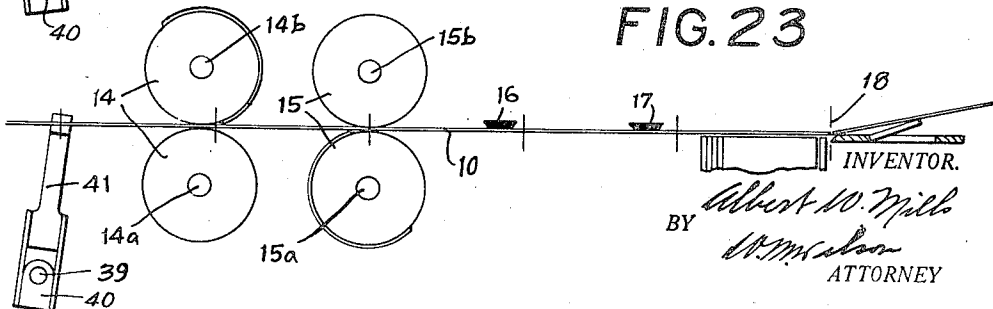


FIG. 23



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UNITED STATES PATENT OFFICE

2,111,121

PRINTING MECHANISM

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Application December 22, 1936, Serial No. 117,139

14 Claims. (Cl. 101-96)

This invention relates to printing machines and more particularly to a machine for printing railroad tickets containing variable data such as destination, fare, serial number, etc.

5 The principal object of the invention is to provide a simplified ticket issuing machine wherein various predetermined distinctive card tickets are produced from a single strip by the operation of a single manually operable key.

10 A more specific object of the invention is to provide an improved printing mechanism which includes a plurality of closely spaced type wheels in which the type in alternate wheels are circumferentially offset so that printing from a type

15 in any wheel will not cause fragmentary printing from type on adjoining wheels, which might occur with other forms of type wheels.

A further object is to provide a printing wheel which is rapidly advanced step by step under control of a Geneva mechanism and from which

20 an impression is taken by a timed power actuated printing hammer during any selected interval of rest.

In carrying out the objects of the invention,

25 a roll of blank material having the width of the tickets to be prepared is threaded through the machine. This material may be provided with the usual protective tinting, if desired, and is notched along the edges at intervals representing ticket lengths. In passing through the

30 machine the opposite sides of the strip are printed upon by suitably engraved rollers from which information common to all tickets to be issued is printed. After passing the printing rollers,

35 the strip is brought to a serial numbering station and a dating station, after which it is advanced to a printing position adjacent to a group of constantly rotating type wheels from which the destination may be selectively printed; a con-

40 stantly advancing type wheel from which the class of ticket is printed; and a group of differentially positionable type sectors from which the fare or price of ticket is selectively printed. A number of operating keys are provided in ac-

45 cordance with the number of destinations to be taken care of as well as the different classes of tickets. Operation of any selected key will cause the automatic printing upon the ticket of the corresponding destination, fare, and class of

50 ticket, and its severance from the strip of record material. Counters are provided in juxtaposition to the various keys which record the number of operations of each key, thus affording an indication of the number of tickets of that class

55 and for that destination issued. In addition,

an accumulating mechanism is provided into which all the prices are entered so that a progressive total is available and which may be utilized in checking the total amount of business transacted in the issuance of tickets from a particular machine.

Various other objects and advantages of the invention will be obvious from the following particular description of one form of mechanism embodying the invention or from an inspection 10 of the accompanying drawings; and the invention also constitutes certain new and useful features of construction and combination of parts hereinafter set forth and claimed.

In the drawings:

Fig. 1 is a plan view of the machine.

Fig. 2 is a detail in isometric of the ticket tape aligning device.

Fig. 3 is an elevation looking from the front in Fig. 1, showing the general arrangement of 20 the machine.

Fig. 4 is a central section looking in the same direction as Fig. 3, the view being taken substantially along lines 4-4 of Fig. 1.

Fig. 5 is a central section through the printing and adding mechanism, the section being 25 taken along the lines 5-5 of Fig. 4.

Figs. 5a and 5b are detail views of the auxiliary printing mechanism.

Fig. 6 is a section taken along the lines 6-6 30 of Fig. 4, showing the gear connections and operating cams.

Fig. 7 is a detail of the type wheels.

