Nov. 2, 1926. 1,605,188

J. W. HUBBARD

PRINTING MACHINE

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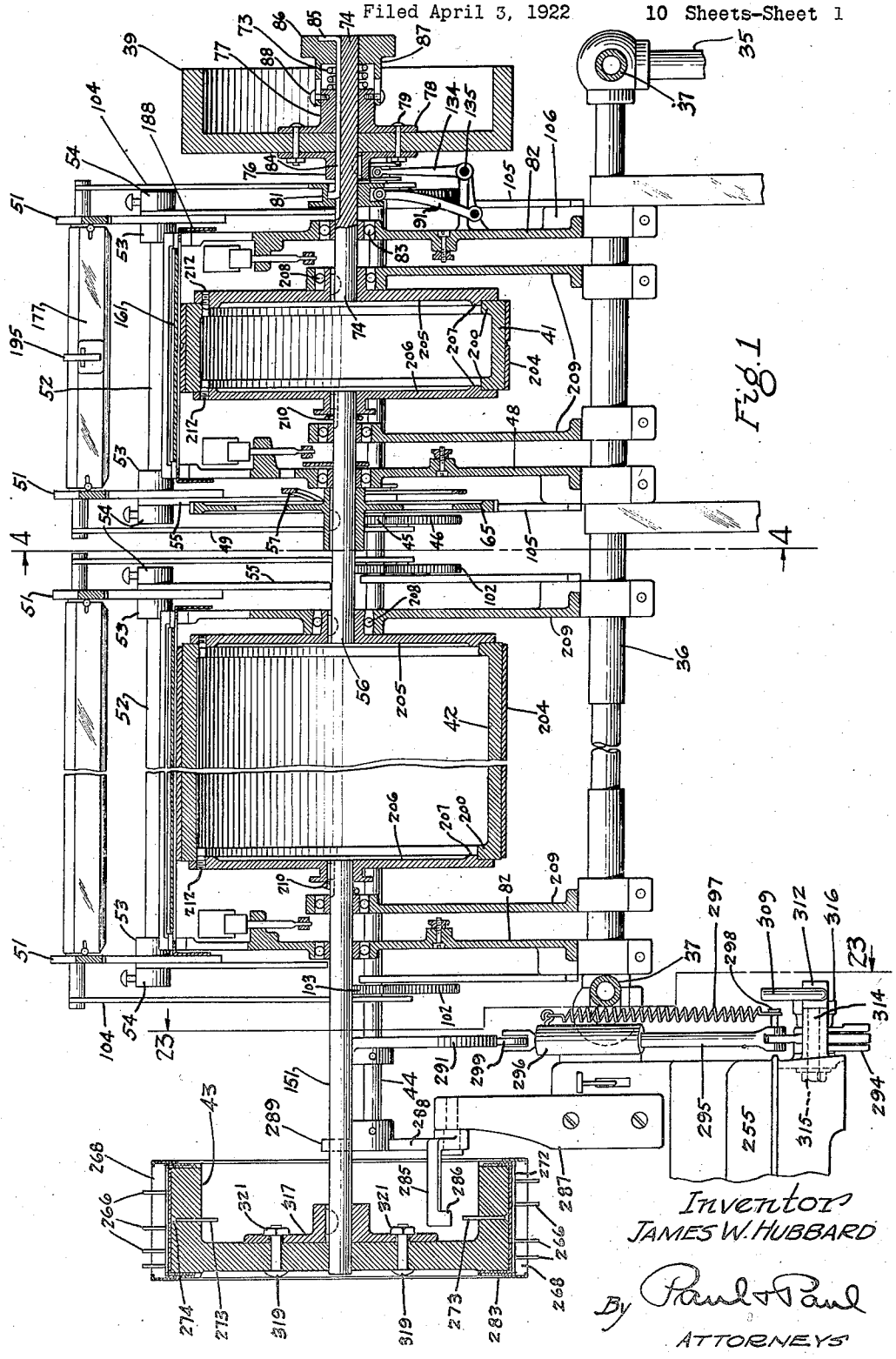


Fig. 1

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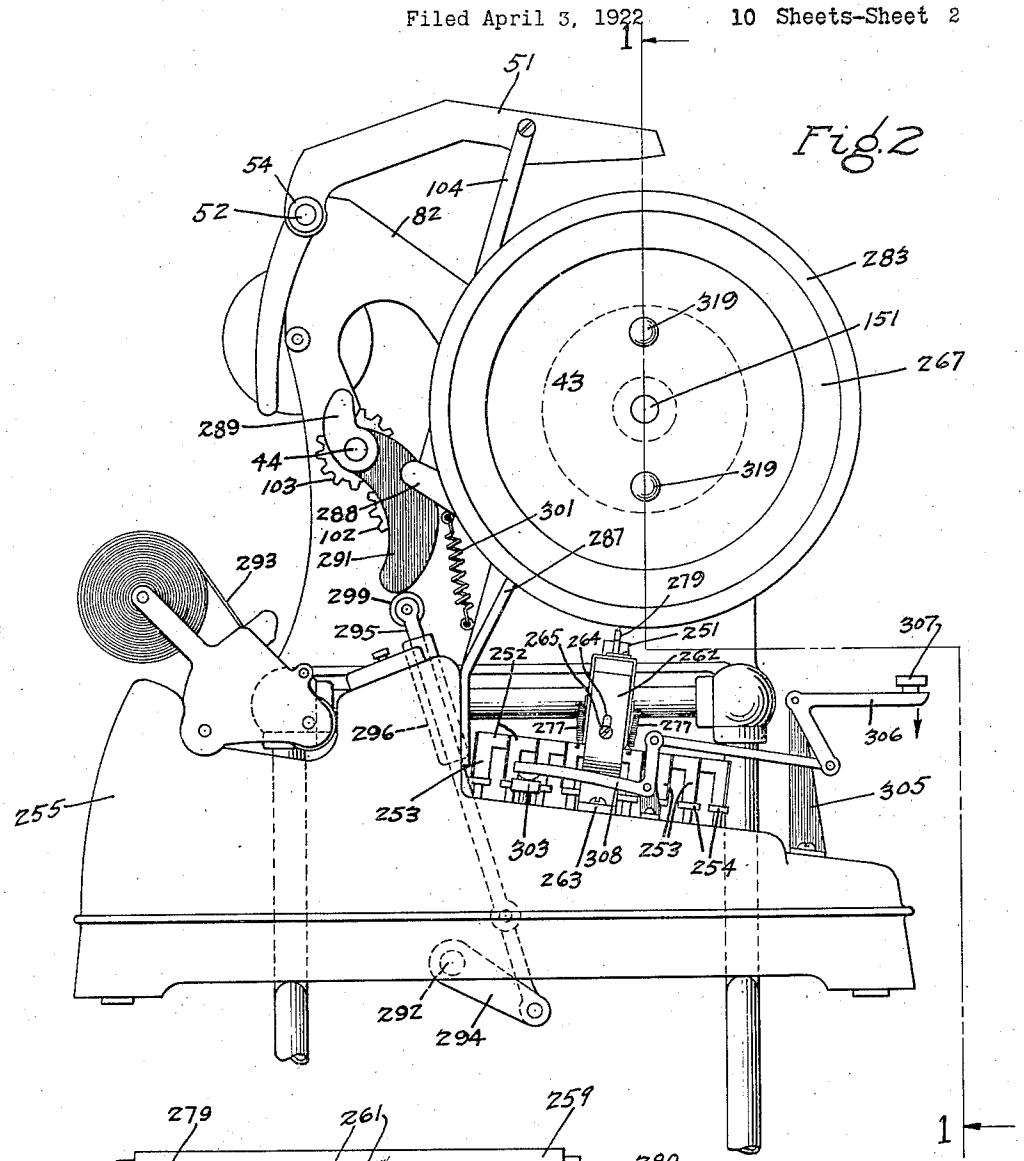


Fig. 2.

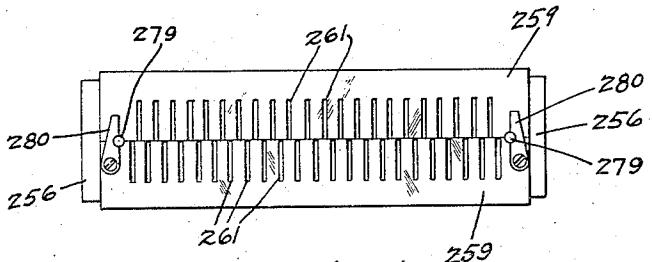


Fig. 23.

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J. W. HUBBARD

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Filed April 3, 1922 10 Sheets-Sheet 3

