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3,025,787

DATA REGISTERING AND MARKING MACHINE

Filed Aug. 25, 1960

3 Sheets-Sheet 2

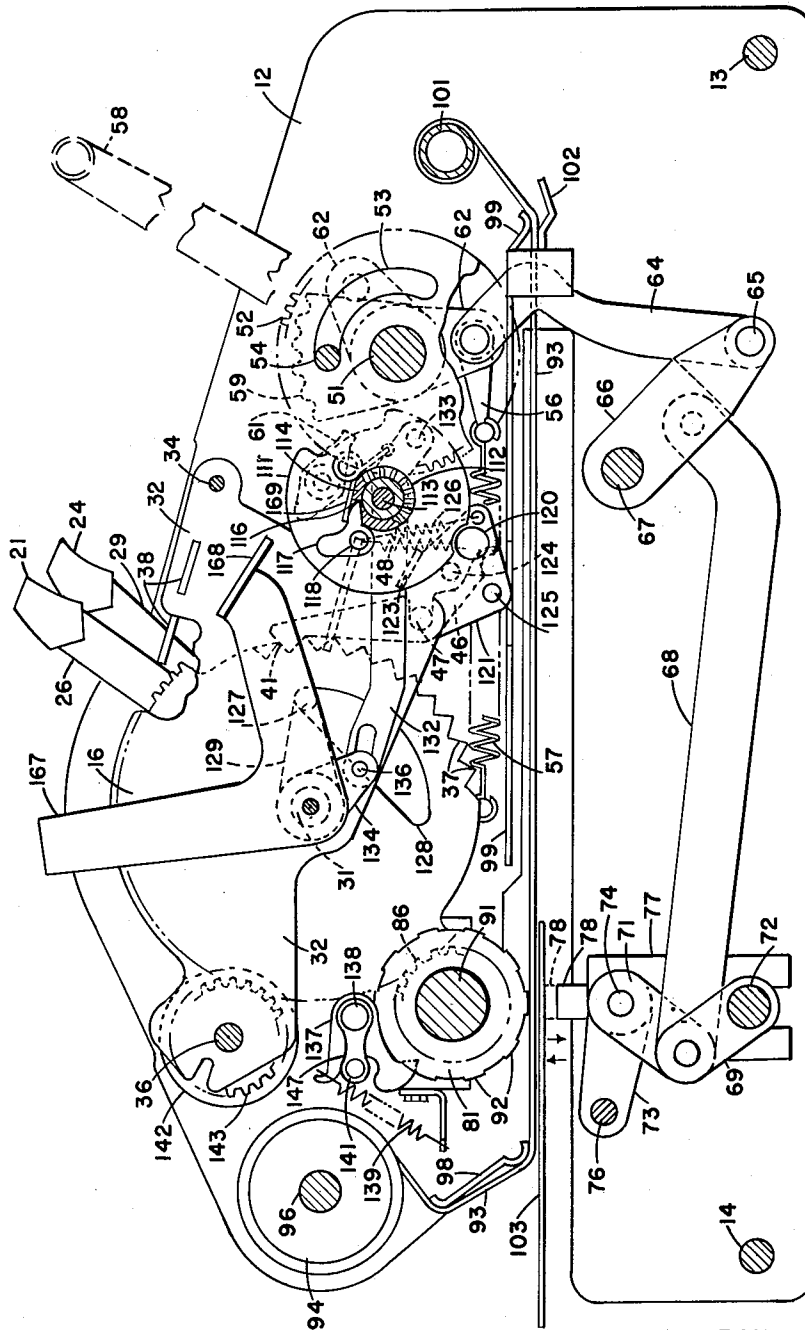


Fig. 2

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Fig. 4

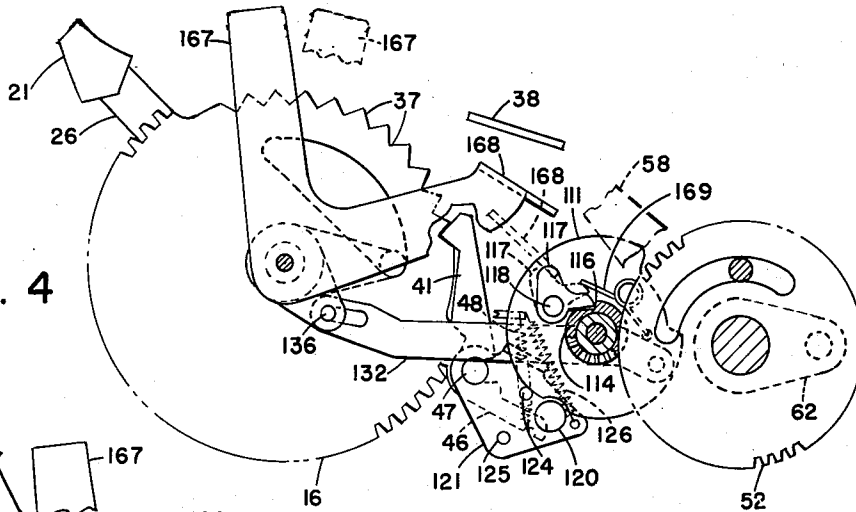


Fig. 5

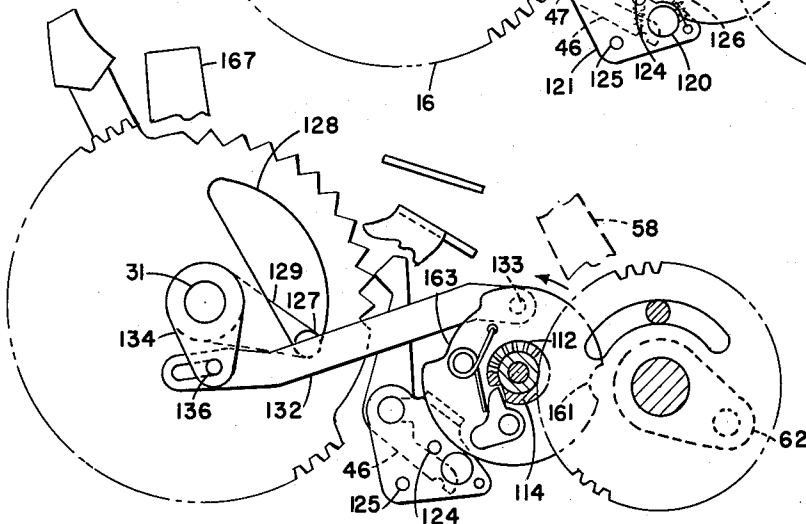
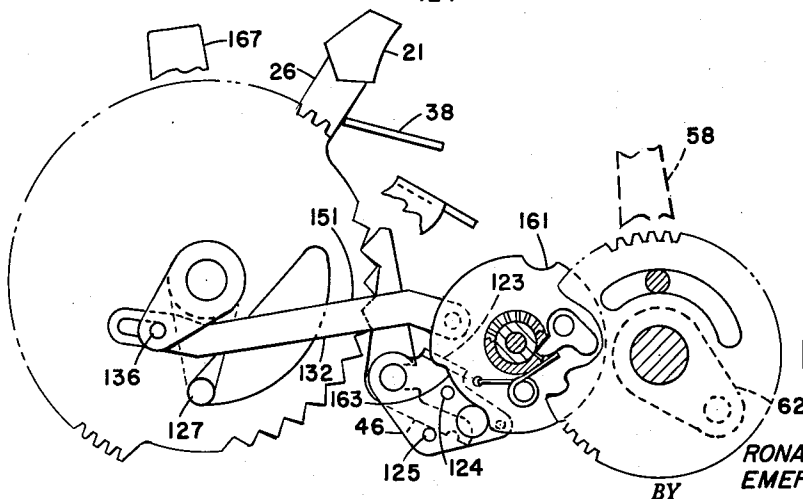