Fig. 8 is a section taken on line 8-8 of Fig. 7.

Fig. 9 is a detail of the main clutch of the 35 machine.

Fig. 10 is a plan view of several of the operating keys.

Fig. 11 is a detail showing one of the key 40 stems.

Fig. 12 is an elevation of the key mechanism, showing the circuit selecting devices.

Fig. 13 is a sectional view taken along the lines 13-13 of Fig. 12.

Fig. 14 is a timing diagram of the machine. 45

Fig. 15 is an enlarged detail of a section of the type wheel showing the offsetting of the alternate alphabetic character printing wheels.

Fig. 16 is a specimen of a ticket showing one 50 side thereof.

Fig. 17 is a view similar to Fig. 16, showing the opposite side of the ticket.

Fig. 18 is a diagrammatic view showing the selective arrangement of the contact devices on the key stems related to a particular key. 55

Fig. 19 is a wiring diagram of the electric circuits of the machine.

Fig. 20 is a section taken along lines 20—20 of Fig. 4, showing the operating mechanism for the serial numbering device.

Fig. 21 is a diagrammatic view showing the relative position of the tape when the destination is printed thereon.

Fig. 22 shows the position of the tape when the tickets are serially numbered and dated.

Fig. 23 shows the position of the tape after a ticket has been fully printed.

Ticket feeding mechanism

The mechanism by means of which the ticket material is advanced from the supply roll to and through the machine to the point of cut-off will first be described, after which the mechanism for making impressions on the tape at various points along its path of travel will be explained in detail.

Referring to Fig. 4, the ticket tape 10 is fed from a spool 11 through an arcuate guide 12. The tape is provided with notches 13 (as shown in Figs. 16 and 17), disposed along the edges at regularly spaced intervals, the distance between any two successive notches being the length of the ticket to be prepared. From the guide 12 the tape 10 passes pairs of rolls 14 and 15 in succession, thence to printing platens 16 and 17 to the position shown in Fig. 21 where the leading edge is at the point of cut-off designated 18. This position of the tape is also shown in Fig. 1 and in Fig. 21 the short vertical lines crossing the tape 10 indicate the limits of the successive tickets. With the tape in the position of Fig. 21, printing of the destination, price, and classification is effected, after which the ticket is retracted to the position of Fig. 22 wherein the "date" is printed on the ticket at platen 17. At the same time, the "serial number" is printed at platen 16 on the next following ticket. Thereafter, the tape is moved to the position of Fig. 23 where the ticket is cut off at the point 18. The mechanism for shifting the tape to these various printing positions will now be described in greater detail.

Referring to Figs. 6 and 9, a pulley 19 is driven from any suitable source of power, such as an electric motor (not shown), by means of a belt 20. Integral with the pulley is a clutch driving element 21, which, with the pulley, is loosely mounted on shaft 22. When a ticket is to be printed, clutch magnets 23 are energized to attract armature latch 24 and permit spring-pressed dog 25, pivoted to arm 26, to engage the driving element 21. Arm 26 is secured to the shaft 22 and, accordingly, the shaft will now be rotated. As will be explained hereinafter in connection with the circuit diagram, the energization of the magnet 23 is not maintained so that shortly after energization it releases its armature latch 24, permitting the arm to drop back into the path of the dog 25 so that upon completing a single revolution of shaft 22, the parts become disengaged and resume their normal relationship, as in Fig. 9.

Referring now to Fig. 1, the shaft 22 carries a bevel gear 27 meshing with a similar gear 28 on a shaft 29 (see also Fig. 3). The shaft 29 carries a gear 30, which meshes with a gear 31, which in turn causes operation of shafts 15a and 14a upon which the lower printing wheels 15 and 14, respectively, are mounted through the medium of gears generally designated 32. Gear 31 also drives a gear 33 which in turn, through the

medium of gearing 35, drives the shafts 15b and 14b upon which the upper printing rollers 15 and 14, respectively are mounted. The shaft 14b carries a gear 35 which, through a pinion 36, drives the shaft upon which inking roller 37 (Figs. 1 and 4) is mounted. A similar inking roller 38 is provided for the printing rollers 15 and may be driven in a similar manner.