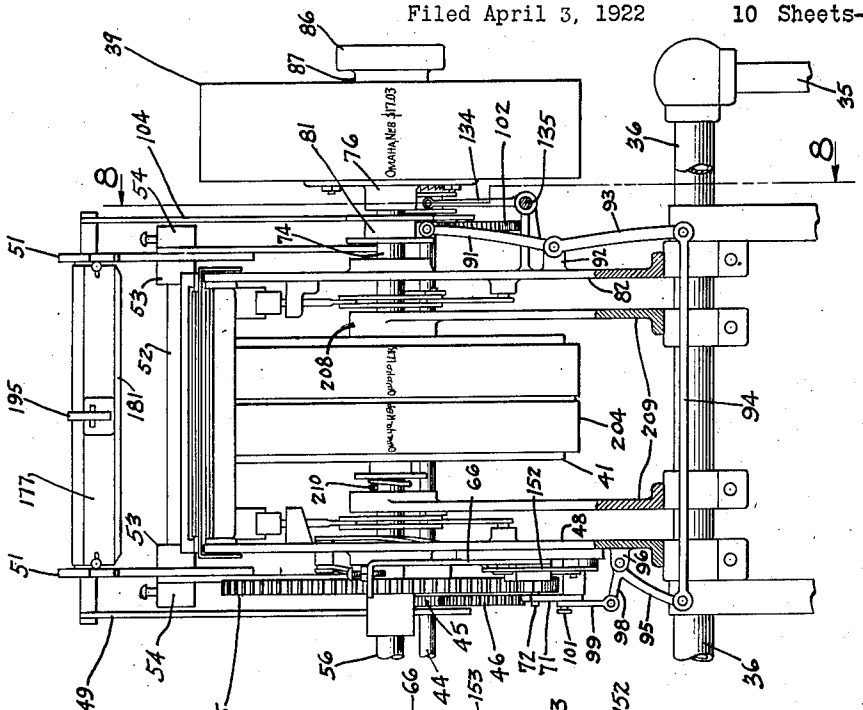


Fig. 3

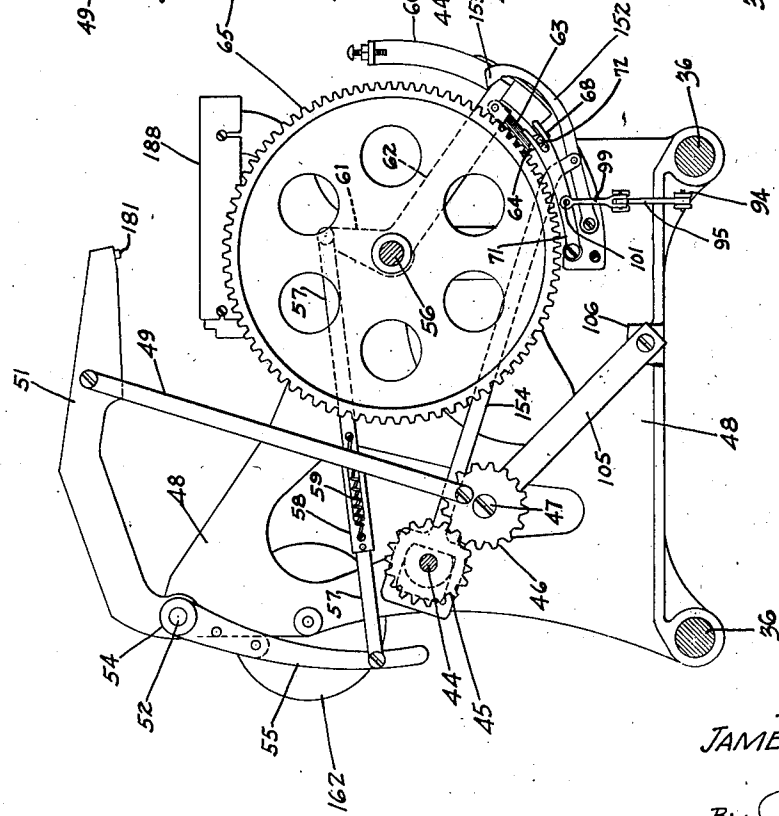


Fig. 4

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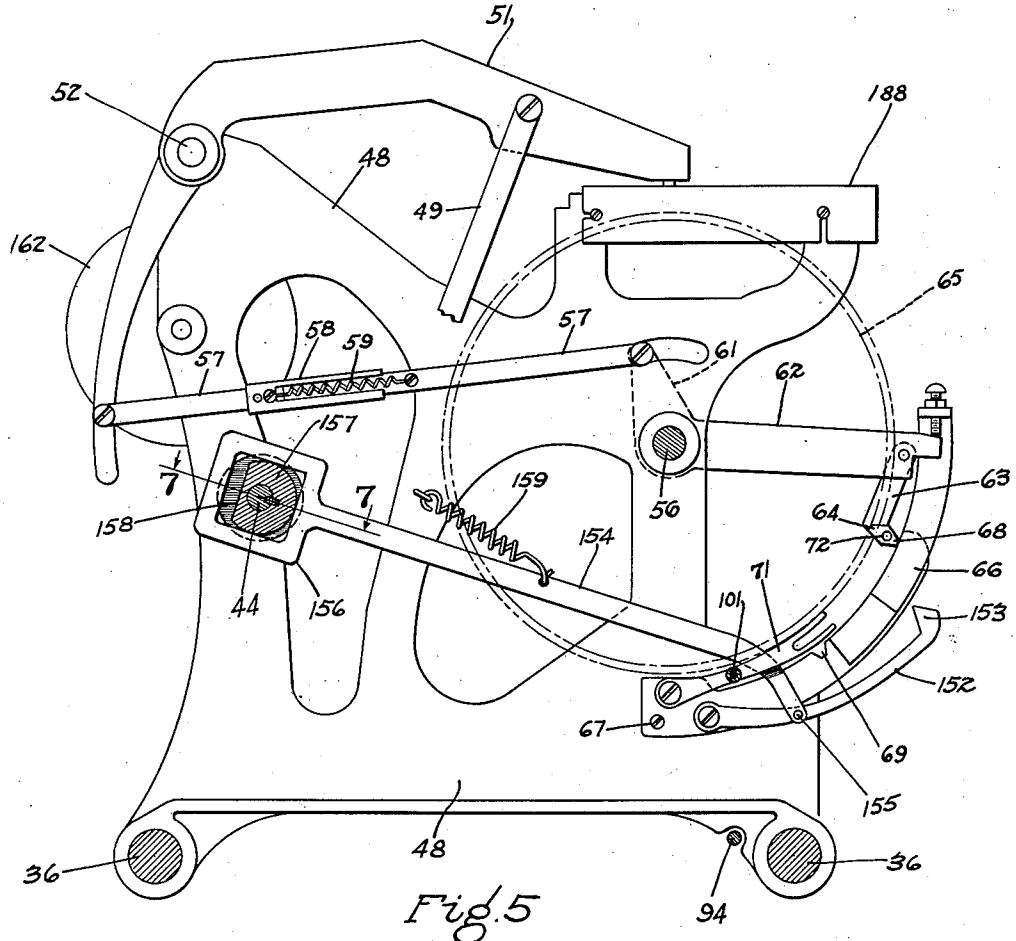


Fig. 5

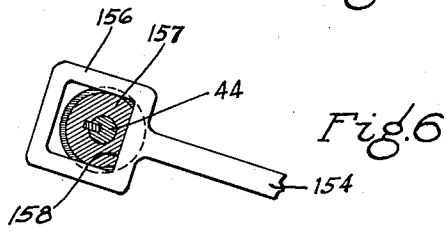


Fig. 6

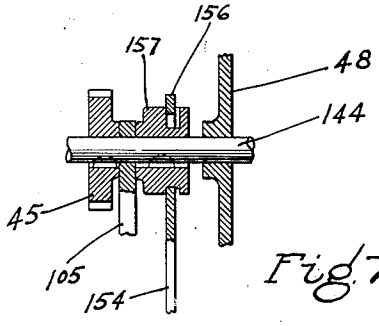


Fig. 7

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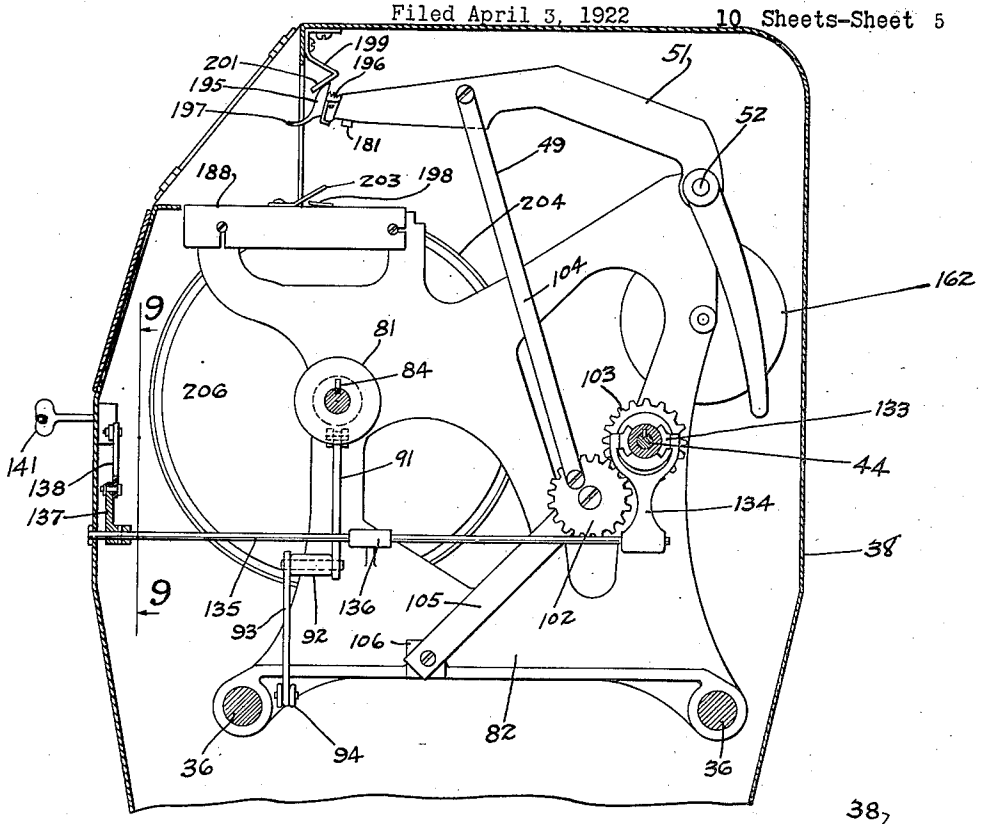