Fig. 6



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DATA REGISTERING AND MARKING MACHINE
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This invention relates to machines for registering, and usually for recording, data of the type where information such as the decimal digits in an amount to be registered, or marked on a record web, is entered in the machine by manually setting input mechanisms to positions representing each item, character, or digit to be registered. Many such machines are used for punching, printing, or otherwise marking on a record web a numerical quantity or amount to be registered thereon. A common arrangement in such machines employs a rotatably settable disk, or a settable segmental member having the general shape of a portion or segment of a disk, which, preparatory to registering the information, is rotated by an angular amount corresponding to an individual item or digit, several items or digits being entered in a number of such members to represent the complete information or amount to be registered in one operation. In some machines these disks or segments are set simply by moving finger pieces, affixed to them, until the desired rotational setting of the segment is reached; alternatively a keyboard is used, and the punching of a key moves a stop member into a position such that, during later rotation of the corresponding segment in the course of the operating cycle of the machine, this segment is stopped by the stop member at an angular position corresponding to the item or digit to be entered.

In any machine of this type the problem arises of insuring that the settable segments or disks are returned to their zero or rest positions before a succeeding cycle of operation of the machine. If some resetting arrangement is not provided, the entering of succeeding information becomes more complicated, and erroneous data may be registered or printed later as a result of leaving one or more of the segments in a position representing an item or digit previously entered. For example, if a machine which has been used to imprint the number 1000 on one document is intended to print a smaller amount on the next document, failure to reset completely the segment for the "thousands" digit will cause the machine to print during the next cycle of operation a number higher by 1000 than the amount intended. For this reason many such machines include mechanism for resetting all of the settable segments or disks to rest position toward the close of each cycle of operation. This mechanism may comprise simply a spring fastened to each segment, so that, when the segments are released after the registering or marking operation, the springs jerk them back to rest position. This arrangement, however, tends to give rough operation, and a segment may stick occasionally and not be reset all the way to its rest position. Another problem arises from the fact that some kind of positioning or detent means ordinarily is required for assuring that each segment is set in one of the positions representing an item or digit, and not in an intermediate position. When any resetting mechanism operates against the positioning forces exerted by such detent means, the resetting step tends to be rough or undependable.

Accordingly, it is an object of the present invention to provide an improved data-registering machine which avoids one or more of the disadvantages of such prior arrangements.

It is another object of the present invention to provide an improved data-registering or amount-marking machine

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which provides easy but positive resetting of the item-setting or digit-setting members.

It is a further object of the invention to provide a data-registering machine with settable segment members which includes efficient and economical mechanism for resetting automatically the members whose setting represents the information or amounts previously entered into the machine, and in which only small forces are required to insure return of each settable member all the way to rest position.

It is yet another object of the invention to provide a dependable but inexpensive automatic arrangement for resetting the digit-entering elements of a manually operated amount-printing machine.

In accordance with the invention, in a data-entering machine, the combination is provided which comprises a plurality of segmental members, each settable by rotation from a rest position to any selected one of a succession of data-representing positions; and positioning and detent means in spring-biased contact with each of the segmental members for retention thereof in the positions to which they are individually set. This same combination also includes means for resetting the segmental members, comprising energizing means arranged for actuation only when resetting is desired; means driven by the energizing means for removing all of the positioning and detent means from their spring-biased contact with the segmental members for a predetermined period, and for releasing the positioning and detent means back into contact with the segmental members at the end of that period; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of the segmental members; and a linkage between the energizing means and the resetting member for causing the resetting member to move and carry all of the segmental members which have been set to such data-representing positions back to rest position during the aforesaid predetermined period, and for returning the resetting member to inoperative position.

In accordance with a more specific feature of the invention, the data-entering device is also a data-registering machine or more specifically an amount-printing machine which is a combination likewise of similar elements, this combination comprising the aforesaid plurality of segmental members, each settable prior to initiation of an amount-printing operating cycle of the machine, to a succession of digit-representing positions, one such member being provided for each order of decimal digits in the amounts to be printed, and also comprising type members associated with each of the segmental members and movable thereby into positions for printing the individual digits in the multi-digit amount to which the respective segmental members are set; this combination further comprises operating means for bringing the type members into inked contact with a web surface during the operating cycle to register data by printing the amount selected by the settings of the segmental members.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings,

FIG. 1 is a plan view taken from the top of a data-registering and -marking machine embodying the present invention, with the top cover removed;

FIG. 2 is a cross-sectional side elevation taken in the direction indicated 2—2 in FIG. 1;

FIG. 3 is a timing chart representing the operation of several elements in the machine with reference to the same horizontal axis of abscissas; and

FIGS. 4, 5 and 6 are detailed elevational views of a

portion of the mechanism shown in FIG. 2, these views representing successive stages in the operation of the mechanism.

Referring now to FIGS. 1 and 2, there is shown a data-entering and data-registering machine of a type for marking amounts on a record web. This data-marking machine represents a preferred embodiment of such a device in the form of an amount-marking machine. It will be understood that items of data, such as one of the decimal digits making up a multi-digit number, may simply be entered mechanically in a numeral register by turning a register shaft through a radial amount equivalent to the item or digit to be registered. Thus the present invention may be embodied, for example, in an adding machine having setttable segments which may be set either directly through finger pieces or indirectly through a keyboard and stop arrangement, whereupon the amount set is entered in the accumulator registers of the machine, the segments then are cleared or reset to zero so that they can be set again preparatory to entering another number into the machine. The embodiment shown in the drawings, however, is an amount-printing machine of the type which may be used for registering amounts by imprinting the amounts on commercial documents. The amount-printing machine illustrated is designed particularly for imprinting dollar amounts on checks and other negotiable instruments.

The machine is provided with a framing structure made up of side plates 11 and 12 maintained rigidly upright by tie rods 13 and 14, additional tie rods being provided elsewhere, as mentioned hereinbelow. In this amount-printing machine, the combination of elements shown in the drawings comprise a plurality of segmental members 16-20. As seen in FIG. 1, a portion of the width of the machine has been omitted, as indicated by showing all the laterally extending parts broken away, including the parts toward the front of the machine, at the left of FIG. 1, and extending to the parts toward the rear of the machine, at the right of FIG. 1. The machine includes, in the portion broken away in FIG. 1, any additional segmental members, of like construction and with all associated elements as required, to make up a total number of segmental members sufficient to provide one for each order of decimal digits in the amounts to be marked or printed. Each of the segmental members has a finger piece to permit manual setting, finger pieces 21-24 being shown on the segmental members 16-19 respectively, and the finger pieces for member 20 and for any other such member being omitted for clarity of illustration. Finger pieces 21-24 are affixed to their respective segmental members 16-19 by arms 26-29 respectively.