Between the arcuate guide 12 and shaft 14a is a rod 39 (see also Fig. 2). Secured to the rod 40 are members 40 which are straddled by fingers 41 which are pivoted to the members 40 at their lower ends and are normally urged apart by a spring 42. The upper extremities of fingers 41 are provided with hooks 43 which are adapted to engage in the notches 13 in the tape to effect accurate alinement of the same. Pivoted to the frame of the machine (see Fig. 1) is a pair of fingers 44 pivoted at 45 and provided with a pin and slot connection 46 so that rotation of one of the fingers will cause concurrent rotation in the opposite direction of the other finger. When the fingers are moved together, they will urge hooks 43 into engagement with the edge of the tape and when they are moved apart, the hooks 43 are free to move away from the edges of the tape under the influence of the spring 42. Integral with one of the arms 44 is an arm 47 connected by a link 48 to a bell crank 49 (see Fig. 4) whose one arm carries a roller in engagement with a cam 50 carried by shaft 14a. On the same shaft is a cam 51 which cooperates with a follower arm 52 secured to the shaft 39. The operation is such that after printing of the destination, price, and classification has been effected on the leading ticket section, cam 50 operates to cause fingers 41 to engage in the notches 13 standing opposite the fingers and thereafter cam 51 will rock shaft 39 counterclockwise as viewed in Figs. 4 and 22, whereby the tape will be retracted from the position of Fig. 1 to that of Fig. 22. Thereafter, the fingers 41 are moved away from the tape and returned to their initial position.

During the movement of the tape 10 toward the left, under control of the fingers 41, the tape is free of the pairs of rollers 14 and 15. As is shown in Fig. 21, the upper roller 14 is provided with type on slightly more than half its circumference, this type being arranged to effect the printing shown in Fig. 16. The lower printing roller 15 carries the type for printing the face of the ticket as in Fig. 17, with the exception of the variable information. In Fig. 21, the upper roller 14 and the lower roller 15 have just advanced the tape to proper position for printing the destination and at this time the raised type move out of engagement with the tape so that there is now no contact between the rollers. During the interval that the type rotates from the position of Fig. 21 to that in Fig. 22, the classification data are printed and the tape is retracted to receive the number and date printing, after which time the type faces will arrive in the position of Fig. 22 and again pick up the tape to advance it the distance necessary to eject the completed ticket.

In Fig. 20 is shown a usual numbering device, indicated generally at 53, which is reciprocal in guides 54 and has the usual plunger 55 in engagement with a roller carried by a bell crank 56 which has link connection 57 with a follower arm 58 which is operated by a cam 59 carried on shaft 22 (see also Fig. 1). A similar cam 60, also carried on shaft 22, serves to operate the dating de-

vice which cooperates with platen 17. At point 18 there is provided a knife 61 (see Figs. 1 and 5) which is pivoted at 62 and has connection with a bell crank 63 which, in turn, is connected by a link 64 to a bell crank follower arm 65 operated by a cam carried by shaft 15a. At the proper time in the cycle of operations, the knife 61 is rocked clockwise (as viewed in Fig. 5) to shear the completed ticket from the following portion of the tape.

Destination printing mechanism

Printing of the destination is effected on the ticket by means of type carried by a constantly rotating set of wheels. As particular type characters pass printing position, printing hammers are rapidly impelled against the type to take an impression therefrom without interrupting the movement of the type wheel. In Fig. 7 is shown the type wheel from which the impressions are taken. These type wheels are of three kinds. The four to the right, designated 67, are employed to print the price. The single wheel on the left, designated 68, is employed to print the classification; and the group of fourteen wheels 69 are employed to print the destination. The last set of wheels will now be described, after which the other two types will be explained.

The wheels 69 are secured upon a shaft 70 (see also Fig. 6). The shaft carries a pinion 71 which, through an idler 72, is driven by gear 73 carried by the shaft 22. The type wheels 69 are thus driven at a rapid rate, completing a full revolution during somewhat less than half a revolution of shaft 22.