Fig. 8

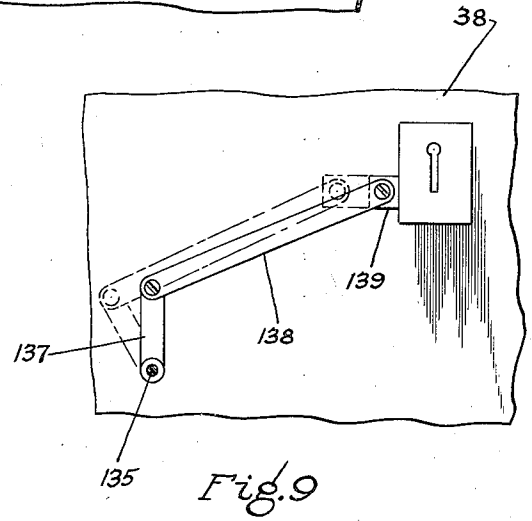


Fig. 9

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J. W. HUBBARD

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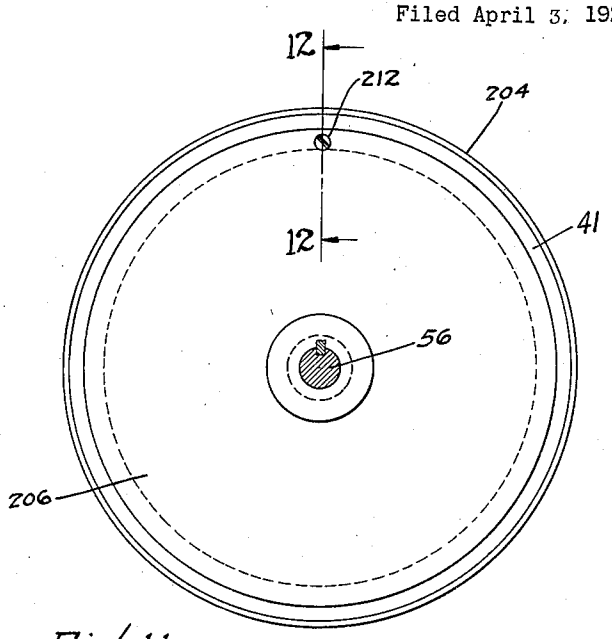


Fig. 11

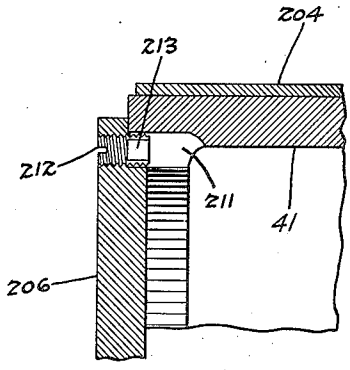


Fig. 12

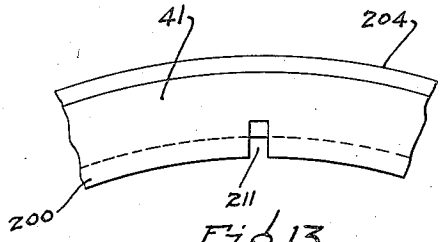


Fig. 13

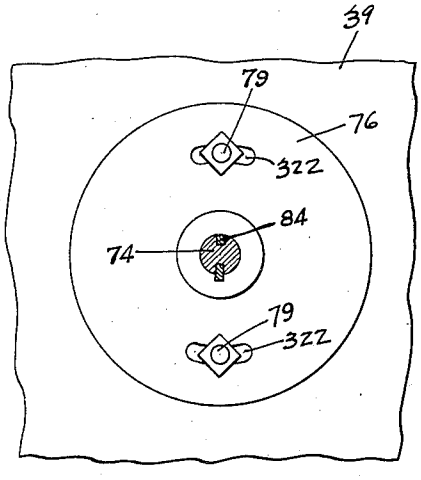


Fig. 14

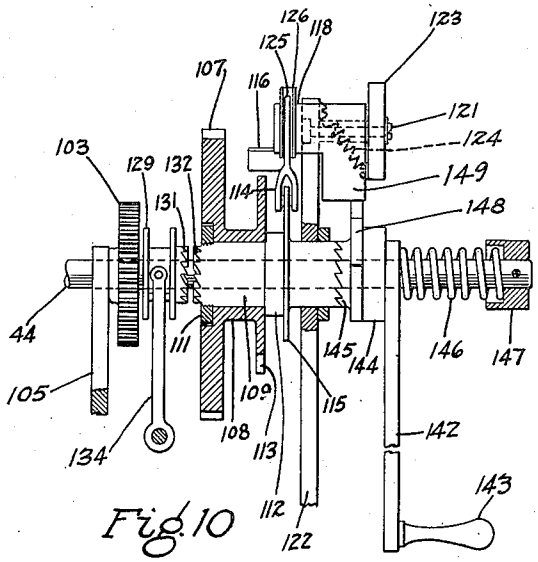


Fig. 10

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J. W. HUBBARD

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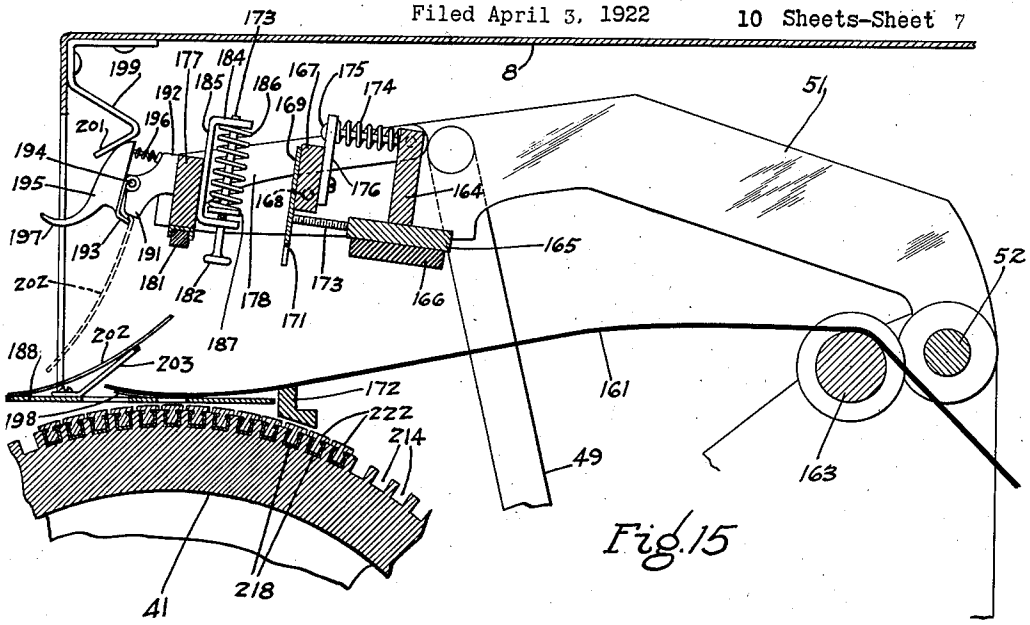


Fig. 15

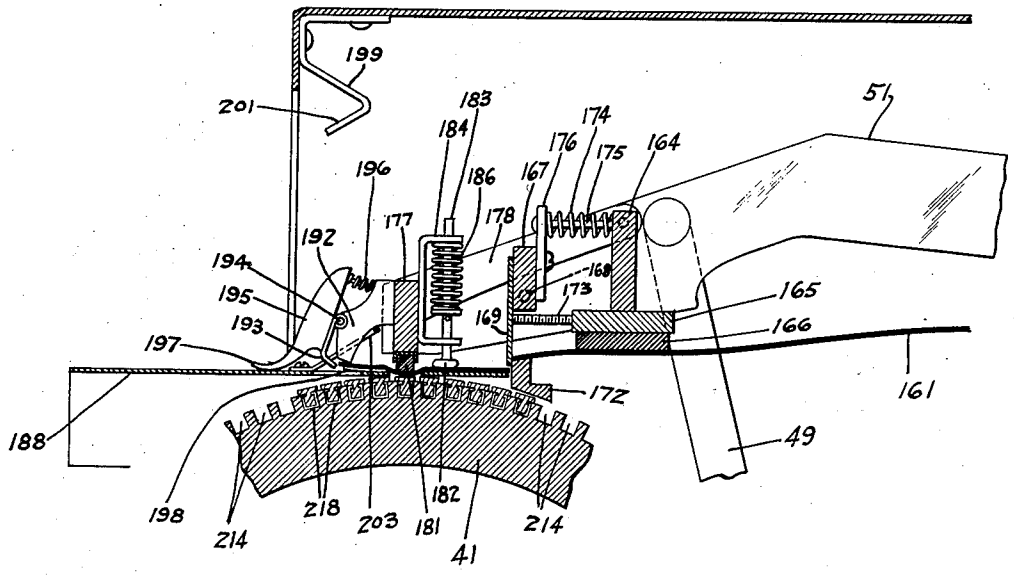


Fig. 16

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J. W. HUBBARD

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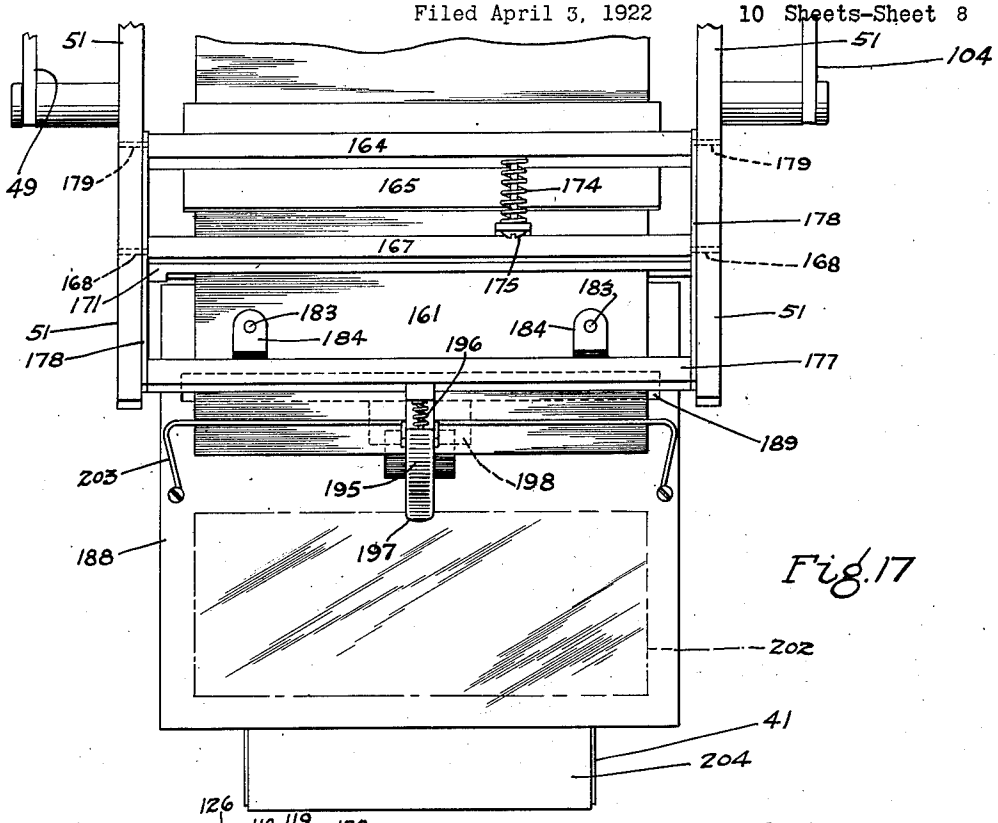