The members 16-20 are segmental so as to include at least a portion of the full periphery of a disk. In the illustrated embodiment it is convenient for the segmental members to have the form of complete disks, which include the desired segmental portions and hence may be viewed as a species of segmental members. The disks 16-20 have central holes which are loose on a disk shaft 31. Shaft 31 is journaled in and passes between a pair of inner side plates 32 and 33, parallel to the main side plates 11 and 12 and supported in spaced relation to each other and to the side plates 11 and 12 by the additional tie rods 34 and 36 assembled in sections to receive the side plates 32 and 33. Each of the disks 16-20 is setttable by rotation from a rest position to any selected one of a succession of data- or digit-representing positions, having predetermined angular separations on the rotatable segmental members or disks, for selecting data to be registered, more specifically the several digits in an amount to be marked or printed. For cooperating with a detent structure which determines the rotational angular locations of the positions representing the ten digits 0-9, plus a rest position in addition to the 0 position when desired, a succession of peripheral indenta-

tions 37, having the aforementioned predetermined angular separations between successive digit-representing positions, is provided on each of the disks. A stop bar 38 (omitted from FIG. 1 to facilitate viewing of other members) is supported between the inner side plates 32 and 33 to stop the arms 26-29 of the finger pieces when the disks are returned to rest position. The bar 38 is staggered to stop the arms 21-23 in a rest position for disks 16-18 coinciding with 0, while permitting the arm 29 for disk 19 and the arms for disk 20 and any other disks to continue one step farther to a rest position separate from 0 position. If the segmental members are not complete disks, then the indentations 37 are provided along a peripheral portion of each of the segmental members. Each of the disks 16-20 is seen in FIG. 2 to have gear teeth formed in most of the peripheral portions not occupied by the succession of indentations 37.

Positioning and detent means are provided in spring-biased contact with each of the segmental members or disks for retention of the disks in the angular positions to which they are individually set prior to initiation of the marking or printing cycle. These means are shown in the form of positioning and detent pawls, of which four pawls 41-44 are shown in FIG. 1. The upper portions of the pawls are in contact with the respective disks 16-19; this portion of the pawl 41 is seen in FIG. 2, where the disk 16 is shown in zero or rest position with the pawl 41 in contact with the first of the indentations 37, which determines the rest position of the disk. It will be seen that, as a disk is set by moving it counterclockwise, starting with the disk in its rest position as seen in FIG. 2, its detent pawl falls into one of the succession of peripheral indentations on the respective segmental member or disk when the disk is in any one of the rest and digit-representing positions. The pawls have offset extensions 46 to the lower right of each pawl, as seen in FIG. 2, and slots are provided on the right side of each pawl near the center thereof. The pawls are pivoted on a shaft 47, on which they may be inserted through the aforementioned slots passing inwardly from the right side of each pawl. Spring-biased contact of the pawls, to position the disks by forcing the pawls to the bottoms of the peripheral indentations 37, is obtained by the action of individual springs 48, fastened at the ends of the respective extensions 46, whereby the disks are urged to rotate slightly, as may be necessary, so that they are detained in their preset stable positions, with each pawl at the bottom of an indentation 37, during the amount-registering or printing portion of the operating cycle. Thereafter, during the later portion of the operating cycle, all of the pawls are lifted automatically out of contact with the disks 16-20, which then are cleared or reset automatically to their zero or rest positions without hindrance from the restraints imposed by the pawls, as will be described hereinbelow. Near the end of the operating cycle the pawls are released and their springs 48 again become operative to urge the pawls into the indentations 37, so that the disks are detained and centered in their rest positions and subsequently in any new digit-representing positions to which they again may be set prior to initiation of the succeeding operating cycle.

The amount-printing machine, accordingly, also comprises operating means for registering during an operating cycle the data selected by the settings of the disks 16-20. The operating means includes a main drive shaft 51 rotated in a reciprocating operating cycle from an initial position, as shown in FIGS. 1 and 2, through a forward stroke to a full stroke position and then through a return stroke back to its initial position. A large gear 52, having in its side an arcuate slot 53 concentric with the center of the gear, is tight on the drive shaft 51 near the side plate 11; the primary function of the gear 52 will be described hereinbelow. Additionally, a stud 54 extends from the side plate 11 through the slot 53 in the

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gear to limit the rotation of the shaft 51. One end of an arm 56 also is tight on the drive shaft 51, and the other end of arm 56 receives the free end of a large spring 57 secured forwardly of the drive shaft. The drive shaft 51 extends through the side plate 11 and carries at that end a handle 58. The angular position of the handle 58 is shown in dashed lines in the sectional view of FIG. 2 to clarify the relative positions of the parts, and is indicated also in FIGS. 4-6. The spring 57 urges the shaft into an extreme clockwise initial position, as viewed in FIG. 2, with one end of the arcuate slot 53 against the stud 54. Pulling the handle 58 to rotate the drive shaft 51 through the forward stroke counterclockwise against the tension of spring 57 brings the shaft to full stroke position with the other end of slot 53 against the stud 54. Motion of the handle to carry the shaft through the return stroke back to its initial position is assisted by the spring tension. To insure that each stroke is carried to the full stroke position, a ratchet 59 on the shaft 51 is prevented from clockwise motion by a spring-loaded pawl 61 until the full stroke position is reached, when the pawl passes the last ratchet tooth and swings clear to permit the shaft to travel through the return stroke.

Drive shaft 51 carries drive arms 62, 63 near each side plate 11, 12 for actuating platen drive linkages. The linkage near side plate 11 is seen in FIG. 2 and will be described with reference thereto, it being evident that a similar linkage is provided just inside the side plate 12. One end of a link 64 is fastened pivotally to the end of the drive arm 62. The other end of link 64 is pivoted by a shaft 65 to one end of a lever 66. Lever 66 is pivoted at its other end on a fixed shaft 67. Shaft 67 passes between the side plates 11 and 12, and shaft 65 also extends laterally to link the companion members to the link 64 and lever 66 which are near plate 12, so that these shafts serve in both linkages and act to stiffen and balance the operating means. Another link 68 runs forward from the middle of lever 66 to a point which is common to a lower toggle arm 69 and an upper toggle arm 71. The lower end of toggle arm 69 is secured pivotally on a fixed shaft 72 extending across the machine, while the upper end of toggle arm 71 is fastened pivotally to the free end of a roughly horizontal arm 73 by means of a platen drive pin 74. The remote end of the arm 73 is pivoted about a fixed stud 76 projecting from the adjacent outer side plate. The platen drive pin 74 protrudes from one end of a platen bed 77 near the top thereof (a similar drive pin extends from its other end), and the bottom of the platen bed is notched vertically upward throughout its length, so that the notch rides on the fixed shaft 72. This structure permits substantially vertical movement of the drive pins through a small distance while the lower end of the platen bed is constrained to move vertically by the fixed shaft 72. A platen 78 is fixed on the top of the platen bed 77 and extends thereon across the machine between

Marking members are associated with each of the segmental members and are movable thereby into positions for making marks representing the individual digits included in the amount to which the respective segmental members are set. In an embodiment of the invention having a minimum number of parts, these marking members may be placed on the segmental members or disks themselves, so that setting a disk into a digit-representing position brings a corresponding marking member into marking position adjacent to the platen 78. However, the various parts may be positioned more conveniently, and designed better for performing their several functions, if a plurality of separate marking wheels 81-85 are geared individually to corresponding segmental members 16-20. These marking wheels are affixed coaxially at their sides to respective gears 86-90, which mesh with the teeth formed on the peripheries of the disks 16-20. The wheels 81-85 carrying the gears 86-90 are free to rotate upon a large shaft 91 journaled in the side plates 11 and 12. The marking wheels have sets of protrud-

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ing marking members 92 spaced along the peripheries thereof, several of these marking members being visible in FIGS. 1 and 2 on the peripheral surface of the marking wheel 81. It appears that the marking wheels are geared for rotation by the respective disks 16-20 to bring selected marking members into positions opposite the platen 78 for making marks representing the individual digits in the amount to which the respective segmental members or disks are set.