Referring now to Fig. 5, there is provided a printing hammer 74 for each of the type wheels 69 and one also for each of the type wheels 67. A special hammer 74a is provided for the type wheel 68 which differs from the hammer 74 in that it has a longer striking face. All of the hammers are freely pivoted at 75 and normally held in the position shown in Fig. 5 by springs 76. Mounted on a shaft 77 which is driven from shaft 70 through the train of gearing generally designated 78 are ratchet-shaped driving wheels 79 of which there is one provided for each type wheel. In line with each wheel 79 is a hook 80 pivoted at its upper end to a lever 81 and having its free end spring-pressed against a by-pass latch 82 of a pivoted member 83. The member 83 is spring-urged in a clockwise direction and normally held against such movement by a latch 84 which has link connection 85 with armature 86 of a magnet 87. Energization of magnet 87 will attract its armature 86 drawing link 85 downwardly to rock latch 84 counterclockwise and release lever 83. The lever will thereupon rock hook 80 counterclockwise about its pivot causing the tooth thereon to move into the path of the teeth of the driving ratchet 79. The driving teeth will cause rapid downward movement of hook 80 and through lever 81 the associated hammer 74 will be given a rapid counterclockwise propulsion against the type wheel. Near the end of the downward movement of hook 80 its free end will strike the fixed camming surface 88 and will disengage it from the driving wheel 79.

The particular character to be printed from any wheel is determined by the timing of the operation of the printing hammers 74 and the circuits and mechanism for effecting this timing will be explained in connection with the circuit diagram. The levers 83 are restored by means of a bail 89 pivoted at 90 (see Fig. 6). The shaft 90 has lever

and link connection 91 to a follower arm 92 which is operated by a cam 93 on shaft 22. The latches 84 are restored by means of a bail 94 secured to a shaft 95 which in Fig. 6 has lever and link connection 97 to a follower 98 which is operated by a cam 99 also secured to shaft 22.

Price printing wheels

The price printing wheels 67 of Fig. 7 are loosely mounted on the shaft 70 and are sector-shaped as shown in Fig. 5. Integral with each sector 67 is a pinion 100 which meshes with rack teeth in a vertical link 101. The lower extremity of each link 101 is also provided with rack teeth meshing with a toothed segment 102 which is secured to a pivoted plate 103 which is normally urged in a clockwise direction by a spring 104. A bail 105, secured to shaft 106, normally holds the plate in the position shown and is operated to cause rotation of the price wheels 67 through mechanism 20 which comprises a spring-pressed arm 107 secured to shaft 106 (Fig. 6), which arm has link connection 108 to an arm 109 secured to a shaft 110. The shaft 110 carries a follower arm 111 cooperating with a cam 112 carried by shaft 22.

The connections 85 from the printing magnets 87 associated with the price wheels also have pivoted connection with bell crank levers 113 which are pivoted at 114 (Fig. 5). These levers 113 serve to hold spring-pressed latches 115 out of the path of teeth 116 in the edge of the sector 103. When the sector is in its restored or upper position, as in Fig. 5, the trailing high portion of the same engages the latch 115 to rock it into latching engagement with the bell crank 113. With the construction described, the teeth 116 successively pass the engaging toe of latch 115 as corresponding type elements on the price wheels 67 pass printing position. Energization of an associated magnet 87 will rock bell crank 113 to release the latch 115 which will thereupon engage one of the teeth 116, stopping the type wheel with a selected type in printing position. At the same time, the related link 85 will trip the printing hammer as hereinabove described so that stopping of the wheel and tripping of the hammer are concurrent operations. The reason for constructing the price printing wheels in the manner described and providing mechanism therefor different from that for printing the destination is to enable an accumulation to be made of the prices so that the total amount of money involved in the several transactions may be accumulated. This accumulating mechanism will be described later.

Classification printing

The classification wheel 68 (Fig. 8) is provided with nine printing faces and as these faces are of considerably greater length than the faces of the type from which printing is effected in flight, it is desirable that an impression be taken with the wheel at rest. For this reason, a form of Geneva drive is provided which includes a star wheel 117 which is integral with wheel 68 and both are freely mounted on the shaft 70. Cooperating with the wheel 117 is a driving pin 118 carried by an arm 119 on a rod 120. The other end of the rod 120 carries a pinion 121 (see Fig. 6) which meshes with a gear 122 driven from the chain of gearing 78 so that the wheel 68 advances constantly with a step-by-step movement as the destination wheels 69 advance with a continuous movement. The printing hammer 74a for the wheel 68 is tripped in exactly the same manner as the hammers 74 and the timing is arranged so that the

hammer is tripped during the period when the wheel is at rest, the particular face printed from depending on the time at which the hammer is tripped.