Fig. 17

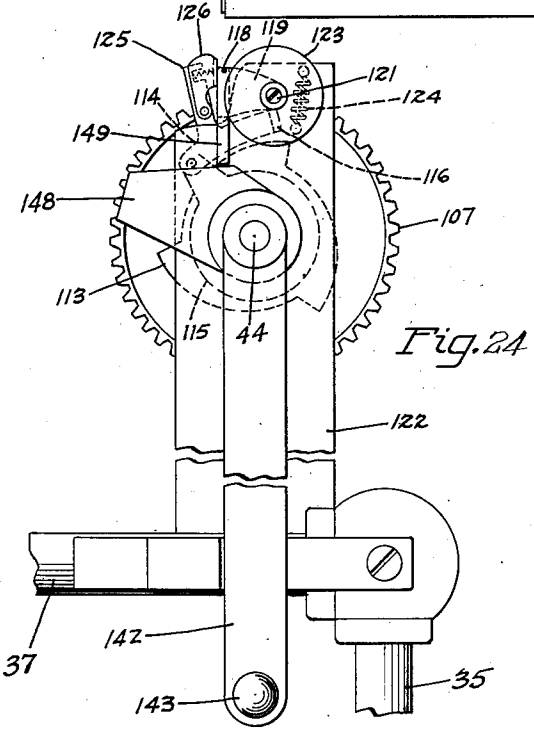


Fig. 24

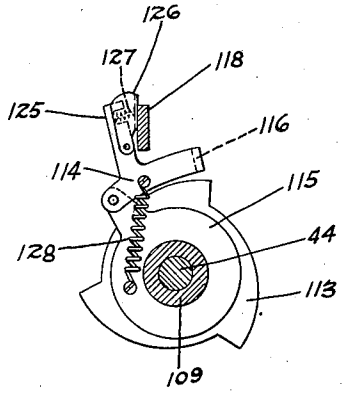


Fig. 25.

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J. W. HUBBARD

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Filed April 3, 1922 10 Sheets-Sheet 9

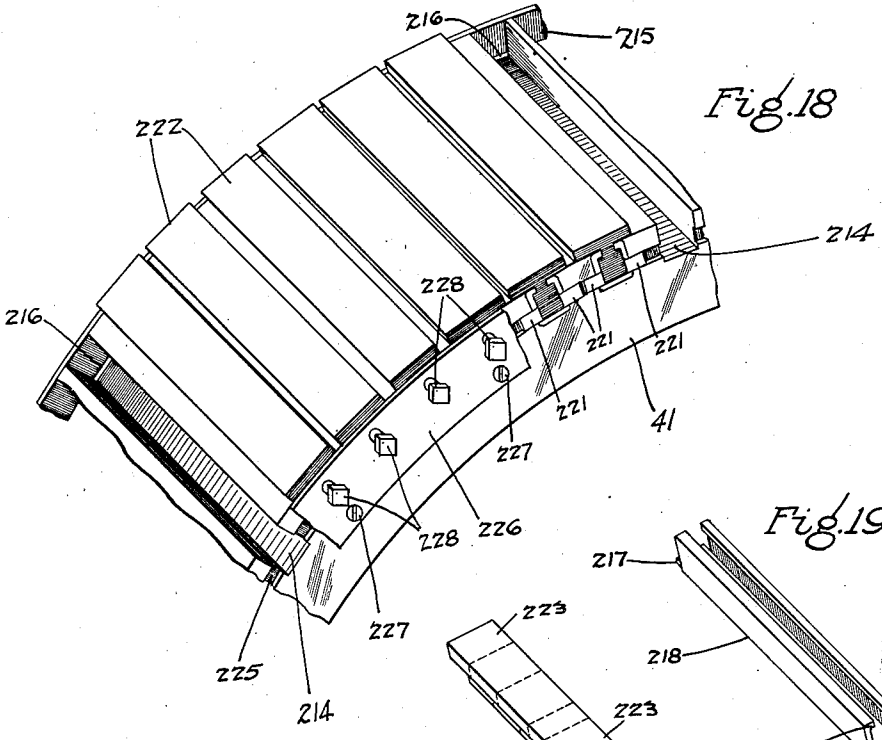
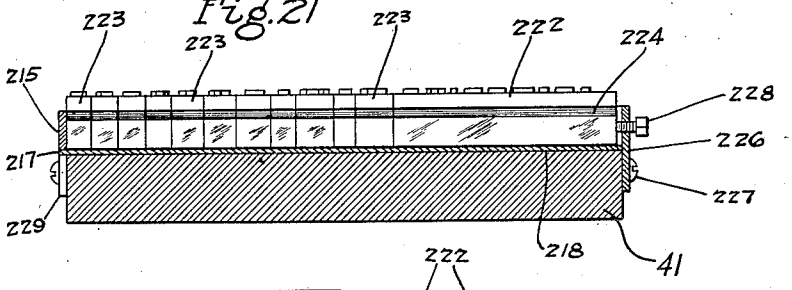


Fig. 18

Fig. 19

Fig. 20

Fig. 21



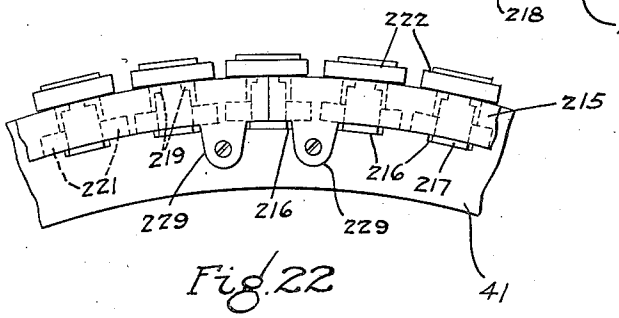


Fig. 22

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J. W. HUBBARD

PRINTING MACHINE

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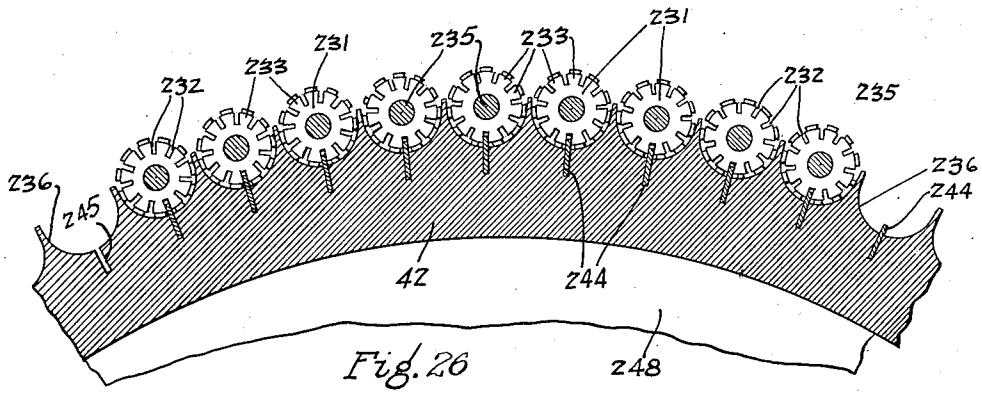


Fig. 26

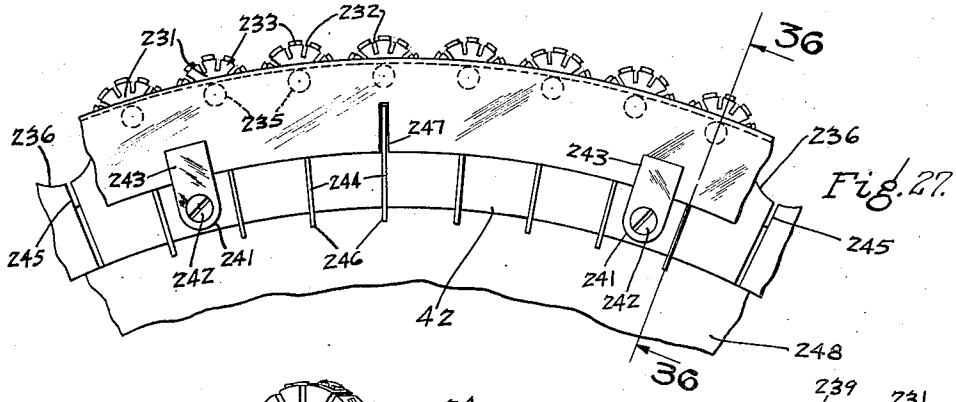


Fig. 27

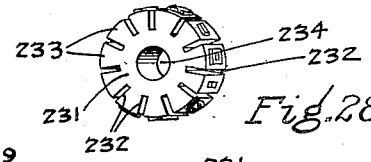


Fig. 28

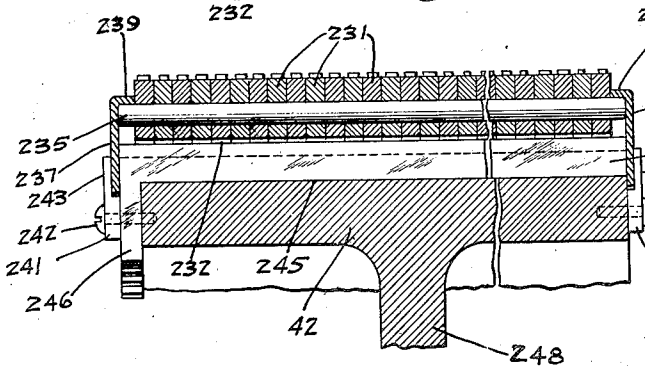


Fig. 29

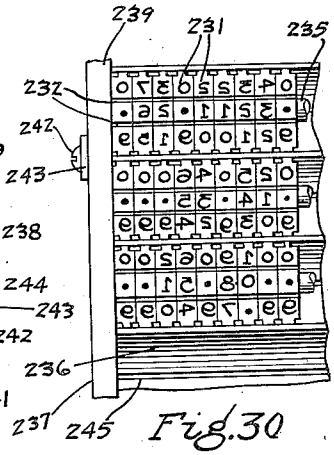


Fig. 30

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Patented Nov. 2, 1926. 1,605,188

UNITED STATES PATENT OFFICE.

JAMES W. HUBBARD, OF EAU CLAIRE, WISCONSIN.

PRINTING MACHINE.

Application filed April 3, 1922. Serial No. 549,333.

This invention relates to printing machines and, more particularly, to such machines adapted to print coupons or tickets for use by common carriers selling passenger transportation by rail, water, or air. In the explanation of this invention, such tickets may be generally referred to as railroad tickets because of their more common use. This invention includes improvements upon the similar printing machines forming the subject-matter of applicant's prior patent, No. 1,324,673.

In accordance with usual practice, present railroad ticket offices maintain on hand large supplies of printed tickets reading from place of origin to a very large number of different destinations, along its own line as well as over other connecting lines. Printing machines of this type obviate the necessity of maintenance of such ticket supplies, in selling offices as well as in reserve.

The new ticket printing machines of the types embodied in applicant's patent, and this application are adapted quickly to print a ticket form upon a strip of paper which form shows the place of origin, name of issuing company, the name or names of any interline railroads, and the usual general conditions such as the provision for continuity of passage and time of commencement. These machines also selectively print, upon the same portion of the strip upon which such form appears, certain specific indicia such as the date of issuance, destination, amount of fare, names of interline railroads, if any, and a serial number for each individual ticket. Generally speaking the parts of these machines may be termed broadly the ticket printing part and the recording part and, in case of the present improved machine as embodied herein, the adding machine part. As is the case with the machine disclosed in the above-mentioned pending application, this novel machine also produces a ticket comprising a check and a ticket proper, the check being adapted to be torn along a score line from the ticket proper by the first conductor in accordance with standard practice. The recording part of the machine prints and retains within the casing a record strip. This record may be detached at desired intervals by the auditing officials of the company issuing the ticket. The record strip is printed simultaneously with the ticket strip and provides a retained record of desired data in connection with each ticket printed, such as the total price and mileage of the ticket and the distribution or apportionment of each such total to interline railroads; war tax, etc. In this novel machine, there are included several improvements such as a new pick-up, reversing and delivery means for the printed ticket, an improved presser-foot, removable type, either individually or by lines of type, changeable numeral printing wheels, removable printing drums, a locking means to prevent unauthorized operation of the machine, and an improved drive for the printing drums shaft. Other improvements are set forth in the following specification.

The object therefore of this invention is to provide an improved printing machine.

Other objects of the invention will more fully appear from the following description and the accompanying drawing and will be pointed out in the annexed claims.

In the accompanying drawings, there has been disclosed a structure designed to carry out the objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a vertical section taken longitudinally through the axis of the machine drums on the line 1—1 of Figure 2 but with the major portion of a common type of adding machine omitted;

Figure 2 is a view in end elevation of the printing machine in operative combination with the adding machine portion thereof;

Figure 3 is a view in front elevation of the index wheel end of the printing machine, the bearing supports thereof being in section to show the index-releasing mechanism;

Figure 4 is a vertical section through the machine on the line 4—4 of Figure 1 showing the driving mechanism and releasing mechanism for the shaft of the ticket printing drums and index wheel;

Figure 5 is a view similar to Figure 4 with the gear omitted and showing the means for locking the printing drum shaft in position during operation of the adding mechanism;

Figure 6 is a detail of the cam and follower in its operative locking position opposite to that shown in Figure 5;

Figure 7 is a cross-sectional view of the cam and follower on the line 7—7 of Figure 5;

Figure 8 is a vertical sectional view on the line 8—8 of Figure 3 showing the casing in section and the mechanism for locking the machine against operation;

Figure 9 is a vertical sectional view on the line 9—9 of Figure 8 showing the locking link;

Figure 10 is a detailed view of the clutch and the clutch-operating means for the drive of the machine;

Figure 11 is a view in elevation of a positioned demountable printing drum;

Figure 12 is a vertical sectional view on the line 12—12 of Figure 11 showing the drum and flange assembly;

Figure 13 is a detailed view showing the drum slot;

Figure 14 is a view of an adjusting flange for the index wheel;

Figure 15 is a detailed view showing the ticket pick-up and delivery device in ticket-delivered position;

Figure 16 is a view similar to Figure 15 but showing such device in position to pick up a ticket;

Figure 17 is a plan view of the ticket pick-up and delivery mechanism;

Figure 18 is a perspective view of a portion of the preferred form of ticket-printing drum having demountable type;

Figure 19 is a perspective view of one of the demountable type carriers for the printing and index drums;

Figure 20 is a perspective view of one of the assembled type bars;

Figure 21 is a cross-sectional view through the drum shown in Figure 18 and showing the type-clamping device at one end of the drum;

Figure 22 is a view in end elevation of a portion of the same drum showing the marginal band at the other end of the drum to retain the type carriers in operative position;

Figure 23 is an enlarged view in plan of the guide or housing for the fingers;

Figure 24 is an enlarged view in end elevation of the crank end of the power shaft;

Figure 25 is an enlarged detail view of the driving tooth and detent;

Figure 26 is a fragmentary vertical section through a printing drum showing the keyed assembly of the numeral wheels;

Figure 27 is a view in side elevation of a portion of a printing drum equipped with numeral wheels;

Figure 28 is a detail view in perspective of one of the numeral wheels;

Figure 29 is a section on the line 36—36 of Figure 27, and shows a plurality of numeral wheels as mounted in the record drum selectively to print the totals of price and mileage and apportionments of the same in desired columns; and

Figure 30 is a fragmentary detailed view in plan of a printing drum equipped with numeral wheels.

In the selected embodiment of the improved machine disclosed in the drawings, there is shown a supporting standard formed of relatively light tubular metal and having four legs 35 joined by the top longitudinal rods 36 and 37 forming a quadrangular frame. Preferably a sheet metal casing 38 (see Figure 8) encloses the parts and drums of the machine with the exception of one of the drums which functions as a rotatable dial or index wheel by means of which particular destinations may be printed. Likewise, as is the case with machines of this general type an operating handle is also exposed. In addition to the dust-proof advantages of enclosure of the parts, there is not only the additional advantage that unauthorized operation may be obviated as by means of an internal locking means operable by a key in a key-hole provided through the casing but also that the retained ticket record strip may be held against unauthorized removal.

In the preferred form of this new machine there is provided a power shaft which extends substantially across the machine and is suitably journaled in the frame. There is also a longitudinal line of shafting to carry the various drums. In this form, this line of shafting is not shown as a single shaft like the power shaft but is shown as composed of three axially alined stub shafts to carry the keyed drums and assure simultaneous movement thereof. The drums shown comprise an index wheel 39, ticket printing drum 41, record printing drum 42 and selector drum 43. The ticket printing drum 41 and the record printing drums carry type on their respective peripheries which type are cooperable, as in applicant's prior patent, with platens to print upon paper strips fed therebetween. When it is desired to print from selected type units on the ticket and record drums, such units are not directly moved to a printing position in the path of the platens. As in applicant's prior pending application, the drums are moved simultaneously with the index wheel to a predetermined position so that, upon operation of the machine, the drums are moved so that the selected type move past an inking roll into inked printing position. Such travel of the type drums from the predetermined indexing position, past the ink rolls to printing position is effected by operative connection between platen-carrying arms and the power shaft 44 of the machine. As here shown, the power shaft 44 is provided with suitable driving connection to actuate the drum shafting. This driving connec-

tion is disengageable to permit unimpeded manual rotation of the line shaft so that the various drums may be rotated to a selected position by the index wheel. When the drums have been moved to such selected position, the power shaft connection may be re-established and, upon operation of the power shaft, the drums perform their functions for the selected position.

The connection between the power shaft and the drum shafting is by way of the printing platen arms and hence reference may be first had to such mechanism although the printing mechanism is broadly the same as that set forth in the prior patent and application above-mentioned. A gear 45 is fixed on the power shaft 44 in position to mesh with the similar gear 46 (see Figure 4) loosely mounted on the stud 47 carried by the frame plate 48. A connecting rod 49 is pivotally and eccentrically mounted at one end on one face of the gear 46 and at its other end pivotally secured to one of the two ticket platen arms 51. These arms are pivotally mounted, in spaced relation, on the frame plates 48 by means of the shaft 52 carried in the lugs 53 of the opposed plate frames 48. This shaft 52 bears terminal collars 54 which function to prevent accidental removal of the shaft. Each of the platen arms 51 is provided with an extension 55 upon the opposite side of the shaft 52. The extension 55, shown in Figure 4, is adapted through operative connection to drive the large gear 65 fixed to one section of the drum line-shafting, such as the stub shaft 56. Such driving connection is by way of the bar 57 which is made in two sections, one of which has pinned thereto a slotted sleeve 58 within which the other section is telescopically received and tensionably held therein by means of the spring 59. One end of this bar 57 is pivotally secured to the extension 55 adjacent the lower end thereof while the other end of the bar is pivotally secured to one arm 61 of a bell-crank lever loosely borne by the stub shaft 56. The other arm 62 of this bell crank lever has a dog 63 pivotally mounted thereon adjacent the end thereof. This dog is provided with a tooth 64 adapted singly to engage the peripheral teeth of the gear 65.

A guide 66 normally maintains the tooth 64 in such engaged position. The guide is terminally held to the adjacent frame plate 48 by means of the screws 67 and arcuately and upwardly projects, adjacent the periphery of the gear 65. The dog 63 is also provided with an extension 68 projecting oppositely to the gear tooth 64. The extension 68 is adapted slidably to travel over the inner arcuate surface of the guide 66 so that the opposed tooth 64 is held in mesh with a selected tooth of the gear 65. A recess 69 is formed in the guide to provide a seat for the toothed extension 68 so that the opposed tooth 64 may drop away from the gear teeth and permit unimpeded rotation of the gear and drum-line shafting. In Figure 5, the dog is shown in meshed gear-driving position, while in Figure 4, the dog is shown in its inoperative position with the extension 68 seated in the recess 69. The dog is normally prevented from assuming such inoperative position by a terminally forked lever 71 pivotally mounted upon the guide 66 and tensionably held in the position shown in Figure 5. In such normal tensioned position, the spaced forks are adapted to receive the pin 72 carried by the dog and thereby hold the dog-extension 68 from dropping into the seat-forming recess 69. The tension acting upon the forked lever 71 is provided by the spring 73 through linkage transmitting the tension of this compression spring 73 (see Figure 1) coiled about the terminal portion of the stub shaft 74 forming another section of the drum line-shafting.

Means are provided in conjunction with this spring 73 so that the linkage and forked lever may be manually moved against the tension of the spring to depress the forked lever and thus to permit the dog to drop away from the gear 65 so that the drums may be simultaneously and freely turned for indexing purposes. The previously-mentioned index drum or wheel 39 is adapted to be positioned upon the shaft 74 and two complementary hub members 76 and 77 are provided with complementary opposed radially projecting flanges 78 between which the axial portion of the index wheel is held by the bolts 79. As is indicated in dotted lines in Figure 1, the hub member 76 is suitably keyed to the shaft to provide simultaneous rotation of shaft and index wheel. A collar 81, having opposed radially projecting flanges is slidably mounted upon the stub shaft 74 between the hub member 76 of the index wheel and the adjacent frame member 82 providing ball-bearings 83 for this shaft. This collar 81 is tensionably outwardly held by means of a wire 84 having its inner end offset and fixedly secured to the collar. The wire outwardly extends from the collar, being longitudinally slidable in a key-way cut in the shaft 74 and terminates in a similarly offset end 85 which is fixedly secured to a release nut or bottom 86 having a hub 87 recessed to encompass the shaft 74 and the coiled spring 73. This hub 87 is slotted to receive slidably the two opposed pins 88 screwed to the hub member 77 of the index wheel. The spring 73 tends outwardly to maintain the button 86 in the position shown in Figures 1 and 3. Thus, the double-flanged collar is also outwardly held and maintains, in similar position, the upper roller-bearing end 91 of the lever

pivoted on the bracket 92 projecting from the frame member 82. The lower end 93 (see Figure 3) of this pivoted lever is thus normally inwardly held and likewise thrusts the pivoted link 94 connected at its inner end to the lower arm 95 of the lever pivoted to the bracket 96 inwardly projecting from the frame member 48. The upper arm 98 of this lever is thus normally and tensionably upwardly held and likewise upwardly holds the link 99 pivotally connected to the forked lever 71 by the pin 101. Obviously, then, the tension of the spring 73 normally upwardly holds the forked lever and thus maintains the dog in working position to engage and actuate the drums when the printing platens are actuated. When it is desired idly to move the drums, the forked lever is depressed by means of inward thrust of the button 86 and the dog is downwardly held in seated position and the gear 65 and drums may be freely revolved. This drive of the drums from the platen arms is employed because the printing drums are first manually turned to a selected indexing position which is not the printing position. From such predetermined position, the drums are automatically rotated by the platen arms to the printing position. Such partial rotation is employed to carry the selected type to be printed past an inking means such for example as that shown in applicant's prior application.

As above described, the drums and gear 65 are driven from the printing platen arms in timed relation therewith. The platen arms are driven from the power shaft 44 (see Figure 8) by means of similar connecting rods 104 pivotally secured to the opposed arms 51, downwardly extending, each rod is pivotally and eccentrically connected to the similar spur gears 46 mounted upon similar bearing bars 105 screwed at their lower ends to brackets 106 carried by the plate frames 48 and 82. The upper ends of the bars are apertured freely to permit the power shaft 44 to pass therethrough. The gears 46 respectively mesh with the spur gears 45 keyed to the power shaft.

The power shaft actuation is effected by means substantially similar to those set forth in applicant's above-mentioned prior application Serial Number 485,498 with the added improvement of a clutch and locking means to prevent unauthorized operation of the machine. Such similar actuation comprehends both power and manual drive.

As before, a power gear 107 (see Figure 10) is constantly in mesh with gears driven from a suitable source of power. This gear has a hub 108 loosely borne by a sleeve 109 in turn loosely borne by the shaft 44. The inner face of the hub 108 is annularly recessed loosely to receive a washer 111 screwed to the sleeve 109 and co-operable with the annular shoulder 112 of the sleeve to prevent displacement of the hub 108. A toothed cam disk 113 is preferably integral with the hub 108 and a clutch device is provided to engage this disk motion to the sleeve 109 which in turn may, through a new interposed clutch, drive the power-shaft 44. The first-mentioned clutch device is like that set forth in applicant's prior application and consists of a relatively movable clutch arm 114 pivotally mounted upon a disk 115 fast to the sleeve 109 against the outer face of the shoulder 112. This arm 114 has an integral inwardly offset tooth 116 which is under tension of a spring 128 constantly drawing the tooth into engagement with a tooth of the cam disk. However, this tooth 116 is normally detained in the inoperative raised position shown in Figure 10 by means which are manually operable by the machine attendant.

A detent 118, for this purpose, is formed by an angled projection from a sector 119 (see Figures 10, 24 and 25) fast on the stud shaft 121 journaled in the upwardly projecting frame member 122. The shaft 121 bears fast thereon a knurled disk 123 by which the shaft 121 and sector may be manually rotated to move the detent from operative holding position. The detent is normally held in depressed position by means of the spring 124 secured to the inner face of the disk 123 and to the frame member 122.

The clutch arm 114 is provided with an integral finger 125 having pivotally mounted thereon a substantially U-shaped shoe 126 outwardly held therefrom by means of the compression spring 127 received in a recess in the finger. The shoe is adapted to engage the detent 118 and its resilient mounting absorbs any shock and minimizes noise. The clutch mechanism is normally held in inoperative position while the motor or other power source is rotating the gear 107. When it is desired to operate the machine, the knurled disk 123 is manually turned, against its spring tension, to raise the detent 118 above the path of the finger 125 which is downwardly drawn by the spring 128 (see Figure 25) so that its tooth 116 may enter the path of the teeth of the driven cam disk 113 whereupon the sleeve 109 will be rotated by the driven gear 107.

The clutch and locking means above referred to is interposed between the sleeve 109 and the shaft 44 with its gear 103 fast thereon. During authorized operation of the machine this clutch is moved to engaging position so that the machine may be operated upon movement of the knurled disk 123 to raise the detent. A double flanged collar 129 is keyed to the shaft and is longitudinally slidable thereon for movement of its hub teeth 131 into and out of mesh with

the similar clutch teeth 132 presented by the inner end of the sleeve 109. When these teeth are meshed, the sleeve 109 may drive the shaft 44. Slidable movement of the clutch collar is controlled by the opposed jaws 133 carried by the plate 134 (see Figure 8) terminally fast to the rod 135 rotatably borne in the bearing 136 provided by the frame plate 82. The rod forwardly projects and has a link 137 (see Figure 9) pinned thereto. This link in turn is pivotally connected to a link 138 pivotally also secured to a slide bar 139 of a common type of lock adapted to be operated by a key 141.

While a printing machine constructed in accordance with this selected embodiment of the invention is usually power-driven, provision is also made for its manual operation. To this end a crank 142, having a handle 143, is loosely mounted upon the shaft 44. The integral hub 144 of the crank is provided with clutch teeth 145 which are shown in Figure 10 in engagement with similar clutch teeth on the outer end of the sleeve 109. These co-operable clutch teeth are normally held in engagement by the compression spring 146 coiled about the terminal portion of the shaft 44 and held by the cap nut 147 pinned to the shaft. The spring 146 permits disengagement of the clutch teeth 145 when the shaft 44 is actuated by the crank. The crank hub is formed with an integral cam 148 (Figure 24) upon which normally rests the lower edge of a cam follower 149 integrally depending from the sector 119 so that, upon rotation of the crank, the follower 149 is sharply raised to cause elevation of the detent 118 and consequent tensioned drop of the tooth 116 into the path of the toothed disk 113 and into engagement therewith for sleeve and shaft movement.

Thus, upon actuation of the shaft 44, the printing platen arms are driven and the drum line-shafting in turn is driven by the platen arms. The ticket printing drum 41 is keyed to the stud shafts 74 and 56 as shown in Figure 1, while the record printing drum 42 is similarly keyed to the stub shafts 56 and 151, the latter shaft also carrying keyed thereon, the selector drum 43. Thus, the three drums are mounted for simultaneous movement as though all were keyed to a single shaft extending across the machine as does the power shaft 44.

As previously stated, the forked lever 71 normally prevents the extension 68 of the gear-driving dog from entering the seat formed by the recess 69 in the guide so that the dog tooth 64 is thus normally constantly maintained in engagement with the teeth of the gear 65. In this improved form of applicant's machine, means are provided for holding the dog-carrying bell-crank lever 61—62 in its initial position shown in Figure 4 and also to prevent any rebound when the lever returns to such position after the printing operation. It should also be noted in this connection that the gear 65 is thus locked in stationary position and, hence, the whole drum-line shafting is held against movement. Such holding will be subsequently adverted to in connection with the mechanism for operating the adding machine. To this end, there is provided (see Figure 5) an arcuately curved finger 152 pivotally mounted on the screw 67 and having its upper end formed with a hook 153 adapted to be swung into the upward path of the outer end of the descended arm 62 of the bell-crank lever thus to prevent movement thereof. A rod 154, at its forward end, is connected to the finger 152 by the pivot pin 155 carried by the finger. This rod upwardly and rearwardly extends and is provided with an integral head 156 (see Figures 5, 6 and 7) presenting an interior opening which is substantially square. A collar 157 is keyed to the power shaft 44 and is formed with an annular cam recess within which is received the side portions of the head 156 so that the head is held therein. As is shown in Figure 5, the base of the cam recess is formed with a low or flat portion 158. The rounded major portion of the cam recess functions to maintain the rod 154 in its inoperative position shown in Figure 5. The rod is normally so maintained against the tension of the spring 159 which has one end secured to the rod and its other end secured to the adjacent frame plate 48. When the power shaft 44 is rotated to the position shown in Figures 4 and 6, the flat low side of the cam permits the rod 154 to be upwardly moved by the tension of its spring 159. Such rod movement draws the finger 152 upwardly above the descended bell-crank arm 62, whereby the arm and dog are arcuately held in fixed non-rebounding position. Similarly, when the shaft 44 is again rotated from the position shown in Figure 4, the cam quickly acts downwardly to force the rod 154 to depress the finger 152 to inoperative position. The cam performs its function before the connecting rods 49 of the platen arms cause descent of the platen arms and consequent actuation of the gear.

The printing mechanism is generally similar to that shown in applicant's above-mentioned application and consists of the ticket printing drum 41 and record printing drum 42 to which are fed strips of paper, such as the paper ticket strip 161 shown in Figures 15 and 16, such strips being fed from rolls of strip paper carried on spools 162 rotatably borne between adjacent frame plates at the rear of the machine. The strips, both ticket and record, pass upwardly from their respective spools over flanged

idlers 163, such as the one shown in Figure 15, to their respective printing drums. The feeding mechanism employed is substantially the same as that shown in applicant's prior application and, constituting no part of the present invention, is omitted in the drawings for the sake of clarity and brevity.

The ticket printing drum 41 and associated mechanism may first be described. In Figure 15 the ticket strip 161 is shown as ready for the printing operation and in Figure 16, as being printed and cut. The oppositely spaced platen arms 51 carry, fixedly secured thereto, a cross-bar 164 to which is secured a platen 165 supporting an impression member 166 cooperable with a type-form (not necessary to be shown) to print a blank form upon the under face of the strip 161 as is set forth in applicant's prior application. A knife-bearing cross-bar 167 is also carried by the platen arms 51 by its pivotal mounting upon similar pins 168 inserted in the opposite ends of the cross-bar in its lower portion. A knife 169 is suitably affixed to the front vertical face of this cross-bar 167 and has its lower transverse cutting edge 171 inclined in order to effect a drawing cut upon the ticket strip 161 passing over the shearing block 172 mounted at its ends upon the machine frame. The knife edge is held in accurate co-operable shearing position by means of an adjustable and tensioned mounting. The screw 173 is received in threaded engagement in the front of the platen 165 and projects forwardly to abut against the rear face of the knife 169 to prevent rearward swing of the knife about its pivotal mounting on the arms 151. The blade is tensionably held in abutment against the adjusting screw 173 by means of a compression spring 174 coiled about the pin 175 projecting forwardly from the cross-bar 164 and held between the relatively narrow plate 176 and the cross-bar rear face. The plate 176 is thus yieldingly pressed outwardly against the rear face of the knife bar 167 (to which the plate is bolted) so that the spring tension tends to rotate the bar 167 about its pivot pins and thus yieldably to hold the knife against the adjustment screw 173. As thus far described, a descent of the platen arms 51 functions to print a blank ticket form upon that portion of the strip behind the knife and to sever the forward portion of the ticket strip as is indicated in Figure 16.

The platen arms, adjacent their forward ends, also carry a platen 177 extending between, and terminally affixed to the opposed front levers 178 each pivotally secured at their rear ends to the inwardly projecting pivot pins 179 carried by the platen arms 51. An impression member 181 is affixed to the front platen 177 and, upon descent of the platen arms, is adapted to co-operate with the type peripherally carried by the ticket printing wheel to print selected indicia upon the under face of the ticket in the blank spaces of the ticket form previously printed thereon. The various type or type bars, setting forth different destinations, fare, name of issuing railroad, and name of any interline railroad over which travel may have to be completed, are carried by the ticket-printing drum. The construction and mounting of this drum will be described after reference to the presser-foot and pick-up position-reversing and delivery mechanism for the printed severed ticket.

The presser-foot device includes a foot 182 integral with a stem 183 slidable in the opposed arms 184 of the U-shaped spring-bracket 185 secured to the front platen 177. A compression spring 186 is held between the under face of the upper bracket arm 184 and a washer 187 held by a pin carried by the stem 183 so that, upon descent of the platen arms to printing position, the spring is compressed and the presser-foot 182 is tensionably held against the ticket strip 161, as shown in Figure 16 whereby the strip is held against the upper surface of the transverse plate 188 secured to the frame of the printing machine. As is shown in Figure 17, two of these presser-feet are preferably employed thus to hold the ticket strip closely and firmly against the plate 188 adjacent its transverse slot 189 through which the strip may be pressed by the impression member 181 against the presented selected type of the ticket-printing drum.

The pick-up and delivery mechanism for the printed severed ticket is carried by the front platen 177 and is more particularly set forth in Figures 15, 16 and 17. The relatively fixed jaw 191 is provided by the outwardly inclined lower face of the metallic block 192 fixedly secured to the front face of the platen 177. The relatively movable jaw 193 is provided by a relatively narrow piece of spring sheet metal having its lower end rearwardly bent and having its upper edge centrally cut away so that the metallic sheet may straddle the forward upper portion of the block 192 so that the two side portions of the sheet metal may be coiled upon themselves and secured about pivot pins 194 oppositely projecting from the forward portions of the block 192. This jaw 193 is therefore pivotally mounted upon the block 192. Tension means are provided normally to hold the jaw 193 in ticket-gripping position with the fixed jaw 191. The finger 195 carries on its upper rear face a rearwardly projecting guide pin which is received axially within the coils of the com-

pression spring 196 or forwardly projecting from the upper front face of the block 192. Hence the lower end of the finger 195 and therefore the movable jaw 193 is normally rearwardly swung under the tension of the spring 196. The two jaws 192 and 193 are shown in tensioned ticket-gripping position in Figure 15, while in Figure 16 the movable jaw is shown as held away from the fixed jaw in order subsequently to engage the leading edge of the ticket upon severance. The movable jaw 193 is held in such opened position by means of the curved extension 197, which is adapted upon descent of the platen arms 51 to engage the plate 188, whereby the finger 195 is rocked on its pivot to open the jaws. The leading portion of the severed ticket is slightly directed upwardly by means of a spring plate 198, secured to the upper surface of the plate 188 beneath the normal descended position of the fixed jaw 192. The automatic ticket release is provided by an angled strip 199 of spring metal which is secured to the casing 8 and downwardly projects so that its elbow portion 201 is presented within the path of the finger 195 when raised to uppermost position. The function of this strip is indicated in Figure 15 wherein the curved outer surface of the upper portion of the finger 195 is shown as inwardly pressed by the elbow portion 201 whereby the finger 195 is rocked against the tension of its spring 196 and the movable jaw 193 is thus moved from clamping engagement with the severed ticket 202.

As the ticket strip is printed on its under face, means are provided for reversing the position of the ticket. Such reversing means consists of a U-shaped wire 203 (see Figure 17) which is secured at its outer ends to the plate 188 and upwardly and rearwardly projects to extend across the plate. The under face of the block 192 is arcuately cut away to provide a recess within which this reversing wire may be received when the platen arms are in the printing position shown in Figure 16. When the platen arms are raised, to the position shown in Figure 15, the pick-up jaws grip the forward portion of the ticket and upwardly raise the ticket while the latter is pulled across the wire so that the lower edge of the ticket is outwardly swung and thereby reversed, as is shown in dotted lines in Figure 15. The automatic release of the ticket causes the latter to drop into the delivered position shown in full lines in Figure 15.

The construction and mounting of the ticket-printing drum and of the record drum are similar, and such construction may be explained in connection with a description of the ticket drum. These drums, as shown in Figures 1, 11 and 12, are adapted to be demounted from their respective stub shafts. The rim portion of the ticket drum is shown as bearing the type 204. The rim portion is provided with two hub plates 205 and 206.

The hub portion of the hub plate 205 is keyed to the stub shaft 74, while the similar portion of the hub plate 206 is keyed to the stub shaft 56. These two hub plates and stub shafts 56 and 74 are thus assembled for accurate and simultaneous movement. The peripheral portion of the hub plate 205 is adapted to be positioned with its inner face against the adjacent outer face of the inwardly projecting flange 200 of the rim and is provided with an annular shoulder 207 to fit against the outer portion of the inner face of the drum rim. The hub of this plate 205 is borne by the ball bearings 208 presented by one of the bearing standards 209. Both hub plates, having such shoulders 207, fit snugly against the drum rims while the spring 210 holds the rim and two hub plates in assembled position so that the hub of the plate 205 is held against the annular flange at the upper end of the bearing standards 209. The ticket drum and record drum are thus similarly assembled so that, when it is desired to change a strip 204 of type on one of the drums, the drum may be demounted from the machine by sliding the left plate 206 along its keyway in the stub shaft 56 or 151 so that the rim is released from its hub plates and may be downwardly moved and taken from the machine. When in assembled position the hub plates 206 of the record drum is keyed to the stub shaft 151. As heretofore set forth power is imparted to the stub shaft 56 by the gear 65 from the power shaft 44. Hence, in order to drive the rim of the ticket printing drum, the flange of its rim is provided with a relatively narrow slot 211 (see Figures 12 and 13), A screw 212 is received in threaded engagement through the hub plate 206 and terminates in a flat-sided portion 213 which is received with a snug fit within the slot 211 whereby any torque imparted to the keyed hub plates 206 is imparted to the ticket rim. A similar screw and slot engagement is provided for the plates 205 so that the stub shaft 74 may simultaneously move with the shaft 56. Likewise, the record drum rim has its hub plates 205 and 206 similarly secured so that the torque of the central stub shaft 56 may be imparted to the record drum and to the stub shaft 151 carrying the selector drum 43 for the adding machine mechanism.

While these last-mentioned figures show these two drums as demountable it is also desirable, if not preferred, to construct these printing drums so that the type may be changed without demounting the drums. As here shown the simple way to effect such type change is by means of type carriers adapted to be held in transverse peripheral drum slots. Furthermore, an extremely convenient manner of changing the individual

numerals is also provided. This latter improvement consists in the provision of small numeral type wheels.

A drum construction wherein type carriers are employed is shown in Figures 18, 21 and 22. As there shown the drum rim is provided with a plurality of transverse or axially extending grooves 214. At one side these slots are open while at the other side, a metallic annular band 215 is preferably permanently affixed to the rim so that its inner edge is slightly spaced from the bottom of the grooves so as to leave a narrow slot 216 (see Figure 18). Each such slot 216 is adapted to receive a tongue 217 projecting from the base of each type-carrier 218. The latter consists of a trough-like member having its sides terminating in inwardly projecting shoulders 219 and with outwardly projecting tabs 221 at the end of the carrier opposite to that having the tongue. The carriers 218 are adapted to receive either a line of integrally cast type or individual type to make up the line to be printed upon the presented strip. For example, as suggested in Figure 21, the long type member 222 represents the name of a station (which is rarely changed) while the type units 223 at the left of this figure represent type individually assembled to print the other indicia such as price of the ticket which may vary from time to time as railroad rates change. The preferred form of type base is shown in Figure 20 wherein the type shown as formed with axially alined grooves 224 adapted snugly to receive the opposed shoulders 219 of the carrier when the type is in assembled position in the carrier. A plurality of type-filled carriers are shown in Figue 18. The edge of the drum is formed with an annularly extending slot 225 to receive the oppositely extending tabs 221 of each carrier. The carriers are held at their far ends as shown in this figure by means of the annular band 215 while their near ends are held by means of a demountable ring plate 226 which is secured to the side face of the drum rim by means of screws 227. Tension screws 228 are received in threaded engagement in this ring plate and inwardly project to abut the end of the type in each carrier firmly to press the type inwardly and thus to hold the same in tensioned fixed position. The view of the peripheral portion of the assembled drum shown in Figure 22 is of the side of the drum rim opposite to that shown in the fragmentary perspective view in Figure 18. As here shown the band is provided with integral ears 299 adjacent the two abutting ends of the band whereby the band may be secured to the adjacently presented face of the drum rim. It is desirable to have the annular ring 226 in segmentary form so that it is not necessary to demount the entire ring when removing and changing a single type line or its units.

Both the ticket drum and the record drum may be thus constructed to facilitate changes in indicia to be printed upon the ticket or record strip, it being of course understood that for any change made in the ticket type a corresponding change must be made in the record type. Furthermore, as must be obvious, the most frequent of necessary changes are those relating to fares, these prices being far more subject to variance and fluctuation than the names of the destinations, issuing railroad or interline railroads, etc. Particularly with reference to the record drum, it is desirable that a quickly changeable means be provided for effecting changes in railroad rates because the indicia printed by the record drum not only includes the price of the ticket but also includes numerals apportioning the mileage and ticket price to the various railroads earning the charges (by interline service or otherwise) and printing any war tax or other surcharges, all as is set forth in applicant's above-mentioned application, Serial Number 485,498.

In the accompanying drawings there is shown a record drum provided with a plurality of small numeral wheels, each peripherally presenting all the numerals and a decimal so that by rotating the individual numeral wheels, the desired arrangement may be quickly and conveniently obtained.

Each numeral wheel 231 is provided with a plurality of radial slots 232 transversely extending through the wheel and dividing the same into eleven sectors 233 upon the peripheral portion of each of which is preferably integrally cast a type adapted to print a numeral. The numerals upon each wheel include the nine numerals, the zero and a decimal point. Each wheel has a central aperture 234 so that the wheel may be revolubly mounted upon a shaft 235. As is shown in Figure 29, a plurality of these wheels are mounted upon each shaft 235. The periphery of the printing drum is shaped to present an annular series of semi-cylindrical axially disposed concavities 236 wherein may be positioned the wheels assembled upon their shafts. These shafts are held against radially outward displacement by the annular flat rings 237 and 238 having inwardly projecting outer terminal flanges 239 to overhang each of the several shafts 235. These opposed flanges also abut against the sides of the two wheels at the opposite ends of the shaft and thus hold all wheels closely together upon each shaft. These rings are slidably mounted and held against the adjacent sides of the drum by means of clips 241 held by the screws 242 to the drum. The clips have upwardly projecting cut-away portions 243 to engage the

outer face of the ring and slidably to hold the same in position. Each series of wheels 231 upon a shaft is held against rotation by means of a locking bar 244 receivable in each groove 245 formed in each concavity. Each bar is of a width to extend into a slot 232 of each wheel so that the alined slots of wheels upon a given shaft may receive a locking bar 244 and the wheels be thus held in a selected alined locked position. This type of locking bar is provided at one end with a finger grip 246 so that the bar may be axially withdrawn when the slot 247 provided in the slidable ring 237 is moved to coincide with the position of the bar as is indicated in Figure 27. Only one slot 247 need be provided in the ring and when such slot is moved to any position intermediate the locking bars all bars are retained in wheel-locking position. By the employment of either the demountable type means or this wheel means of printing, the drum need not necessarily be of the readily demountable kind but instead may be, as suggested in Figure 29 and shown in detail in applicant's prior application, formed with a central median web 248 extending inwardly and providing a hub to be keyed to a single drum shaft taking the place of the individual stub shafts forming the drum line-shafting. Thus any selected arrangement of the alined printing wheels may be made and the wheels all held in such predetermined position while at the same time a very simple and quick means is provided for changes therein.

I claim as my invention:

1. A ticket printing machine having in combination ticket printing type, a platen means cooperable with the type and movable to and from ticket-printing position, a pick up carried by the platen means and adapted to engage and remove a printed ticket, and means automatically operable thereafter to effect release of said ticket.

2. A ticket printing machine having in combination ticket-printing type, a platen cooperable with the type, arms carrying the platen and movable to and from cooperable ticket-printing position, a detent on the machine above the platen, means on the arms to pick up a printed ticket, said means being adapted to engage said detent automatically to release and thereby deliver the printed ticket.

3. A ticket printing machine having in combination, a drum and an index wheel rotatably mounted for simultaneous movement, type peripherally borne by the drum, and corresponding index notations peripherally borne by the index wheel, a platen movably mounted on the machine to co-operate with said type to print a strip fed therebetween, means to actuate the platen and to rotate the drum from a predetermined selected position to cooperable printing position, said drum rotating means being releasable whereby the drum and index wheel may be freely rotated to position a selected peripheral type, and means carried by the index wheel to release said drum.

4. A ticket printing machine having in combination, shafting rotatably borne by the machine, a drum and an index wheel keyed to the shafting for simultaneous movement, type peripherally borne by the drum and corresponding index notations peripherally borne by the index wheel, a platen movably mounted on the machine to cooperate with said type to print a strip fed therebetween, means to actuate the shafting, a driving connection between the shafting and platen and drum whereby the platen may be moved to printing position and the drum may be rotated from a predetermined selected position to cooperable printing position, said drum connection being releasable whereby the drum and index wheel may be freely rotated to position a selected peripheral type, tension means on said shafting yieldingly maintaining said drum connection in operative position, and means on said index wheel to release said drum.

5. In a machine of the class described, a ticket printing mechanism selectively operable to mark destinations upon railroad tickets, means for making a record, operable in conjunction with the ticket printing mechanism, said record making means including means for listing in classified and segregated form upon a record sheet the proportions of the prices of each ticket applicable in the various territorial sub-divisions through which said ticket affords transportation.

6. In a machine of the class described, a ticket printing mechanism selectively operable to mark destinations upon transportation tickets, a record making mechanism with common operating means for said ticket mechanism and record making mechanism, said record making mechanism including means for listing in classified and segregated form upon a record sheet, the proportions of the prices of each ticket applicable in the various territorial sub-divisions through which said ticket affords transportation.

7. In a machine of the class described, the combination with ticket printing mechanism, operable to print selectively the destinations upon transportation tickets, a recording device selectively operative by the operation of the ticket printing device, said recording device being operative to print indicia on a sheet in columns in one direction and in lines at right angles to the column data indicating respectively the destinations printed by the ticket printing mechanism. also the total cost and subdivisions of the total cost of the tickets.

8. In a machine of the class described, a ticket marking device selectively operable to

mark destinations upon transportation tickets, means for marking and issuing such tickets, a record marking device operable in conjunction with the ticket marking device, said record marking device including means for listing in classified and segregated form upon a record sheet the proportions of the prices of each ticket applicable in the various territorial sub-divisions through which said ticket affords transportation.

9. In a machine of the class described, a ticket marking device selectively operable to mark destinations upon transportation tickets, means for marking and issuing such tickets, a record marking device operable in conjunction with the ticket marking device, said record marking device including means for listing in classified and segregated form upon a record sheet the proportions of the prices of each ticket applicable in the various territorial sub-divisions through which said ticket affords transportation, and a common operating means for said ticket marking and record marking devices.

10. In a machine of the class described, a ticket marking device selectively operable to mark destinations upon transportation tickets, means for marking and issuing such tickets, a record marking device operable in conjunction with the ticket marking device, said record marking devices including means for listing in classified and segregated form upon a record sheet the proportions of the prices of each ticket applicable in the various territorial sub-divisions through which said ticket affords transportation, and common selecting means for said ticket marking and record marking devices.

In witness whereof, I have hereunto set my hand this 29th day of March, 1922.

JAMES W. HUBBARD.