While the use of marking wheels to carry the marking members usually is most satisfactory, it will be understood that marking may be accomplished in various ways, using the settable disks and marking members of the present invention. When marks are made on a web or sheet surface to register or record data, the marking members may be associated with the disks in such a way that setting of a disk causes a marking member to move into a position or location on the surface of the web which depends in a predetermined manner upon the value of the digit or the nature of the data to be recorded. For this purpose arrangements are generally well known in which a marking member is incorporated on a slide, the slide carrying a rack which meshes either with the settable disk itself or with a pinion geared to the disk or carried on the disk shaft 31. In the embodiment illustrated, however, setting of a disk causes its marking wheel to turn and move the selected marking member into a prelocated marking position, in this case at the bottom of the marking wheel directly between the large shaft 91 and the platen 78.

In one form of marking arrangement the marking members, whether carried directly on the settable disks, or carried on a marking slide or on disks or cylinders such as the marking wheels 86-90, are simply punches, which may have rectangular or round cross-sectional shapes or which may be in coded groups or shaped to represent characters. In this case the operating cycle of the machine brings these punches into contact with a member, such as the platen 78, which has the form of a punching die for receiving each of the punches which may be in punching position. The marks then have the form of holes punched in the web. In the embodiment illustrated, however, the data are recorded in the form of printed marks. Thus the marking members 92 are type members movable into positions for printing, and the marking wheels 81-85 serve as type wheels having sets of types 92 spaced along the peripheries thereof and geared individually to the corresponding disks for rotation thereby to bring selected types into positions for printing.

If a sliding type bar were used, each mark might have the same shape, since the marks may be distinguished by position alone on the record sheet. However, the marking members 92 located along the peripheries of the marking wheels differ from each other in shape; they may be code marks of arbitrary shape or alphanumeric characters. Each of the type wheels in the embodiment described herein carries types 92 for printing the ten digits 0-9, so that setting the disks brings selected types into positions for printing the individual digits which make up the amount to which the respective disks are set.

For making a printed impression through inked contact of a type 92 with a record web, a wide ink-impregnated or ink-coated ribbon 93 is provided, as shown in FIG. 2, the ribbon being omitted in the plan view of FIG. 1 for ease of illustrating other components. The ribbon 93 is supplied on a spool 94 which may be rotatably positioned between spool holders 96 and 97 affixed to the respective side plates 11 and 12. A ribbon guide bracket 98, shown only in FIG. 2, guides the ribbon toward the printing line as it comes off the spool 94. A ribbon guide plate 99 is positioned along the central and rearward portions of the machine (this plate being largely cut out

as shown in FIG. 1) and has a depressed portion at its rear edge over which the ribbon passes as it travels rearwardly and then upwardly toward a ribbon take-up spool 101. A lower ribbon guide bracket 102 is affixed to the edges of the guide plate 99 at its rear end to support the ribbon 93 from below as it passes the guide plate on its way to the take-up spool. Any conventional mechanism may be used to maintain ribbon tension and to advance the ribbon a small amount during each cycle of operation, and such mechanism is not shown in the drawings.

A record web 103 may be inserted between the type wheels 81-85 and the platen 78 with the ribbon 93 interposed between the web and the types 92 located at the bottoms of the type wheels. The side plates 11 and 12 are slotted deeply to enable insertion of a wide web or long sheet 103. Adjustable positioning members (not shown) may be provided as needed to insure that the marking or typing is carried out at the desired locations on the web 103. The web may have the form of a strip, card, or sheet, and machines of the character shown and described herein frequently are used for imprinting amounts on checks, which are inserted as shown for the sheet or web 103 in FIG. 2.

Referring now to the operation of the portions of the machine described hereinabove, machines of this character may be electrically driven through their operating cycles. In that event a motor shaft would be coupled through a suitable drive mechanism, such as an eccentric coupled to an arm on the drive shaft 51, so as to rotate the shaft 51 in a reciprocating operating cycle. Such a power-operated arrangement is not shown herein, however, since provision is made for manual operation through the handle 58. Pulling the handle forward (to the left as viewed in FIGS. 1 and 2) causes the shaft 41 to rotate counterclockwise through an angle of 115°. Reversal of direction during this forward stroke is prevented by the action of the pawl 61 on the full stroke ratchet 59. At the end of the forward stroke, as the slot 53 in the large gear 52 strikes the stud 54, the pawl 61 releases the ratchet, and the return stroke may be carried out with the aid of the return drive spring 57, which has been placed under increasingly great tension during the forward stroke.

In the graphical timing chart of FIG. 3, the horizontal axis represents the angular displacement of the drive shaft 51 from its rest position, passing from 0° to 115° on the forward stroke and back to 0° on the return stroke. The position of the faces of the types 92 relative to the upper surface of the web 103 supported by the platen 78, allowing for the thickness of the intervening ribbon 93, is represented by the curve 106 in the lower portion of FIG. 3. The vertical axis of ordinates of the lower portion of FIG. 3 is subdivided at the left of the chart in thousandths of an inch of free space between the type and the platen. As the handle 58 is pulled toward the front of the machine, the drive shaft 51 turns until the drive arms 62 and 63 reach the full stroke position shown in dashed lines for arm 62 in FIG. 2. During this operation the arm pulls the link 64 upward, rotating lever 65 counterclockwise as seen in FIG. 2, which in turn pulls the link 68 toward the right and tends to pull the toggle arms 69 and 71 into vertical alignment. Guided by the arm 73, the right end of which performs a small arc in a direction substantially vertically upward, the platen drive pin 74 moves upwardly and carries the platen bed 77 with it, the forked lower end of the platen bed sliding upwardly on the fixed shaft 72. In this way the platen bed carries the platen 78 upwardly during the forward stroke. The free space between the platen and the types on the type wheels 81-85 thus decreases until, at point 107 on the curve 106, the marking or type members are brought into marking or inked contact through the ribbon 93 with the upper surface of the web 103 when the drive shaft is in the neighborhood of its full stroke position. As the platen is pressed upwardly beyond the point 107, relative motion

between the platen and the type cannot occur except for a moderate compression of the ribbon and the web beneath the type face, but some additional effective motion of the platen still takes place until the full stroke position actually is reached at the point 108 on curve 106, represented by a platen position indicated in dashed lines in FIG. 2. This added motion of the platen appears as a corresponding distortion in the side plates 11 and 12, which as mentioned above are grooved deeply to receive the record web 103 from the front of the machine, bringing the portions of the side plates above and below the groove slightly closer together and increasing the printing pressure. On the return stroke the pressure decreases, and the printing couple opens and the platen starts to withdraw from the record web at the point 109 on curve 106. Thus the type members come into inked contact with the web surface in the neighborhood of the full stroke position, corresponding to angular positions between the points 107 and 109 on the curve 106 of FIG. 3, to print the amount selected by the settings of the segmental members or disks. Of course, if alphanumeric types are not used, the marking members associated with the segmental members are brought similarly into marking contact with the web surface during the operating cycle to make holes or other marks in or on the web representing the amount selected by the settings of the segmental members. If on the surface of the web, the marks need not be made in an ordinary ink, but may be, for example, of a special magnetic, conductive, or fluorescent ink, and need not even be visible under ordinary light.

Describing further the machine as illustrated in FIGS. 1 and 2, a cam member 111 is rotatable through one revolution by the operating means during each operating cycle, the aforesaid one revolution starting only after the amount-marking or -printing is substantially completed, that is, when the printing couple is almost or completely open, such opening occurring as the point 109 is reached in the curve 106. It will be evident from the foregoing description that the above-designated operating means includes the drive shaft 51, reciprocated by the handle 58, and the linkage from the drive arms 62, 63 to the toggle 69, 71 which raises and retracts the platen 78 to close and open the printing couple. To provide the single timed revolution of the cam 111, a small gear 112 is mounted on a stub shaft 113 on the side plate 11 so as to be in mesh with the large gear 52 on the drive shaft 51. Fastened concentrically on one side of the gear 112 is a ratchet wheel 114 having only a single tooth 116. The throw of the drive shaft during the forward and return strokes, and the ratio of the gears 52 and 112, is such that the ratchet wheel is geared to the drive shaft for a rotation, during the forward stroke, of more than one revolution but less than two revolutions of the ratchet wheel and for the same rotation thereof in the reverse sense, of course, during the return stroke. In the machine illustrated, for a full stroke rotation of 115° of the main shaft and the large gear 52, the small ratchet gear 112 has a rotation of about 523°, corresponding to a gear ratio of 50:11, or somewhat less than 1½ revolutions.