5 Restoring means is provided for the latches 113 which comprises a bail 123 (Fig. 5) carried by shaft 124 (Fig. 6) which has lever and link connection 126 with a follower 127 operated by a cam 128 carried by shaft 22.

10 Extending over the printing wheels is an inking ribbon 129 which is fed from a spool 130 to a pair of feeding rollers 131, the larger of which has associated therewith a ratchet and pawl mechanism generally designated 132, which are operated through a link 133 connected at its lower extremity to the bail 105 so that for each operation of the bail the ribbon is slightly advanced.

Key mechanism

20 The selecting keys are shown in Figs. 10, 12, and 13. These keys constitute levers 134 which are pivoted on rods 135. Connected to each key lever 134 at 136 is a bar 137 normally urged upwardly by a spring 138. Each key lever 134 has pin and slot connection 139 with the operating arm 140 of a counter mechanism 141 of the well known Veeder type so that each key lever operation will be separately counted. In Fig. 10, each key lever 134 and its corresponding counter 30 141 has located adjacent thereto an indicating marker 142 which designates the destination, price, and classification assigned to the particular key. Thus, the lowermost left hand marker 142 in Fig. 10 indicates that its key lever 134 controls the preparation of a "one way" ticket to Albany, whose price is \$3.45.

Cooperating with all of the key levers 134 is a horizontally slidable plate 143 having notches 144 40 through which the key levers 134 extend. Extending into each notch is a cam latch 145 against which the operated key lever acts to cause the plate 143 to be shifted toward the left as viewed in Fig. 10. The plate has connection with a link 146 which is provided with an extension 147 (see also Fig. 12) which operates a pair of contacts 45 148. As the plate 143 is moved toward the left as a consequence of the operation of one of the key levers, the extension 147 will close contacts 148. These contacts control the initiation of a cycle of operations of the machine during which the ticket is prepared and ejected. Secured to each of the bars 137 is a plurality of contact plates 150 which are suitably insulated from one 50 another and from the bar 137 (see Fig. 11). The number of plates 150 connected to each bar 137 is dependent upon the number of letters in the destination and the number of figures in the price to be printed under control of the related key. For example, the bar 137 associated with 60 the "Albany" key has plates 150 secured thereto which are separately shown in Fig. 18. The left hand plate will control the printing of the designation "One way"; the next six plates will control the printing of the destination "Albany"; the next one will control the printing of the dollar sign; and the last three will control the printing of the digits of the amount. Each of the plates 150 has a pair of steps 151 located at various 65 levels in accordance with the character to be printed. These steps are arranged, when the supporting bar 137 is lowered, to complete electrical connections to the printing magnets to select the various characters at the proper time 70 in the operation of the machine. Extending

across all of the bars 137 in a single row are pairs of springs 152 which are anchored at their extremities to plug sockets 153 and 154. These springs lie beneath the steps 151 and are normally out of contact therewith. When any bar 137 is shifted downwardly, all of the related steps 151 will make electrical contact with the related springs 152 so that each plate will connect a spring 152 on one side of the bar with a spring 152 on the opposite side, which is either in the same or a different horizontal plane. 10

The circuit connections established may best be understood from the circuit diagram in Fig. 19 wherein the springs 152 on one side of the bars are shown as horizontal lines extending between the sockets 153 and 154 and the wires on the opposite side are shown as a separate set directly below. The plates 150 are represented as vertical lines making connection between one of the upper set of springs 152 and one of the springs 152 of the lower set. Each of the springs 152 of the lower set is connected by a wire 155 to one of the printing magnets 87, the uppermost spring being connected to the printing magnet 87 which controls the printing of the classification data 25 derived from the printing wheels 68 of Fig. 7. The lowermost four springs are connected to the magnets 87 which control the positioning of the numerical type sectors 67 while the intervening group control the magnets which print from the constantly rotating type wheels 69. The connections to this group of springs 152 are made in accordance with the positions on the ticket in which it is desired to have the destination and amounts appear. The upper group of springs 152 have their sockets 154 connected by wires 156 35 to the segments 157 of a commutator device shown in Fig. 5. There are two lines of segments 157 and alongside each line is a common conducting strip 158. A pair of connecting brushes 159 is provided to connect the segments 157 in succession with the common conductor 158 of one set and a brush 159A effects similar connection between the second set and its common conductor 158. These brushes are carried by 45 and insulated from an arm 160 carried by a shaft 22. The timing of the operation is such that the brushes 159A and 159B make contact with the segments successively as the type on the various printing wheels arrive at the printing line in the order designated in Fig. 19 opposite the springs 152. The tracing of a specific circuit will make this clear. 50