The cam 111 is rotatable on an axis concentric with that of the ratchet wheel 114, and as shown is mounted loose on the same stub shaft 113. A driving pawl 117 is pivotally mounted on a pin 118, fixed to the side of the cam 111, so that the pawl engages the single tooth 116 of the ratchet wheel 114 only when the small gear 112 is rotated counterclockwise (FIG. 2) past the one point of engagement at the tooth 116. Since the drive shaft 51 and large gear 52 rotate clockwise, to drive the small gear 112 counterclockwise, only on the return stroke, the driving pawl can engage the ratchet wheel only during the return stroke. As seen in FIG. 2, which shows the positions of the parts at the start and end of the operating cycle, the driving pawl 117 is at the point of engagement with the tooth 116 at the start of the cycle. However, the ratchet wheel rotates in the sense which carries the tooth 116 away from the pawl for one full revolution and

almost a half of another revolution during the forward stroke, and almost one third of the return stroke has been accomplished before the ratchet wheel has returned in the reverse sense, that is, counterclockwise, to the position of engagement of its tooth 116 with the pawl 117. Consequently, the driving pawl is mounted on the cam for engaging the single tooth of the ratchet wheel only during the last full revolution of the ratchet wheel in this reverse sense, whereby the cam 111 rotates during each operating cycle through one revolution, counterclockwise as seen in FIG. 2, starting only after the amount-printing is substantially completed.

The cam 111 with its driving arrangement, including the gears 52 and 112, the ratchet 114, and the pawl 117, thus constitute energizing means for the mechanism, about to be described, operated by the cam, this energizing means being moved by the main drive shaft 51 of the operating means during each operating cycle but only after the data-registering, or more specifically the amount-marking or -printing, is substantially completed. It will appear that this energizing means is arranged for actuation only when resetting of the segmental members to their rest positions is desired. This occurs during each operating cycle after the data-registering is completed, unless a disabling means, to be described hereinbelow, is moved into a position for preventing automatic resetting, in which event the energizing means (or more specifically the pawl 117 and cam 111 thereof) is not actuated at all during the operating cycle.

Means is provided, driven by the cam 111 of this energizing means, for removing all of the positioning and detent means or individual pawls 41 et seq. from their spring-biased contact with the segmental members or disks 16-20 at the beginning of a predetermined portion of the operating cycle and for releasing these pawls back into contact with the segmental members at the end of that portion of the cycle. This means for moving the pawls comprises cam-follower means operated by the cam 111, and includes specifically a cam follower 120 riding on the peripheral camming surface of the cam 111. The cam follower 120 has the shape of a rod, the outer end of which has a roller to contact the cam, and which extends inwardly beneath the inner side plate 32 to connect at its inner end with a yoke bow 121. This bow is one of a pair of bows 121 and 122 located just inside the inner side plates 32 and 33 respectively. These bows are connected by a yoke cross member 123 and are pivoted at their upper left ends, as seen in FIGS. 1 and 2, on the same shaft 47 about which the detent pawls 41-44 rock. The yoke structure is completed by an upper pin 124 and a lower pin 125, which pass between the yoke bows 121 and 122 parallel to the pawl shaft 47. Springs 126 are connected to the bows to urge the yoke structure 121-125 counterclockwise (FIG. 2) about the shaft 47 and maintain the follower 120 on the camming surface.

The cam-follower means 120-126 thus carries a pawl-contacting arrangement in the form of the upper pin 124 passing near the upper surface of the offset extension 46 of each pawl and the lower pin 125 passing near the lower surface of each extension 46. The cam-follower means cooperates with the cam 111, through downward pressure of the upper pin 124 on the pawl extensions 46 when the follower rides toward a high point on the cam, for causing the pawl-contacting pin 124 to rock all of the pawls out of their spring-biased contact with the respective segmental members or disks 16-20 during an earlier portion of each revolution of the cam member, and thereafter for releasing the pawls back into contact with the respective segmental members or disks when the follower 120 reaches a camming surface having a smaller radius.

A resetting member 127 is provided which ordinarily is in inoperative position but which is adapted to move into rotational contact with each of the segmental members or disks 16-20. The resetting member 127 is a bail, passing through similarly shaped slots 128 in each of the

disks 16-20, and having arms 129 and 131 tight on the shaft 31 which carries the disks. A linkage in the form of a crank member 132 is provided between the energizing means, as represented by the cam 111, and the resetting bail 127 for causing the bail to move and carry all of the segmental members 16-20 which have been set to registering or digit-representing positions back to rest position during the aforementioned predetermined portion of the operating cycle, and for then returning the resetting member 127 to its inoperative position. The crank 132 is fastened eccentrically to the side of the cam 111 by a pin 133 and is connected at its other end to a lever 134 which is tight on the disk shaft 31. This connection is made through a pin 136 which rides in a slot near the end of the crank 132, permitting some lost motion in the linkage between the cam 111 and the resetting bail 127. Thus the crank 132 is rotatable with the cam 111 and is linked with the resetting bail 127 for moving it into contact with all of the segmental members or disks which have been set to digit-representing positions. Specifically, the bail 127 is adapted to contact the lower left ends of the slots 128, as seen in FIG. 2, and rotate the disks back to rest position while the pawls 41 et seq. are rocked out of spring-biased contact with the segmental members or disks.

When marking or type wheels 81-85 are utilized, so that the marking members or types are not placed directly on the settable disks, it has been found advisable to provide additional locking members which center and lock the type wheels in their selected positions for marking or printing. Thus, referring to FIG. 2, a locking dog 137 is pivoted on a shaft 138 and urged counterclockwise by a spring 139 into centering and locking contact with a tooth on the type wheel gear 86. It will be understood that a similar locking dog (not shown) is properly provided for contacting the gear associated with each other type wheel to lock the wheel when in one of the positions at which a type 92 is presented to the platen 78 for printing. The shaft 138 carries also a locking dog lifter 141 held by arms 147 and 148. Means, not shown, is provided for rotating the shaft 138 clockwise so that the lifter 141 rotates the locking dogs clockwise out of contact with the type wheels.

Machines of the character described advantageously are provided with a visual indicator to show the operator the digit-representing position to which each disk has been set. In the embodiment illustrated, this arrangement includes a series of indicating wheels rotatable on the shaft-shaped tie rod 36. For convenience of illustration, only two of the indicating wheels are shown in the drawings. Wheel 142 carries concentrically a gear 143 (in the same plane as the gear 86 and hiding it in FIG. 1 but not in FIG. 2) which meshes with the teeth on the disk 16, while wheel 144 carries a gear 145 (above the gear 87 and hiding gear 87 in FIG. 1) which meshes with the gear teeth on the disk 17. The indicating wheels 142 and 144 carry numbers on their peripheries, a few of which are shown on the wheel 142 in FIG. 2, which may be viewed by the operator through a hole or slit in the cover (not shown) of the machine to indicate the settings of the disks and the corresponding positions of the type wheels and indicator wheels.

Describing now the operation of the cam 111 and the mechanisms driven by it, reference may be had again to FIG. 3, in which the curve 151 represents qualitatively the rotation of the resetting bail 127 as a function of the angular position of the drive shaft 51. During the forward stroke of the operating cycle the handle 58 is pulled forward (left in FIG. 2), whereby the large gear 52 on the drive shaft 51 causes the single-toothed ratchet 114 to rotate clockwise from the position shown in FIG. 2 through a full revolution and then to continue through almost another half revolution, at which time the handle 58 is in its extreme forward position and the drive arm 62 has reached the position shown in dashed lines in

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FIG. 2. This point corresponds to the vertical line 152 through the curves of the FIG. 3 graph. As the handle returns and the printing couple starts to open, the ratchet 114 rotates counterclockwise until just one revolution remains during the return stroke, at which point the ratchet 114 has returned again to a position where the driving pawl 117 is contiguous to the tooth 116 on the ratchet 114. This point is represented by the vertical line 153 on the FIG. 3 graph.

The position of the various elements in question at the stage corresponding to 153 on the graph is illustrated in the partial elevational view of FIG. 4, where the angular positions of the handle 58 and the drive arm 62 are indicated in dashed lines for comparison with their rest positions shown in FIG. 2. The return stroke has carried the drive arm 62 from the position shown dashed in FIG. 2 to the horizontal position indicated in FIG. 4. Further counterclockwise rotation of the ratchet 114 during the balance of the return stroke causes the tooth 116 to engage the driving pawl 117 and drive the cam 111 through one revolution. This carries the mechanism through the positions represented in the partial elevational views of FIGS. 5 and 6, corresponding to the vertical lines 154 and 155 respectively in the FIG. 3 graph. At the stage represented in FIG. 5, the link 132 has moved leftward until the pin 136 has been engaged by the right end of the slot in the crank 132, and the resetting bail 127 then has been moved counterclockwise about the disk shaft 31 through an arc long enough to pick up the disks which have been set to extreme positions. As the mechanism continues to move toward the stage represented in FIG. 6, the bail 127 contacts all of the disks which had been set, and at the point 155 has carried them to their rest positions with the arms 26-29 against the stop bar 38. As the cycle continues, the eccentric connection of the crank 132 on the cam 111 moves the crank toward the right, again taking up the lost motion of the pin 136 in the slot on the crank 132 and returning the resetting bail 127 to its inoperative position, as shown in FIG. 2. The motion of the bail 127 clockwise about the shaft 31 to reset the disks is represented by the downwardly extending portion 156 of the curve 151 in FIG. 3, while the return of the bail to its inoperative position is represented by the upwardly extending portion 157 of this curve near the end of the operating cycle. The positions of the arm of the handle 58 and of the drive arm 62 are indicated also in FIGS. 5 and 6, at the stages 154 and 155 during the return of the drive shaft 51 toward the initial position represented in FIG. 2.

As the return stroke proceeds from the stage identified as 153 in FIG. 3 and illustrated in FIG. 4, cam 111 and the cam-follower means have operated to rock the detent pawls 41 et seq. away from contact with the disks 16-20. The motion of the pawls is represented by the curve 158 in FIG. 3. During the entire portion of the operating cycle from the position shown in FIG. 1 to that shown in FIG. 4, the cam-follower 120 remains seated in a small depression 161 in the camming surface. The shape of the camming surface is best seen in FIGS. 4-6. As soon as the tooth 116 engages the driving pawl 117 and begins to turn the cam 111, starting at the stage 153 in FIG. 3, the follower 120 climbs out of the depression 161. This causes the yoke assembly 121-125 to start rotating clockwise so that the pin 124 commences to push against the upper edge of the offset extension 46 on each detent pawl. During the first quarter revolution of the cam 111, the follower 120 rides to the highest point on the camming surface, causing all of the pawls to be rocked against the biasing force of the springs 48 so that the pawls move clear of the indentations 37 and of the interlateral portions therebetween on the disks 16-20. This motion of the pawls is represented by the rising portion 162 of the curve 158. The follower 120 now remains at its position of maximum travel while the cycle proceeds through the position 154, represented in FIG. 5.

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As the cam 111 approaches the position shown in FIG. 6, however, the follower commences to fall sharply into a deep depression 163 in the camming surface, causing a rapid return of the pawls into contact with the disks. This motion of the pawls is represented by the falling portion 164 of curve 158.

At this same stage 155, however, the disks which have been reset by the bail 127 have just reached their rest positions, as indicated in FIG. 6 and by the curve 151, and there is a tendency of the disks to vibrate or recoil from the stop bar 38 as they decelerate from the resetting rotation. The pawls now are seated in the peripheral indentations 37 for the rest positions of the disks. To stabilize the disks quickly in their rest positions, the cam-follower means cooperates further with the cam 111 for causing the pawl-contacting arrangement not only to release the pawls back into spring-biased contact with the respective disks when the disks thus have been reset to rest position, as represented by the portion 164 of curve 158, but also for a short time immediately thereafter to retain the pawls in substantially fixed position within these respective peripheral indentations on the disks. This cam-follower action is achieved by making the depression 163 in the camming surface deep enough so that the yoke springs 126 pull the yoke and its lower pin 125 against the lower edge of the offset extensions 46 on the pawls. This retains the pawls within the indentations on the disks while the follower remains in the bottom of the depression 163, so that the pawls cannot retract against the action of the biasing springs 48. The additional motion of the pin 125 to achieve this pawl-retaining position is represented by the dotted depression 165, added to the curve 158 which represents the pawl position. After a short hold in the depression 163, the cam follower rises to a plateau on the camming surface and stays there during the brief remainder of the operating cycle, falling back into the depression 161 as the cam reaches the rest position and the cycle ends.

Referring to the curves 151 and 158 in FIG. 3, it will be seen, as mentioned hereinabove, that the detent pawls are removed from spring-biased contact with the disks at the beginning of a predetermined portion 153-155 of the operating cycle and are released back into contact with the disks at the end of that portion of the cycle. The resetting bail 127, through the eccentric connection of the crank 132 to the cam 111, is caused to carry all of the disks back to rest position, as represented by the portion 156 of curve 151, during this predetermined portion of the cycle, during which the pawls are held out of contact with the disks.

The motion of the locking dogs 137 through a suitable linkage, not shown, with the driving arrangement is represented by the curve 166 in FIG. 3. Early in the operating cycle the locking dogs are permitted to be drawn by the spring 139 into positions to lock each of the type wheels, which had been set to the desired printing positions by adjustment of the disks 16-20 prior to the operating cycle. The locking dogs remain in locked position thereafter until the printing couple is about to open. Between the stages 153 and 154 of the operating cycle, the locking dog lifter is actuated to pull the dogs away from the gears attached to the type wheels. Thus, by the time the resetting bail 127 contacts the disks to return them to rest positions, the type wheels have been unlocked. The timing of these motions is evident from the curves of FIG. 3. One object of the present invention is to remove the restraint exerted on the setting disks by the positioning and detent pawls 41 et seq. during the operation of the resetting bail 127. Attainment of this object will not be realized, of course, unless any restraints upon the motion of members coupled to the setting disks also are removed during the resetting operation. It has been found advisable for accuracy of printing to lock the type wheels during the printing operation, independently of the positioning and detent action of the

pawls 41 et seq. on the setting disks. Accordingly, those skilled in the art will be able to provide suitable means for effecting the desired retraction of the locking dogs 137 during the resetting portion of the cycle. One arrangement for retracting the locking dogs is described and illustrated in an application serial No. 51,900 for Letters Patent of the United States entitled Data-Marking Machine, now Patent No. 2,996,979, said application having been filed concurrently herewith in the names of Ronald W. Ferguson, Emery M. Low, and Paul J. Thut and assigned to the same assignee as the present application. Application Serial No. 51,900 discloses and claims a novel and especially efficient arrangement, operative in timed combination with other elements of such a machine, not only to retract the locking dogs from the type wheels or the gears affixed to the wheels at about the same time that the detent pawls are removed from contact with the setting disks, but also to lock the type wheel gears again before the next printing operation is effected.