With the plates 150 making electrical connection between the sets of springs 152 as shown, a circuit will be completed when the brush 159A 55 contacts the first segment 157, which is traceable as follows: from the negative side of line 161, to left hand conductor 158, brush 159A, uppermost segment 157, wire 156, socket 154, to the left hand plate 150, thence to the uppermost spring 152 and the uppermost printing magnet 87 through a wire 162, cam controlled contacts 163, to positive side of line 164. This circuit is completed as the classification wheel 68 presents the designation "One way" to the printing line and this designation will be printed on the ticket. A second circuit is also completed concurrently which extends from the uppermost wire 152, to the second plate 150, the second spring 152, to the second printing magnet 87, a wire 165, a pair of cam controlled contacts 166, to line 164. The parts are so timed that the type element for printing the letter "A" is at the printing line at this time and the character "A" will consequently 75

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be printed. It will be observed that the fifth plate 150 from the left is also connected to the uppermost spring 152 and a further circuit will also be completed through this plate to the fifth spring 152 to energize its related printing magnet 87 to print the latter "A" in this position also. When the brush has advanced to the second segment 157, a circuit is completed to print the letter "B" in its proper position on the ticket. In this manner, as the brushes 159A and 159B advance, the characters will be printed in the order in which they are connected to the springs 152; thus, the digits 3, 4, and 5 of the price will be printed next, and the "L" and "N" in order, and near the end of the cycle, the letter "Y" will be printed, followed by the printing of the dollar sign. In a single revolution of the printing wheels, therefore, the various characters will be printed as they pass through the printing position.

Referring now to Fig. 15, wherein a section of the type wheel group is shown, it will be observed that alternate ones of the wheels 69 are displaced a half step with respect to the rest of the wheels. This is done to avoid so-called shadow printing, that is, the printing of adjacent portions of characters from the adjoining type wheels together with the printing of the selected character, and permits the use of the largest possible characters in a smaller space. In order to print correctly from these offset type, it is necessary to delay the timing of the wheels whose characters are set back a half step an equivalent amount, and it is for this reason that the two emitter brushes 159A and 159B are provided. The brush 159A controls the completion of circuits through the classification and amount printing magnets corresponding to the even numbered type wheels when counted from the left in Fig. 15. These are the printing magnets which are connected to the wire 162, and the contacts 163 in series with these magnets are timed to be open when brush 159B makes connection with its segments 157, and to be closed when brush 159A contacts its segments. The remaining printing magnets 87 are connected to the wire 165 and the contacts 166 which are timed to be closed only when the brush 159B is in contact with its segments and to be open when the brush 159A makes connection. Thus, for the printing of the classification "One way", the circuit is controlled through the brushes 159A and the contacts 163. At the same instant, brushes 159A also complete the circuit through the fifth plate 150 which prints the second "A" in the word "Albany." The open condition of the contacts 166 at this moment prevents the completion of the circuit for the first letter "A" in this word. This circuit is completed a half step later when the brush 159B contacts the first segment 157 and at this time the contacts 163 are open and contacts 166 are closed, permitting the completion of the circuit through wire 165 and printing of the first letter "A" from a type wheel whose characters are retarded.

In the diagram of Fig. 19, the brushes 159A and 159B are shown as being of the same length and their related segments 157 are offset a half space. In the actual construction, for purposes of uniformity, the segments of the two sets are actually side by side, but the brushes 159B (see Fig. 5) are adjusted to make contact a half step later than the brushes 159A.

Referring to Fig. 6, the shaft 90 has secured thereto an arm 167 which, through a link 168,

operates a bell crank 169 (Fig. 3) to draw the link 146 toward the left to release the key lever 134 which has been depressed. This takes place near the end of the cycle of operations so that the parts may return to their normal position. A hand lever 170 is provided (Fig. 6) which lies over a pin 171 in lever 167 so that the same may be operated manually. A units counter 172 is also provided which is connected by a link 173 to the link 108 so that each operation of the machine may be counted and, since for each operation a ticket must be issued, the counter indicates the total number of tickets prepared and ejected.