Occasionally it is desired to operate the amount-printing machine described hereinabove in consecutive cycles of operation to print the same amount during each cycle. For this purpose it is convenient to provide disabling means for preventing the resetting of the settable disks between these successive cycles of operation. Thus, disabling means is provided for holding the driving pawl 117 in a pivotally withdrawn position, out of engagement with the single tooth 116 of the ratchet 114, during any operating cycle in which it is not desired to reset the segmental members or disks. This disabling means has the form of a lever 167 pivoted coaxially with the shaft 31 which carries the setting disks. The disabling lever has a lower end portion 168 adapted to be rocked into contact with an upper extension of the driving pawl 117. Ordinarily the driving pawl is maintained in contact with the ratchet surface by a spring 169. However, backward motion of the disabling lever 167 where it extends above the machine mechanism forces its lower end portion 168 to rotate the driving pawl 117 counterclockwise about the pin 118 and out of engagement with the ratchet. The disabling positions of the lever 167-168 and of the pawl 117 are indicated in dashed lines in FIG. 4. While the lever 167 remains in this position, the operating means passes through the return stroke without any rotation of the cam 111, so that the motions represented in the curves 151 and 158 in FIG. 3 do not occur.

While there has been described what at present is considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention. It is aimed, therefore, in the appended claims to cover all such changes and modifications which fall within the true spirit and scope of the invention.

What is claimed is:

1. In a data-registering machine adapted for actuation in successive discrete operating cycles each having a predetermined sequence of operations, the combination comprising: a plurality of segmental members, each settable, prior to actuation of an operating cycle, by rotation from a rest position to any selected one of a succession of registering positions for entering data to be registered; positioning and detent means in spring-biased contact with each of said segmental members for retention thereof in the positions to which they are individually set; operating means actuated during the operating cycle for registering the data selected by the settings of said segmental members in said selected registering positions; energizing means moved by said operating means during each operating cycle but only after said data-registering is substantially completed; means driven by said energizing means for removing all of said positioning and detent means from said spring-biased contact with said seg-

mental members, said removing being effected at the beginning of a predetermined portion of the operating cycle which begins after said data-registering is substantially completed, and for releasing said positioning and detent means back into contact with the segmental members at the end of said predetermined portion of the cycle; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a linkage between the energizing means and the resetting member for causing the resetting member to move and carry all of the segmental members which have been set to said registering positions back to reset position during said predetermined portion of the operating cycle and for returning the resetting member to inoperative position.

2. In a data-registering machine for marking amounts on a record web, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be marked, each settable, prior to initiation of a data-registering operating cycle of the machine during which marking is effected, by rotation from a rest position to any of a succession of digit-representing positions for selecting the several digits in an amount to be marked; positioning and detent means in spring-biased contact with each of said segmental members for retention thereof in the positions to which they are individually set; marking members associated with each of said segmental members and movable thereby into positions for making marks representing the individual digits in said amount to which the respective segmental members are set; operating means for bringing said marking members into marking contact with a web surface during an operating cycle to place marks on the web representing the amount selected by the settings of said segmental members; energizing means moved by said operating means during each operating cycle but only after said amount-marking is substantially completed; means driven by said energizing means for removing all of said positioning and detent means from said spring-biased contact with said segmental members at the beginning of a predetermined portion of the operating cycle and for releasing said positioning and detent means back into contact with the segmental members at the end of said portion of the cycle; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a linkage between the energizing means and the resetting member for causing the resetting member to move and carry all of the segmental members which have been set to said digit-representing positions back to rest position during said predetermined portion of the operating cycle and for returning the resetting member to inoperative position.

3. In a data-marking machine for marking amounts on a record web, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be marked, each settable, prior to initiation of a data-marking operating cycle of the machine, by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations on said rotatable segmental members, for selecting the several digits in an amount to be marked; a succession of indentations, having said predetermined angular separations, along a peripheral portion of each of the segmental members; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective segmental member when said member is in any one of said rest and digit-representing positions; marking members associated with each of said segmental members and movable thereby into positions for making marks representing the individual digits in said amount to which the respective segmental members are set; operating means for bringing said marking members into marking contact with a web surface during an operating cycle

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to place marks on the web representing the amount selected by the settings of said segmental members; a cam member rotatable through one revolution by said operating means during each operating cycle, said one revolution starting only after said amount-marking is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective segmental members during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective segmental members; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the segmental members which have been set to digit-representing positions and rotating such members back to rest position while said pawls are rocked out of spring-biased contact with the segmental members, and for returning the resetting member to inoperative position.

4. In an amount-marking machine, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be marked, each settable, prior to initiation of an amount-marking operating cycle of the machine, by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations on said rotatable segmental members, for selecting the several digits in an amount to be marked; a succession of indentations, having said predetermined angular separations, along a peripheral portion of each of the segmental members; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective segmental member when said member is in any one of said rest and digit-representing positions; a plurality of marking wheels, having sets of marking members spaced along the peripheries thereof, and geared individually to corresponding segmental members for rotation thereby to bring selected marking members into positions for making marks representing the individual digits in said amount to which the respective segmental members are set; operating means for bringing said marking members into marking contact with a web surface during an operating cycle to place marks on the web representing the amount selected by the settings of said segmental members; a cam member rotatable through one revolution by said operating means during each operating cycle, said one revolution starting only after said amount-marking is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective segmental members during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective segmental members; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the segmental members which have been set to digit-representing positions and rotating such members back to rest position while said pawls are rocked out of spring-biased contact with the segmental members, and for returning the resetting member to inoperative position.

5. In an amount-printing machine, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be printed, each settable, prior to initiation of an amount-printing operating cycle of the machine, by rotation from a rest position to any of a succession of digit-representing positions for selecting the several digits in an amount to be printed; positioning and detent means in spring-biased contact with each of said segmental members for reten-

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tion thereof in the positions to which they are individually set; type members associated with each of said segmental members and movable thereby into positions for printing the individual digits in said amount to which the respective segmental members are set, operating means for bringing said type members into inked contact with a web surface during the operating cycle to print the amount selected by the settings of said segmental members; energizing means moved by said operating means during each operating cycle but only after said amount-printing is substantially completed; means driven by said energizing means for removing all of said positioning and detent means from said spring-biased contact with said segmental members at the beginning of a predetermined portion of the operating cycle and for releasing said positioning and detent means back into contact with the segmental members at the end of said portion of the cycle; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a linkage between the energizing means and the resetting member for causing the resetting member to move and carry all of the segmental members which have been set to said digit-representing positions back to rest position during said predetermined portion of the operating cycle and for returning the resetting member to inoperative position.

6. In an amount-printing machine, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be printed, each settable, prior to initiation of an amount-printing operating cycle of the machine, by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations on said rotatable segmental members, for selecting the several digits in an amount to be printed; a succession of indentations, having said predetermined angular separations, along a peripheral portion of each of the segmental members; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective segmental member when said member is in any one of said rest and digit-representing positions; type members associated with each of said segmental members and movable thereby into positions for printing the individual digits in said amount to which the respective segmental members are set; operating means for bringing said type members into inked contact with a web surface during the operating cycle to print the amount selected by the settings of said segmental members; a cam member rotatable through one revolution by said operating means during each operating cycle, said one revolution starting only after said amount-printing is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective segmental members during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective segmental members; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the segmental members which have been set to digit-representing positions and rotating such members back to rest position while said pawls are rocked out of spring-biased contact with the segmental members, and for returning the resetting member to inoperative position.