Referring to Fig. 19, the closure of contacts 148 due to the operation of one of the key levers 134 will complete a circuit from line 164, contact 134 will complete a circuit from line 164, contacts 148, a relay 174, to line 161. The relay closes its contacts 174a which completes the circuit through the main clutch magnet 23 and after this, as explained, will cause a cycle of operations in the machine, toward the end of which the contacts 148 are mechanically unlatched to permit their opening and interruption of the operation after a complete cycle has been effected.

Accumulating mechanism

The accumulating mechanism is shown in Figs. 5, 5a and 5b and comprises a plurality of printing wheels 175 to which gears 176 are attached. The wheels and gears are mounted on a rod 177 carried in a frame 178 which is pivoted at 179 and has a rod 180 passing through a slot 181 in an arm 182 secured to a rod 183. When the arm 182 is rocked clockwise, the slot 181 will cause the member 178 to rock counterclockwise and withdraw the gears 176 from engagement with the teeth in sectors 184. The operation is such that as the sectors 103 are rocked clockwise to position the price printing type sectors 67 under control of the corresponding magnets 87, pins 185 in the sectors 103 will cause the corresponding sectors 184 to move therewith and take position in accordance with the digital value selected for printing. After all the type sectors have been positioned, the gears 176 are moved into engagement therewith so that on the return stroke, the amount represented by the positioning of the sectors 184 will be rolled onto the gears. Each gear is provided with the usual carrying tooth 186 which is adapted to rock the usual arm 187 clockwise whenever the wheel passes through zero. The usual latch 188 is provided to hold the arm in rocked position. This arm cooperates with a lateral extension 189 of the next higher order sector 184 permitting it to advance an additional step to enter a unit in its corresponding wheel whenever the lower order wheel passes through zero. The mechanism for rocking the wheels in and out of engagement comprises linkage designated 190 in Fig. 6 which connects the rod 183 to a follower arm 191. The roller is operated by a cam 192 carried by the shaft 22. After each entry into the wheels 175, a printing hammer 193 (Fig. 5) is tripped to take an impression from the wheels onto a record strip 194 which is provided with suitable spacing mechanism (not shown). Hammer 193 is carried on a rod 195 (see Figs. 5a and 5b) to which is also secured a member 196 which is connected by a link 197 to an arm 198 secured to a rod 199. In Fig. 6 the rod has link and lever connection 200 to a shaft 201 whose follower arm 202 is operated by a cam 203 mounted on the shaft 22. At

the proper time in the cycle the shaft 199 is rocked counterclockwise from the position of Fig. 5a to the position of Fig. 5b, causing the member 196 to rock in the same direction. A spring-pressed latch 204 carried by the member has one arm which, as the member is rocked, engages a lever 205 secured to the rod 195, causing the lever 205 to also rock counterclockwise. Near the end of the stroke, latch 204 engages a fixed pin 206, causing it to rock to the position shown in Fig. 5 to release the lever 205, which thereupon, under the influence of a spring 207, will thus be tripped for rapid clockwise rotation and will carry with it the printing hammer 193.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is as follows:

1. A printing mechanism for completely printing a word by depression of a single key, said printing mechanism including a plurality of type wheels for the different letters of the word, all said wheels being alike with alternate wheels circumferentially displaced with respect to others, means for selecting a type element on each wheel and for effecting printing of the different letters of the word at different times during a cycle of operation of the mechanism and for printing a letter from said alternate wheels at a different time than the same letter in an adjacent type wheel and means for initiating a cycle of operation of the machine to effect a word printing on each operation of a key.
2. In a printing mechanism, the combination of a plurality of type wheels each having type elements representative of the letters of the alphabet, the type elements of each wheel being adjacent to the space between successive type elements of the adjoining wheel, means for rotating said wheels to successively present the type elements thereon to a printing position and means including timing devices to cause selection of a type element on each wheel and effect printing therefrom at differential times depending upon the location of the selected elements on the wheels.
3. In a printing mechanism, the combination of a plurality of rows of spaced type elements, each row comprising type elements representative of the letters of the alphabet, the elements of each row being located adjacent to the space between successive elements of the adjoining row of elements, means for concurrently moving said rows of elements to present the type elements thereon to a printing position and means including timing devices to cause selection of a type element in each row and effect printing therefrom at differential times depending upon the location of the selected elements in the rows of elements.
4. In a printing mechanism, the combination of a plurality of rows of spaced type elements, each row comprising type elements representative of the letters of the alphabet, the elements of each row being located adjacent to the space between successive elements of the adjoining row of elements, means for concurrently moving said rows of elements to present the type elements thereon to a printing position, a key and means operative upon actuation of said key and including timing devices to cause selection of a type element in each row and effect printing therefrom at differential times depending upon the location of the selected elements in the rows of elements.
5. In a printing machine, the combination of a plurality of rows of spaced type elements each row comprising type elements representative of the letters of the alphabet, the elements of each row being adjacent to the space between successive elements of the adjoining row of elements, a printing hammer for each row of elements, means for concurrently moving said rows of elements to present the type elements thereon to a printing position, a single key and means controlled by said key upon actuation for moving said hammers against their respective rows of type elements at different times.
6. In a printing machine, the combination of a plurality of rows of spaced type elements, each row comprising a plurality of different type elements, the elements of each row being located adjacent to the space between successive elements of the adjoining row of elements, type hammers, a power drive, an actuator for each hammer for connecting said power drive with the hammers during movement of the rows of elements, to impel the hammers against the type elements in their respective rows, means for concurrently moving said rows of elements to present the type thereon to a printing position, a single key and means effective upon actuation of said key for causing said actuators to operate their hammers at different times.
7. In a printing mechanism, a plurality of rotatable type carriers each having a plurality of spaced type elements about its periphery, the elements of each carrier being located adjacent to the space between successive elements of the adjoining carrier, electromagnetic means for effecting printing from any of said elements during rotation of the carriers, a pair of emitters, one having offset type and the other timed for the remaining carriers, a key and means controlled thereby for selecting impulses from both of said emitters for control of said electromagnetic means to cause the same to effect printing from adjacent carriers.
8. In a printing machine, a type wheel, a Geneva drive mechanism for advancing said wheel step by step, a printing hammer, a power actuator therefor, and key controlled means for coupling said hammer to said power actuator when said type wheel is at rest to take an impression therefrom.
9. In a printing machine, a type wheel, having a plurality of type elements thereon, a Geneva drive mechanism for advancing said elements in succession to a printing position and holding them at rest momentarily, a printing hammer and key controlled means including a timing device for causing said hammer to take an impression from any of said type elements when it is at rest.
10. In a printing machine, a printing station and a stamping station located adjacent to one another, means for initially presenting a section of a ticket tape to said printing station, a key, means controlled thereby for causing movement of said section from said printing station to said stamping station to receive a stamping impression, further means controlled by said key for causing return of the section from said stamping

station, to said printing station, to receive printing impressions and means for causing ejection of said section from said printing station.

11. The invention set forth in claim 10 in which cutting means is provided and rendered operative to sever said section from the tape after ejection from the printing station.

12. In a printing machine, a type wheel having a plurality of type elements, means for rotating the same, an emitter arranged to emit a series of impulses one for each type element, a series of coil springs, connected to said emitter to each receive a differently timed impulse, a common coil spring parallel to said series of springs, a key movable transversely to the direction of the length of said springs and contact means carried by said key to engage and electrically connect one of said series of springs to said common spring, a circuit completed by said engagement and means included in said circuit for causing printing to be effected by one of said type elements.

13. In a ticket printing machine, a plurality of

printing wheels, a date stamping device, a plurality of manually operable keys, each key corresponding to different data, a ticket tape having notches in the edges thereof dividing the tape into ticket sections, means for advancing said tape, section by section to said printing wheels, means rendered operative by the actuation of a key for engaging said notches and causing retrograde movement of the tape to bring a section thereof into registration with said stamping device, further means for thereafter advancing said section to said printing wheels and means brought into operation by said key for causing the stamping of the registered section by said device and printing on the section by said wheels in accordance with the data represented by the key.

14. The invention set forth in claim 13 in which means is provided and set in operation by the actuation of said key for causing severance of the section from the tape after stamping and printing operations have been completed.

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