7. In an amount-printing machine, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be printed, each settable by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations on said rotatable segmental members, for selecting the several digits in an amount to be printed; a succession of indentations, having said pre-

determined angular separations, along a peripheral portion of each of the segmental members; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective segmental member when said member is in any one of said rest and digit-representing positions; type members associated with each of said segmental members and movable thereby into positions for printing the individual digits in said amount to which the respective segmental members are set; operating means, including a drive shaft rotated in a reciprocating operating cycle from an initial position through a forward stroke to a full stroke position and through a return stroke back to its initial position, for bringing said type members into inked contact with a web surface when said drive shaft is in the neighborhood of its full stroke position to print the amount selected by the settings of said segmental members; a ratchet wheel having only a single tooth and geared to said drive shaft for a rotation, during said forward stroke, of more than one revolution but less than two revolutions of the ratchet wheel and for the same rotation thereof in the reverse sense during said return stroke; a cam member rotatable on an axis concentric with that of said ratchet wheel; a driving pawl pivotally mounted on the cam member for engaging said single tooth of the ratchet wheel only during the last full revolution of the ratchet wheel in said reverse sense, whereby said cam member rotates during each operating cycle through one revolution starting only after said amount-printing is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective segmental members during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective segmental members; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the segmental members which have been set to digit-representing positions and rotating such members back to rest position while said pawls are rocked out of spring-biased contact with the segmental members, and for returning the resetting member to inoperative position.

8. In an amount-printing machine, the combination comprising: a plurality of segmental members, one for each order of decimal digits in the amounts to be printed, each settable by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations on said rotatable segmental members, for selecting the several digits in an amount to be printed; a succession of indentations, having said predetermined angular separations, along a peripheral portion of each of the segmental members; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective segmental member when said member is in any one of said rest and digit-representing positions; type members associated with each of said segmental members and movable thereby into positions for printing the individual digits in said amount to which the respective segmental members are set; operating means, including a drive shaft rotated in a reciprocating operating cycle from an initial position through a forward stroke to a full stroke position and through a return stroke back to its initial position, for bringing said type members into inked contact with a web surface when said drive shaft is in the neighborhood of its full stroke position to print the amount selected by the settings of said segmental members; a ratchet wheel having only a single tooth and geared to said drive shaft for a rotation, during said forward stroke, of more than one revolution but less than two revolutions of the ratchet wheel and for the same rotation thereof in the reverse sense

during said return stroke; a cam member rotatable on an axis concentric with that of said ratchet wheel; a driving pawl pivotally mounted on the cam member for engaging said single tooth of the ratchet wheel only during the last full revolution of the ratchet wheel in said reverse sense, whereby said cam member rotates during each operating cycle through one revolution starting only after said amount-printing is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective segmental members during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective segmental members; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the segmental members which have been set to digit-representing positions and rotating such members back to rest position while said pawls are rocked out of spring-biased contact with the segmental members, and for returning the resetting member to inoperative position; and disabling means for holding said driving pawl in a pivotally withdrawn position out of engagement with said single tooth during any operating cycle in which it is not desired to reset the segmental members.

9. In an amount-printing machine, the combination comprising: a plurality of disks, one for each order of decimal digits in the amounts to be printed, each settable by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations, for selecting the several digits in an amount to be printed; a succession of peripheral indentations, having said predetermined angular separations, on each of the disks; a plurality of positioning and detent pawls, each in spring-biased contact with one of said peripheral indentations on a respective disk when said disk is in any one of said rest and digit-representing positions; a plurality of type wheels, having sets of types spaced along the peripheries thereof, and geared individually to corresponding disks for rotation thereby to bring selected types into positions for printing the individual digits in said amount to which the respective disks are set; operating means for bringing said types into inked contact with a web surface during an operating cycle to print the amount selected by the settings of said disks; a cam member rotatable through one revolution by said operating means during each operating cycle, said one revolution starting only after said amount-printing is substantially completed; cam-follower means operated by said cam member for rocking all of the pawls out of said spring-biased contact with the respective disks during an earlier portion of each revolution of the cam member and thereafter for releasing said pawls back into contact with the respective disks; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said disks; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the disks which have been set to digit-representing positions and rotating such disks back to rest position while said pawls are rocked out of spring-biased contact with the disks, and for returning the resetting member to inoperative position.

10. In an amount-printing machine, the combination comprising: a plurality of disks, one for each order of decimal digits in the amounts to be printed, each settable by rotation from a rest position to any of a succession of digit-representing positions, having predetermined angular separations, for selecting the several digits in an amount to be printed; a succession of peripheral indentations, having said predetermined angular separations, on each of the disks; a plurality of positioning and detent pawls, each in spring-biased contact with one of said

peripheral indentations on a respective disk when said disk is in any one of said rest and digit-representing positions; type members associated with each of said disks and movable thereby into positions for printing the individual digits in said amount to which the respective disks are set; operating means for bringing said type members into inked contact with a web surface during an operating cycle to print the amount selected by the settings of said disks; a cam member rotatable through one revolution by said operating means during each operating cycle, said one revolution starting only after said amount-printing is substantially completed; cam-follower means operated by said cam member and carrying a pawl-contacting arrangement passing near each pawl, said cam-follower means cooperating with said cam for causing the pawl-contacting arrangement to rock all of the pawls out of said spring-biased contact with the respective disks during an earlier portion of each revolution of the cam member; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said disks; and a crank member, rotatable with said cam member, linked with the resetting member for moving it into contact with all of the disks which have been set to digit-representing positions and rotating said disks back to rest position while said pawls are rocked out of spring-biased contact with the disks, and for returning the resetting member to inoperative position; said cam-follower means cooperating further with said cam for causing the pawl-contacting arrangement not only to release the pawls back into spring-biased contact with the respective disks when said disks have been reset to rest position but also for a short time immediately thereafter to retain the pawls in substantially fixed position within said respective peripheral indentations on the disks.

11. In a data-entering arrangement including a plurality of segmental members, each settable by rotation from a rest position to any selected one of a succession of data-representing positions, and including positioning and detent means in spring-biased contact with each of said segmental members for retention thereof in the positions to which they are individually set, means for resetting the segmental members comprising in combination: energizing means arranged for actuation only when resetting is desired; means driven by the energizing means for removing all of said positioning and detent means from said spring-biased contact with said segmental members for a predetermined period and for releasing said positioning and detent means back into contact with the segmental members at the end of said predetermined period; a resetting member ordinarily in inoperative position but adapted to move into rotational contact with each of said segmental members; and a linkage between the energizing means and the resetting member for causing the resetting member to move and carry all of the segmental members which have been set to data-representing positions back to rest position during said predetermined period and for returning the resetting member to inoperative position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,025,787

March 20, 1962

Ronald W. Ferguson et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 46, after "settable" insert a comma; column 3, line 11, for "in" read -- into --; line 18, after "machine," insert -- and --; line 33, for "comprise" read -- comprises --; column 5, line 55, after "between" insert -- the side plates 11 and 12. --; column 7, line 35, for "41" read -- 51 --; column 10, line 69, for "FI. 2" read -- FIG. 2 --; column 12, line 64, for "he" read -- the --; column 14, line 13, for "re-set" read -- rest --.

Signed and sealed this 11th day of September 1962.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents