

Oct. 11, 1938.

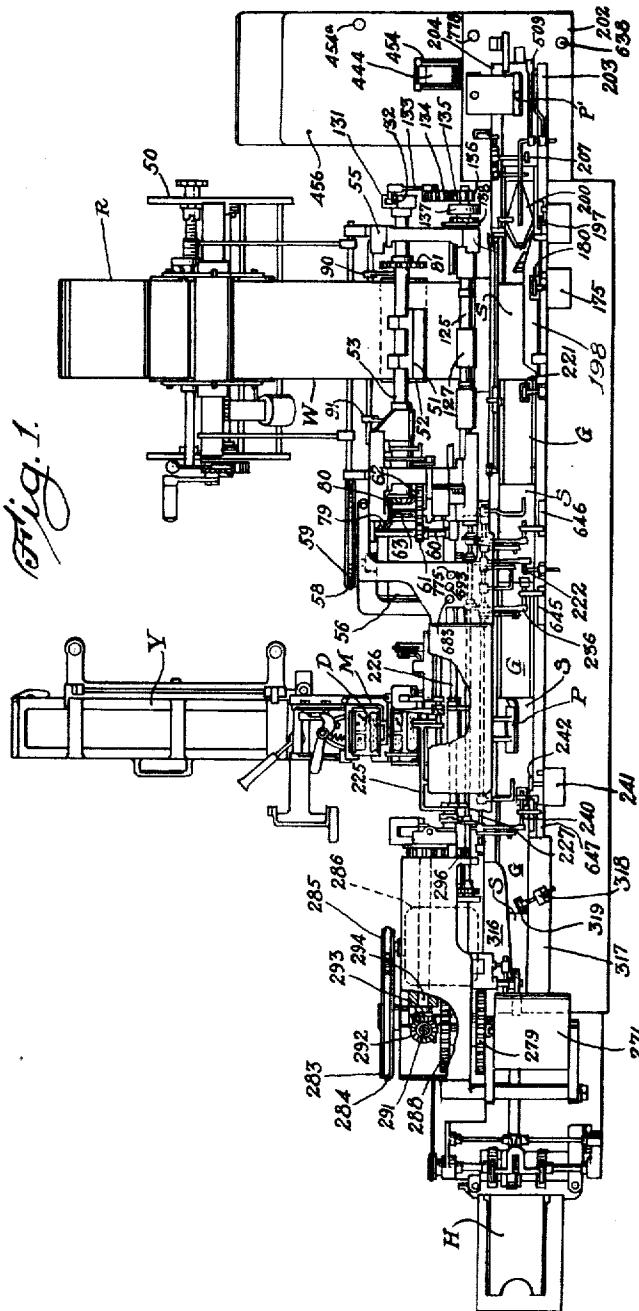
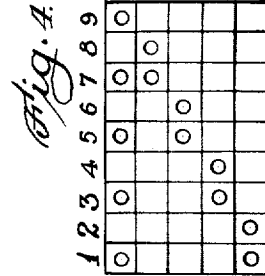
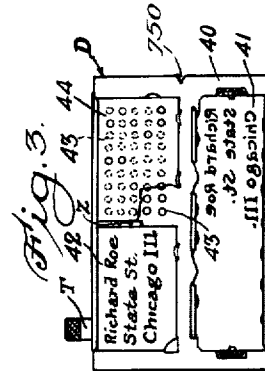
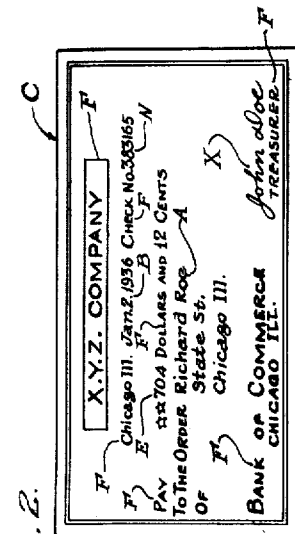
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2,133,136

PRINTING MACHINE

Original Filed Feb. 24, 1936

9 Sheets-Sheet 1



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PRINTING MACHINE

Original Filed Feb. 24, 1936 9 Sheets-Sheet 2

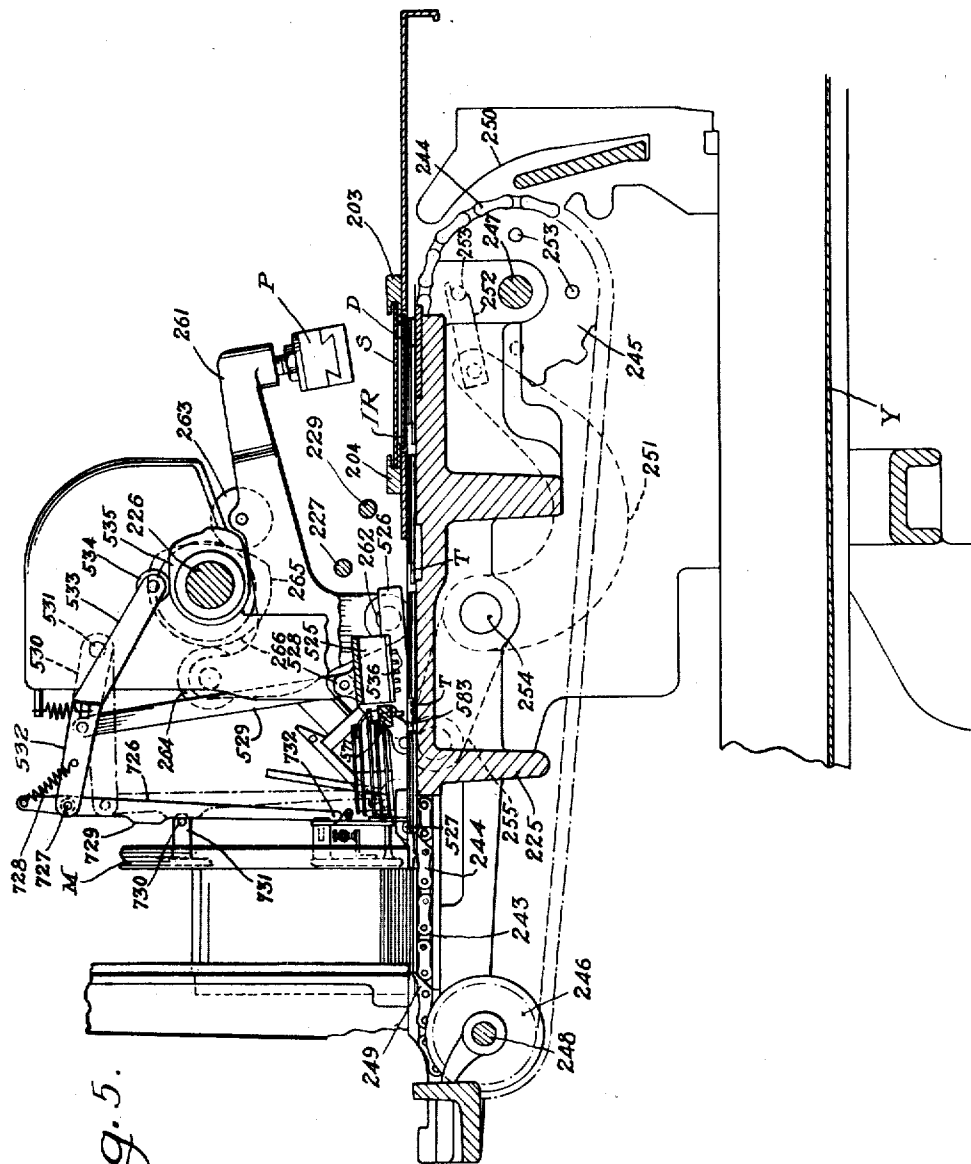


Fig. 5.

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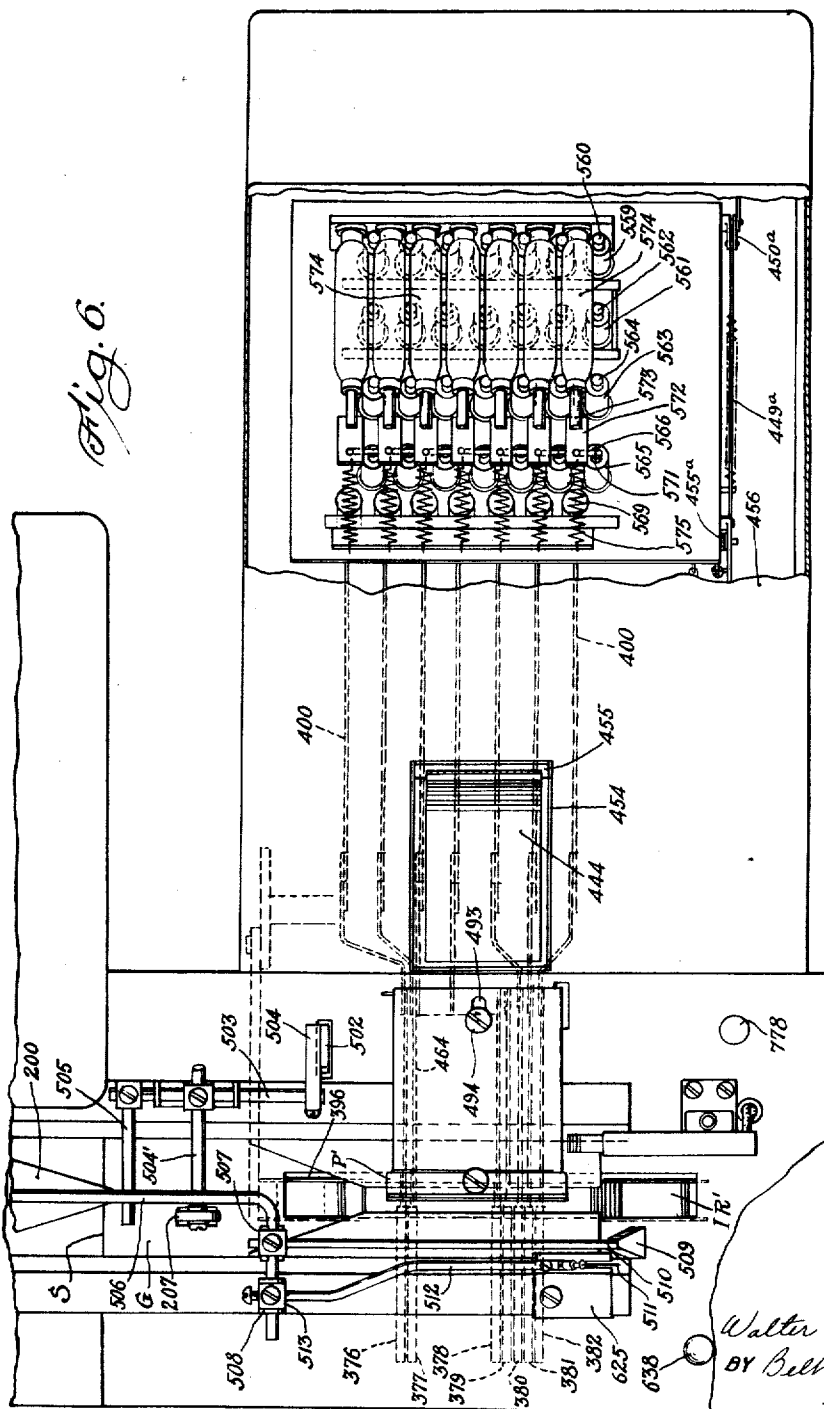
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PRINTING MACHINE

Original Filed Feb. 24, 1936 9 Sheets-Sheet 3



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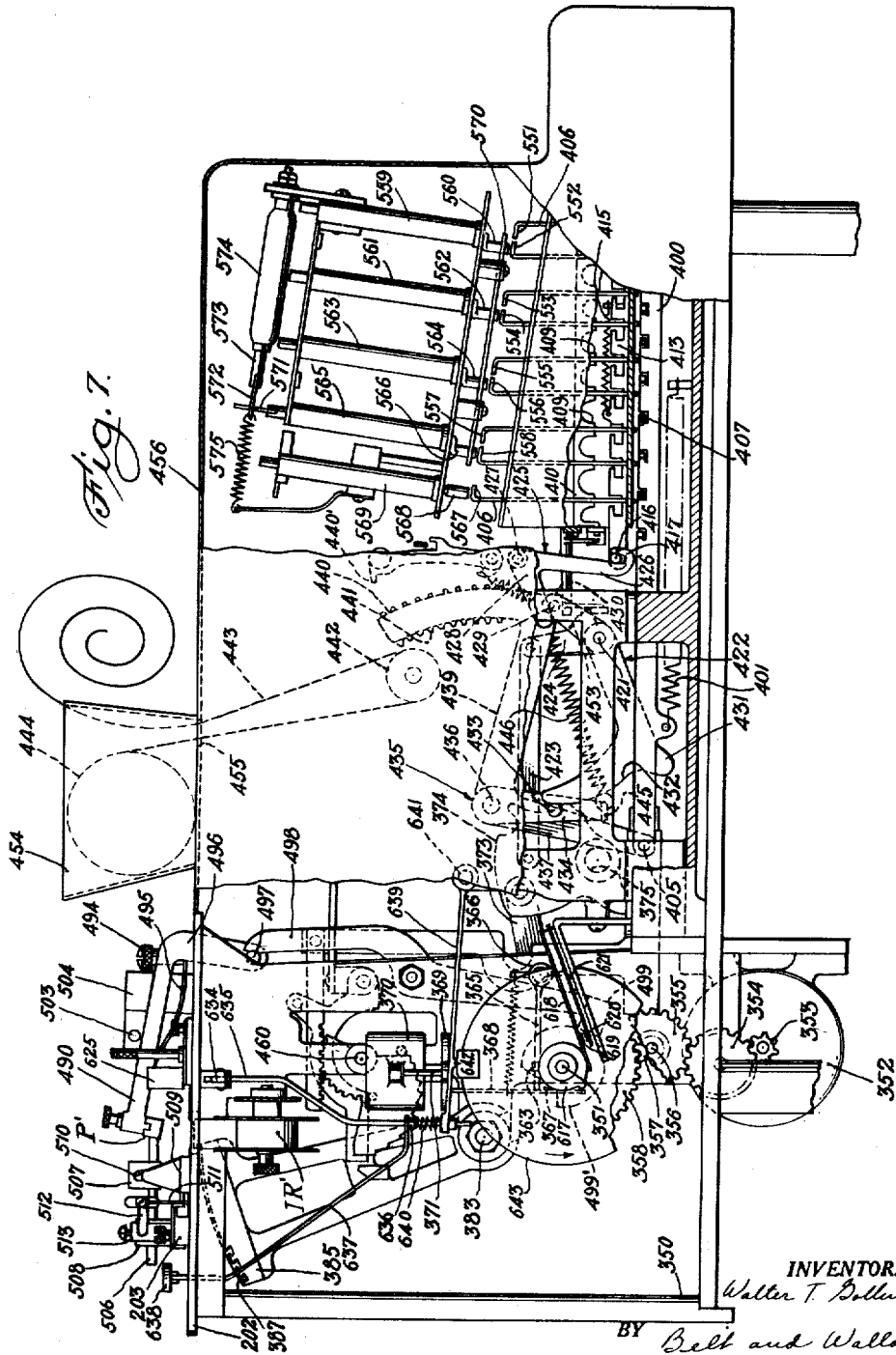
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PRINTING MACHINE

Original Filed Feb. 24, 1936 9 Sheets-Sheet 4



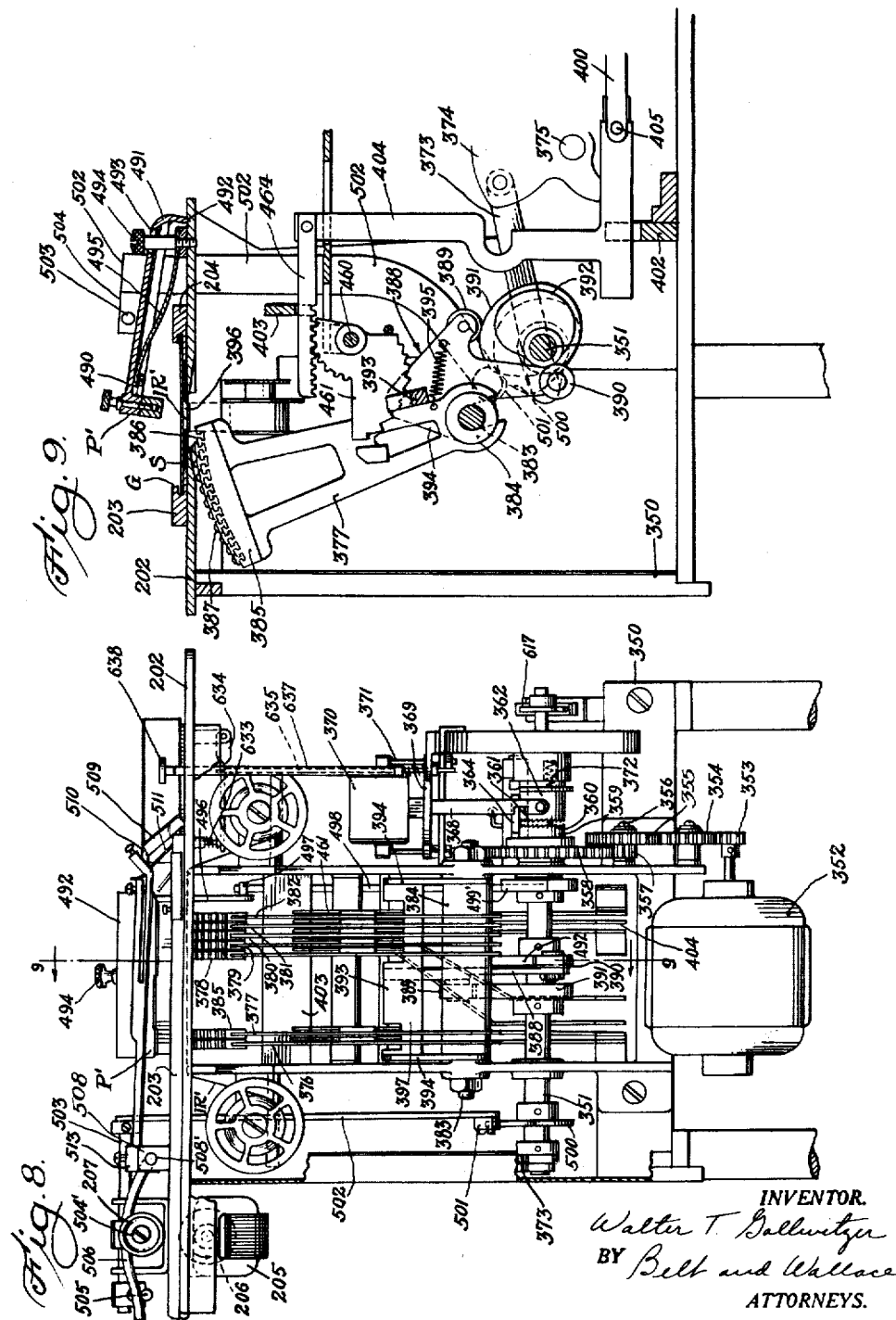
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PRINTING MACHINE

Original Filed Feb. 24, 1936 9 Sheets-Sheet 5



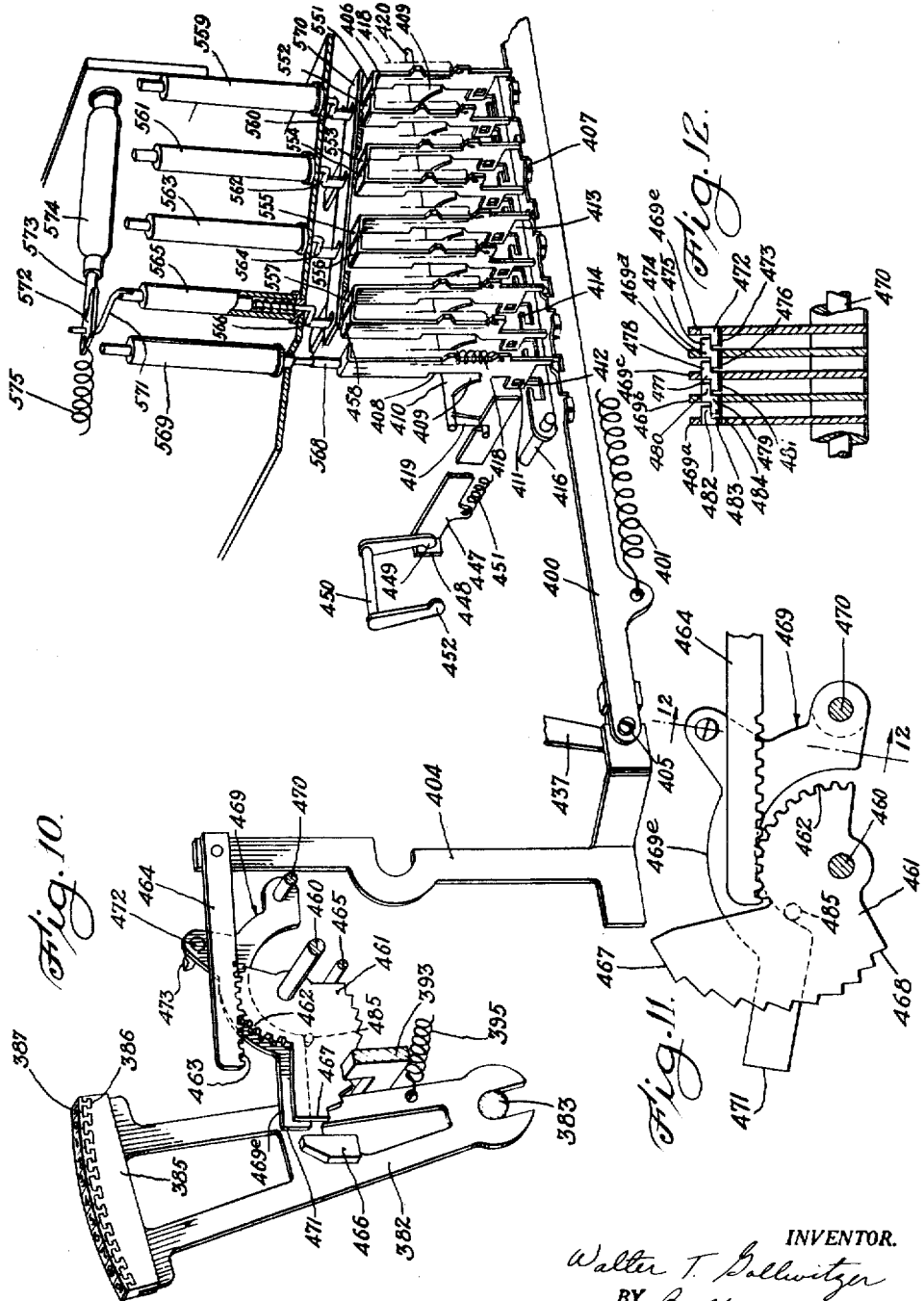
Oct. 11, 1938.

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2,133,136

PRINTING MACHINE

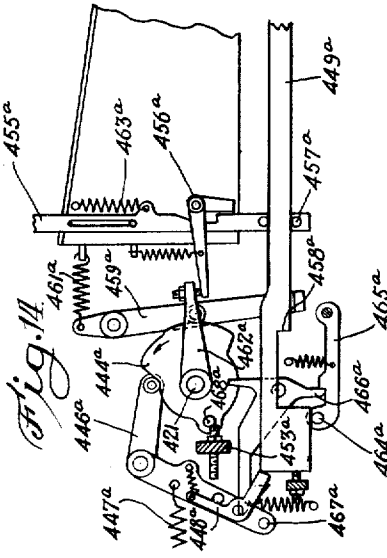
Original Filed Feb. 24, 1936 9 Sheets-Sheet 6



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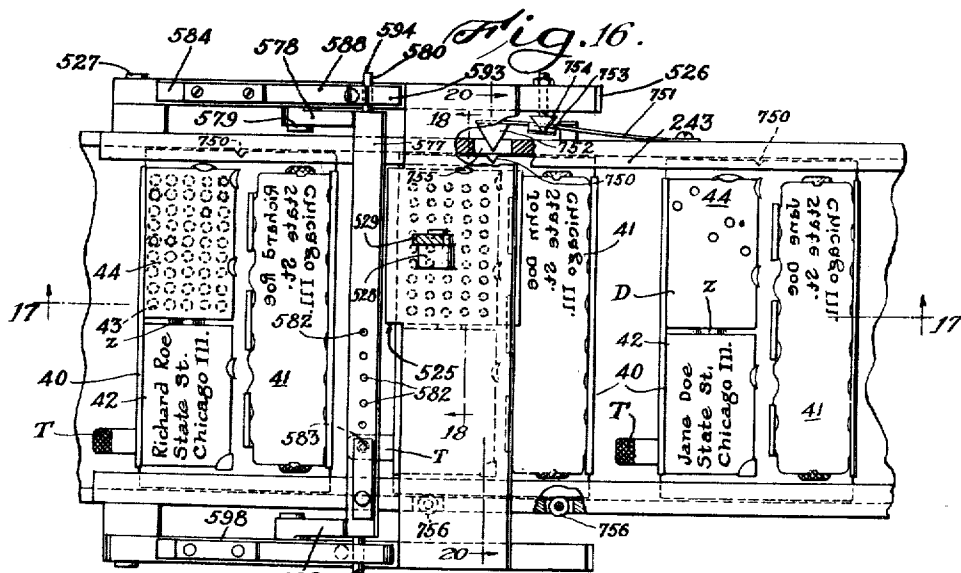
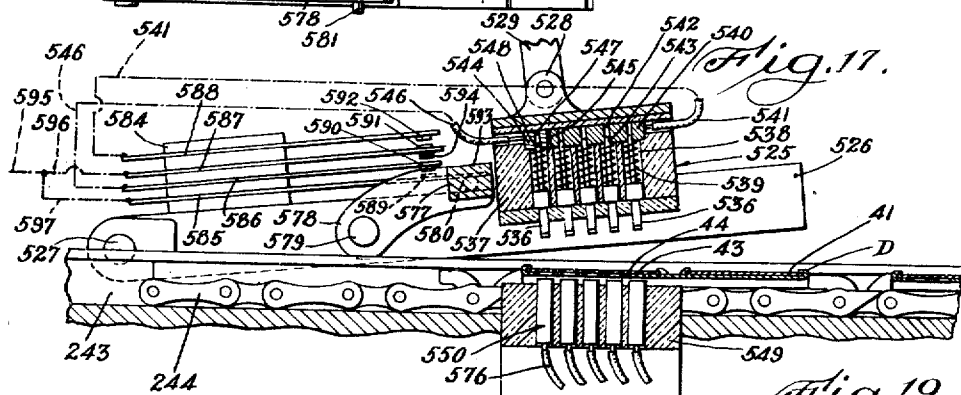
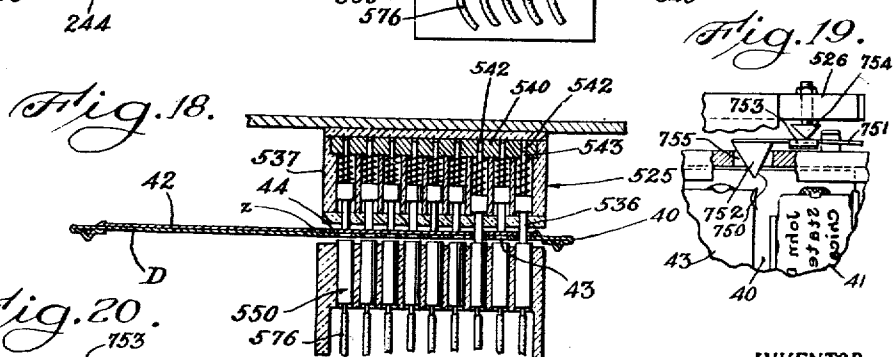
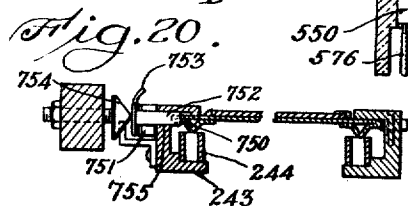
Oct. 11, 1938.

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2,133,136

PRINTING MACHINE

Original Filed Feb. 24, 1936 9 Sheets-Sheet 8



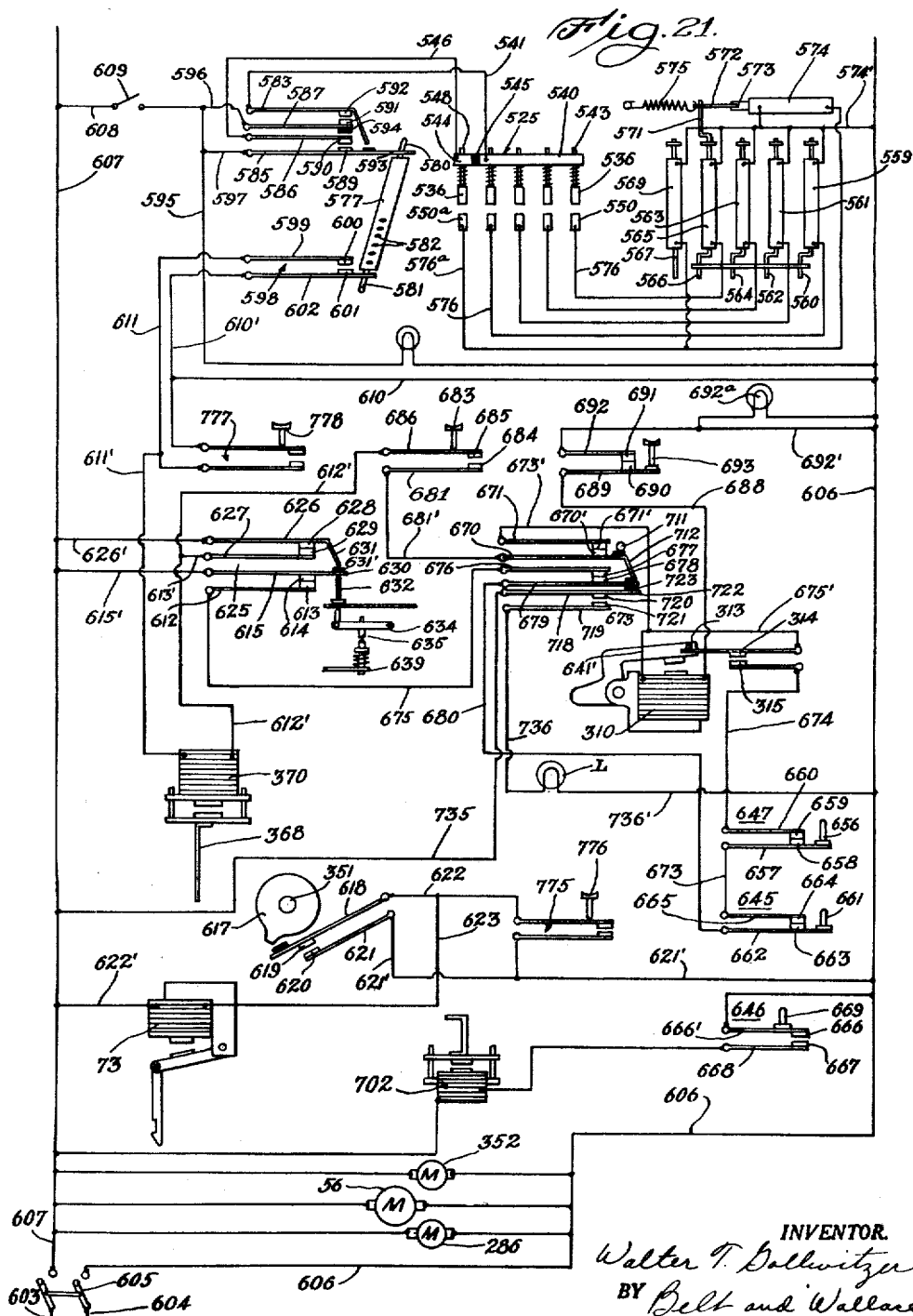
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2,133,136

Original Filed Feb. 24, 1936 9 Sheets-Sheet 9



UNITED STATES PATENT OFFICE

2,133,136

PRINTING MACHINE

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Original application February 24, 1936, Serial
No. 65,376. Divided and this application Feb-
ruary 16, 1938, Serial No. 190,825

26 Claims. (Cl. 101—93)

This invention relates to printing machines of the kind in which impressions are made from printing and control devices sequentially fed through the machine and wherein impressions are made directly from the devices and also wherein other impressions are made under control of the devices, and this invention more particularly pertains to making impressions under control of the devices.

This application is a division of my co-pending application Serial No. 65,376, filed February 24, 1936.

Heretofore printing devices sequentially fed through printing machines have been equipped to print names and addresses or other identification of the shareholders of a corporation, the policyholders of an insurance company, the customers of a public utility or of other groups of persons and impressions have been made directly from the printing devices, for example, on dividend checks for the shareholders, premium notices to the policyholders, bills of the public utilities or on other similar business instruments to be distributed among groups of persons. It is desirable, however, not only to print names and addresses or other identification but also to print other information such as numerical accounting data and if such data are printed it may be advantageous to accumulate the total of amounts printed or to perform other mathematical operations. It is therefore another object of the invention to provide devices from which impressions may be made directly and also under control of which the printing of other information and the performance of mathematical operations may be effected.

It has been proposed to print identifications such as names and addresses from printing devices or the like and to print other information such as numerical accounting data under control of records perforated or otherwise arranged on cards or the like independent of the printing devices. This required sequencing the printing devices and record cards and comparison or other checking thereof to insure that the impression from the printing device for one person was not made on the business instrument on which an impression was made under control of the record card for another person. Where the printing devices and cards were fed through the same machine the comparison or checking has usually been so effected that the machine was stopped when selected of the independently but sequentially fed printing devices and cards did not correspond, a not altogether satisfactory arrange-

ment. Such sequencing and comparing of independent printing devices and cards may be avoided by including printing characters for printing a name and address or the like and control means for effecting the printing of numerical accounting data or the like on a single device whereby the entire record to be printed is accommodated on a single device. This, however, still entails assuring that impressions made from the printing characters and under control of the control means on a particular device be impressed on the same instrument, and hence still another object of my invention is to make impressions directly from a printing and control device and under control of a control means on the device on the same instrument so that the name or other identification of a particular person will be printed on the same instrument as that on which numerical accounting data or the like for that person are printed.

The numerical accounting data or the like printed on different business instruments may vary widely and therefore a further object of my invention is to employ a novel variable printer settable to afford a wide variety of combinations of type characters from which impressions may be made to print varying numerical accounting data or the like on business instruments, and another object is to set up such a variable printer under control of printing and control devices sequentially fed through a printing machine in which impressions may be made directly from the devices on the business instruments which are printed in the variable printer.

It is often desirable to totalize the numerical accounting data or the like printed on business instruments or to effect other mathematical operations based on such data and it is often desirable to prepare a record of such data. Hence other objects of my invention are to employ a calculating machine wherein numerical accounting data printed on business instruments may be totalized or other mathematical operations based on such data may be performed; to prepare a record of data entered in such a calculating machine; to operate such a calculating machine under control of printing and control devices sequentially fed through a printing machine to have impressions made directly therefrom; to associate a calculating machine with the variable printer of this invention and to totalize the numerical accounting data or the like printed by the variable printer or to perform other mathematical operations and, if desired, to prepare a record of data entered in

the calculating machine; and to enable conjoint operation of a calculating machine and variable printer by utilizing for this purpose the same control means on printing and control devices sequentially fed through a machine whereby corresponding operation of the calculating machine and variable printer will be assured.

The control of a variable printer and, if desired, a calculating machine under records on printing and control devices fed through a machine may be effected by affording in a field on each device locations in which there may be positioned individual indications for each digit that can be printed by the variable printer or entered in the calculating machine but so to do requires relatively large fields on the devices. However, such large fields can only be accommodated on printing and control devices of relatively large size and it is advantageous to restrict the size of such devices. Moreover, such an arrangement of indications requires as many operating parts in the operating means for the variable printer, and for the calculating machine when one is used, as there are possible locations in the fields for individual digit indications and this makes it difficult to compactly arrange the variable printer, and when used, the calculating machine, and particularly operating means therefor. Hence, still further objects of my invention are to arrange at least part of the record on a printing and control device in accordance with a novel system that will enable a large number of digit indications to be accommodated in relatively small fields on printing and control devices of restricted size; to classify the digits, and therefore the indications thereof under the system; to provide novel parts in the operating means capable of effecting printing or entry of digits in different classes; and to selectively position such parts, prior to operation thereof, to effect printing or entry of the digit of a selected class.

Printing and control devices are fed through a printing or other machine and are collected and stored in a predetermined sequence as, for example, alphabetically. But it is not always desired to make an impression from the printing characters nor to effect a printing or other operation under control of the control means on every printing and control device in a sequence of devices fed through the machine. Hence, a still further object of my invention is to selectively make impressions from printing characters and effect printing or other operations under control of control means on printing and control devices automatically under control of the devices themselves.

Other objects are to selectively position in a novel manner more characters in an operative position in a variable printer than there are characters represented by control means on the control devices under control of which the characters are set up; to selectively position a blanking character or one of the characters from 0 to 9 in an operative position in a variable printer where only the characters from 1 to 9 are represented by control means on the control devices under control of which the characters are set up; to selectively position a blanking character or one of the characters from 0 to 9 in an operative position in a variable printer where only the characters from 1 to 9 are represented by control means on the control devices under control of which the characters are set up and where an absence of control means represents either a blanking character or the 0 character, and the

blanking character is normally positioned in operative position; to position a blanking character normally in an operative position in a variable printer where one of the characters from 0 to 9 is capable of being selectively positioned in the operative position and only the characters from 1 to 9 are represented by control means on the control devices under control of which the characters are set up; to position blanking characters normally in an operative position in a variable printer capable of having digital characters positioned to represent a number having a plurality of digits whereby all the digital spaces to the left of the first significant digit will be occupied by blanking characters; and to normally position blanking characters in the digital locations of an operative position in a variable printer and to selectively position significant digits in certain of said locations and to insure the positioning of the 0 character in any location to the right of any significant digit and in which location a significant digit is not positioned.

Other and further objects will appear in the following description wherein reference is made to the accompanying drawings in which

Fig. 1 is a top plan view of the entire machine;

Fig. 2 is a view of a typical business instrument printed in the machine;

Fig. 3 is an elevation of a typical printing device used in the machine;

Fig. 4 is a chart illustrating the system or code under which a record is provided on the printing device;

Fig. 5 is a vertical sectional view taken longitudinally through the printing device guideway;

Fig. 6 is a top plan view of the variable printer and calculating machine employed in this invention;

Fig. 7 is a side view of the variable printer and calculating machine;

Fig. 8 is a front elevation of the variable printer;

Fig. 9 is a vertical sectional view taken on the line 9—9 on Fig. 8;

Fig. 10 is a perspective detail view of one type segment of the variable printer and operating means therefor;

Fig. 11 is an enlarged detail view of a stop device employed in the mechanism illustrated in Fig. 12;

Fig. 12 is a sectional view taken substantially on the line 12—12 on Fig. 11;

Fig. 13 is another side view of the calculating machine and showing the total taking devices;

Figs. 14 and 15 are views showing alternative positions of certain of the parts shown in Fig. 13;

Fig. 16 is a fragmentary plan detail view of a portion of the printing device guideway;

Fig. 17 is a vertical sectional view taken substantially on the line 17—17 on Fig. 16;

Fig. 18 is a vertical sectional view of the detector switch mechanism taken substantially on the line 18—18 on Fig. 16 but showing the parts in closed position;

Fig. 19 is a fragmentary plan view showing selected of the parts illustrated in Fig. 16 in another position;

Fig. 20 is a sectional detail view taken substantially on the line 20—20 on Fig. 16; and

Fig. 21 is a wiring diagram.

The selected embodiment of the invention shown in the accompanying drawings is adapted for the preparation of checks and more particularly dividend payment checks of a corporation, but it is to be understood that this is merely an

illustrative use of the invention for many other kinds of business instruments for many other purposes may be prepared as will be apparent from the following description.

The number of shareholders in a corporation is often very large and their holdings vary from a few to quite a large number of shares. The distribution of a dividend declared by a corporation among its shareholders is usually done by checks and because of a large number of shareholders and the variety of their holdings the preparation of the dividend checks has been an arduous and time-consuming task.

One manner in which the preparation of dividend checks has been simplified and speeded up has been by providing the names or other identification of the shareholders of a corporation on printing devices which have been passed through a printing machine to address or otherwise identify the checks. One form of printing device suitable for this purpose is shown in my Patent 1,979,261, patented November 6, 1934, and while printing of dividend checks by the use of such printing devices facilitated the preparation and distribution thereof it was still necessary to perform other operations on the checks as, for example, entering of the amounts thereon. Moreover, the name of the issuing company, the bank upon which the checks were drawn and similar matter re-occurring on all of the checks was usually printed thereon prior to passage thereof through a printing machine for addressing or other identification and the printing of this re-occurring matter on the checks has been relatively expensive. Moreover, it is necessary to date, number and sign the checks and it is preferable that such matter be printed on the checks in a way that it will contrast with other matter appearing on the checks, and this is also true of the amounts printed on the checks. It will thus be seen that it was necessary to perform a number of separate operations in order to prepare the dividend checks and that while printing addresses or other identification on the checks by the use of printing devices facilitated preparation thereof it did not solve all of the problems entailed in economically preparing the checks.

However, I propose to facilitate the preparation of dividend checks by not only providing devices for printing the name and address or other identification of a shareholder but which will also carry control means so that the entire record may be printed by the devices. The record, by way of example, may be the identification of a shareholder and the amount which the shareholder is to receive by reason of the declaration of a dividend. This amount represents the number of shares owned by the shareholder multiplied by the rate of the dividend. Such a record may be provided on the printing devices in a variety of ways of which the manner shown in the accompanying drawings and described hereinafter is but illustrative.

Thus I have shown a printing device D including a frame 40 on which a flat metal plate 41 is removably retained preferably adjacent the lower part thereof. This plate is adapted to be embossed or otherwise provided with printing characters from which the name and address or other identification of the shareholder of a corporation may be printed. In addition to this the printing device is also provided with an index card 42 bearing an impression from the printing characters on the plate 41 and this facilitates filing and other handling of the printing device.

The index card is preferably located in one upper corner of the frame 40.

I provide a plurality of openings 43 in the other upper corner of the frame. In the present instance I provide nine rows of openings with five openings in each row and preferably these openings are positioned in transverse and longitudinal alignment with each other. Each of the nine rows of openings may be used to indicate the digit of a number or other numerical accounting data or the like and I may therefore arrange the indications of a nine place number on the printing device illustrated, and when the number is expressed in terms of dollars and cents I may indicate any amount up to 9,999,999 dollars and 99 cents.

I could, if desired, provide nine or ten openings in each of the nine rows and then use a particular opening in each row as an indication of a particular digit in each row but so to do would entail the use of a field of relatively large size to accommodate openings so arranged and, as will be apparent from an inspection of Fig. 3, this would entail increasing the size of the printing device D. I therefore provide but five openings in each row which number may be accommodated without increasing the size of the printing device, and I utilize these openings in accordance with a system or code, to be explained, whereby I am enabled to provide an indication for any digit in every row.

I have explained that nine rows of openings with five openings in each row are provided in the frame 40 and in order to render operative only selected of the openings so as to thereby indicate particular digits I employ a control card 44 which is mounted over the openings 43. The control card 44 as well as the plate 41 and index card 42 are removably secured on the frame by suitable retaining devices such as, for example, those shown and described in my above referred to Patent 1,979,261.

When it is desired to indicate a particular digit in any one of the nine rows, one or more perforations are provided in the control card 44 in alignment with one or more of the openings 43. The manner in which such perforations in the card 44 are located to indicate particular digits is illustrated in Fig. 4 wherein it will be noted that in order to indicate the digit "1" in any one of the nine rows perforations are made in the control card 44 in alignment with the uppermost and lowermost perforations 43 in that particular row while in order to indicate the digit "2" a perforation is made in alignment with only the lowermost opening in the particular row. The manner in which perforations are located for the other digits can be readily ascertained by reference to Fig. 4.

As shown in Fig. 4 the odd digits 1, 3, 5 and 7 in a particular row are all indicated by two perforations in the control card, one of which is always located in alignment with the uppermost perforation in the particular row. It will also be noted that when only one perforation is made in the control card in alignment with the uppermost opening in a particular row it is indicative of the digit 9. Furthermore, the even digits 2, 4, 6 and 8 are each indicated by a single perforation in the control card, the opening being respectively located in alignment with openings other than the opening uppermost in a particular row. It may therefore be said that under the system or code disclosed in Fig. 4 the digits and indications therefor are classified, the odd digits

1, 3, 5 and 7 being in one class, the even digits 2, 4, 6 and 8 being in another class, and the odd digit 9 being still in another class. The utility of such classification of the digits is more fully explained hereinafter.

I have referred to the devices on which the record to be printed on a business instrument is provided as printing devices and will so refer to such devices hereinafter from time to time since such is the utility of the devices. It will be noted, however, that these devices are printing and control devices and therefore it is to be understood that reference to printing devices hereinafter is in the generic sense of printing and control devices.

In Fig. 2 I have shown a check C as an illustration of a business instrument which may be prepared by this invention and by referring thereto it will be seen that this check includes a form F such as the name of the issuing company, the bank on which it is drawn, the formal words of a negotiation and the like; a date B; a number N; an amount E; an address A and a signature X. It is to be understood that more or less matter might be printed if so desired.

While this invention is primarily directed to making impressions directly from and under control of the printing devices I have shown a machine which will completely print the check C and to this end I have provided a printing couple wherein the date B, the number N and signature X may be conveniently printed, a variable printer under control of the printing device for printing the amount E, printing means for making an impression directly from the printing device to print the address A and another printing couple wherein the form F may be conveniently printed.

Furthermore, in preparing dividend checks and many other business instruments it is often desirable to accumulate a total of the various amounts printed on the instruments or to perform other mathematical operations, and it is likewise advantageous to prepare a record, such as a detail strip, of the amounts printed and I have therefore shown a calculating machine, and more particularly an adding machine, wherein a total of the amounts E printed on the various checks may be accumulated and wherein a record of the amounts so printed may be prepared.

I have also shown withdrawing a web from a roll of blank paper and severing the business instrument blanks from this web, but it is to be understood that this is merely illustrative and that the primary feature of the invention, that is, printing directly from and under control of printing devices, can be used in other ways for which it is or may be adapted and that it is not limited to use in the preparation of business instruments severed from a web.

A roll R of blank paper is mounted in a suitable supporting stand 50 as, for example, like that shown in my co-pending application Serial No. 78,681, filed May 8, 1936. A web W is withdrawn from the roll and, if desired, suitable unwinding means such as that disclosed in my just referred to co-pending application may be associated with the roll so that tension on the web will be kept uniform.

The web W is passed between the cylinders 51 and 52 of a printing couple, which cylinders are respectively mounted on shafts as 53 that are suitably journaled in a frame 55 mounted at the right hand end of the printing machine, as more particularly described in my co-pending application Serial No. 65,376.

Power is supplied to the shafts as 53 from a motor 56 through an endless belt 58 which is passed about the pulley 59 fast on the shaft 60 that is journaled in the frame. A pinion 61 fast on the shaft 60 meshes with a gear 62 rotatably mounted on the shaft 63 rotatably journaled in the frame 55. The shafts as 53 are intermittently rotated and controlled by a clutch which is under the control of an electromagnet 73, Fig. 21. A bevel gear 79 fast on the shaft 63 meshes with a bevel gear 80 fast on the shaft 53 whereby the shaft 53 is rotated with shaft 63 when said shaft 63 is rotated. Equally sized intermeshing gears as 81 are respectively fast on the shaft as 53 whereby these two shafts rotate in synchronism.

In the present instance when checks are being printed the printing cylinder 52 is equipped with devices for printing the signature X, the number N and the date B on the check C.

A signature printing form, a date printing form and an accumulating numbering device may be provided on the printing cylinder 52 but it is to be understood that these might be replaced with other suitable devices, the nature of which will be dictated by the characteristics of the business instruments being printed, the specifically mentioned devices being pertinent to printing checks. A pair of brackets 90 and 91 support the devices which supply ink to the printing forms on the printing cylinder 52 and are more particularly described in my co-pending application Serial No. 65,376.

In the form of the invention illustrated I employ a web of a width equal to the desired length of the checks for checks are usually of greater length than width and by severing the checks from the web in this manner I am enabled to sever a great many more checks from a web of a given length than I would be able to do if the web were the same width as that desired of the checks and the web was severed transversely of the checks rather than longitudinally thereof. However, it is important that the checks be of a uniform width and I therefore feed the leading edge of the web past a severing device in an equal amount in each operation of the feeding means and by so doing I insure that the checks will be of uniform width.

In the accompanying drawings I have shown a web feeding means somewhat like that shown and described in the patent to Hartley, No. 1,955,806, patented April 24, 1934, but it is to be understood that any other suitable intermittently operable web feeding means may be employed without departing from the purview of my invention.

The web feeding means includes a pair of shafts as 125 rotatably mounted in the frame 55. Suitable resilient clamping rollers as 127 or the like are provided on the shafts as 125 and the web is clamped in the bite between these rollers.

Inasmuch as there may be conditions causing variations in the width of the checks, I provide an adjustable crank arrangement in the means which imparts rotative movement to the shafts as 125 and to the feed rollers as 127 carried thereby. Such an adjustable crank includes the arm 131 fast on the shaft 53 and has a bifurcated guideway 132 therein. One end of a link 133 is adjustably secured in the guideway 132. The arm 131 rotates with the shaft 53 and the adjustable mounting of one end of the link in this arm enables variation of the throw imparted to said link.

A rock arm 134 is pivotally mounted in the frame 55 and the free end of the link 133 is pivotally connected thereto. A gear segment 135 on the rock arm 134 meshes with a pinion 136. An overrunning clutch 137 and a brake 138 of a design similar to the overrunning clutch 137 are interposed in the drive for this mechanism. The web feeding and severing means is described in greater and fuller detail in my co-pending application Serial No. 65,376.

The checks or sheets S severed from the web are deposited on a pan above the sheet guideway G and are fed from the pan and through the guideway to receive impressions under control of the printing and control devices and directly from the devices and then into a printing couple wherein the form F is printed on the checks. In the present machine impressions are made on the sheets under control of the printing and control devices to the right, as viewed in Fig. 1, of the position whereat these sheets are severed from the web, and impressions are made on the sheets directly from the printing devices and the form is printed on the sheets to the left of such position. It is to be understood however that the sheets could be severed from the web to the left or to the right of all devices for making impressions thereon or individual sheets could be deposited in the guideway in any desired way for passage through the various printing mechanisms.

In the present machine where sheets are severed from the web I first make an impression thereon under control of the printing and control devices and to this end the sheets are first fed into a variable printer, operable under control of the control means on the printing and control devices. The variable printer is located to the right, as viewed in Fig. 1, of the position where the sheets are severed from the web, and suitable means are provided for feeding the sheets into this variable printer. Thus a housing 175 is mounted on the frame of the machine adjacent the position in which the severed sheets S are initially placed upon being severed from the web. Within and extending from the housing is suitable mechanism, including a roller 180, designed to effect feeding of the sheets from their initial position through the guideway G which is provided with two strips 203 and 204 undercut on their adjacent sides, and the sheets S pass through these undercut portions.

In order to move the sheet rapidly toward the left a motor 205, Fig. 8, is mounted below the guideway G and includes a roller 206 that projects up through an opening in the lower wall on the sheet guideway. A clamping roller 207 is mounted above the guideway and after an impression has been made on a sheet by the variable printer this roller 207 lowers and clamps the sheet in engagement with the roller 206 whereupon the sheet is rapidly fed toward the left as viewed in Fig. 1. The sheet is further carried through the guideway by the clamping rollers 221 and 222 which feed the sheet into the addressing machine.

The sheet feed mechanism is more particularly described in my co-pending application Serial No. 65,376. It will be seen from the foregoing description, however, that after a sheet is severed from the web it is first fed to the right into the variable printer, then printed, and then fed to the left into the printing machine and that in a part of its movement to the left the sheet moves below a part of its line of travel to the right.

The timing of the sheet movement in conjunction with the operation of the variable printer and the timing of operation of the variable printer relative to the web feeding and severing means are explained in connection with the description of the variable printer, but this timing is such that the sheets are fed one at a time into and from the variable printer.

In the present instance upon moving from the variable printer the sheets are fed into an addressing machine wherein the name and address A on the check C or other identification is printed on the sheets.

The addressing machine includes a frame 225, Fig. 5, in which a main drive shaft 226 is journaled. Power is supplied to this main drive shaft through a suitable means more particularly described in my co-pending application Serial No. 65,376. A cam shaft 227 is also journaled in the frame 225, and through a suitable gear train interconnects the main drive shaft 226 and the cam shaft 227 for operation in a one-to-one ratio. A rod 229 is mounted in the frame 225 adjacent the cam shaft 227 and carries means which control the movement of sheets through the sheet guideway G and which are operated by cams carried by the cam shaft 227. Stop fingers are provided in the present instance which are movable to and from engagement with the leading edge of sheets moving through the guideway, these fingers being moved into stopping position and holding the sheets against further movement until a predetermined time in the operation when they are retracted from engagement with the sheets to permit the sheets to move to the left through the guideway.

A stop finger of the kind just referred to is indicated by 236, Fig. 1. Another stop finger 240 is provided which, after the stop finger 236 has been elevated, is moved into lowered position to engage the leading edge of the sheet S and position it relative to the platen P so that an impression can be made at the proper place thereon, this impression in the present instance being the name A and the like on the check C. A motor in the housing 241 operates the roller 242 that engages the sheet S prior to and during the time it is engaged by the stop finger 240 so that as soon as the platen P has made an impression on the sheet S and the stop finger 240 is raised the sheet will be fed through the sheet guideway to the form printing couple.

The platen P makes impressions on the sheets S from printing devices D in the present instance through an ink ribbon IR, although it is to be understood that impressions could be made from printing devices in any desired way depending, of course, upon the nature of the printing devices, an ink ribbon IR being a convenient way to make impressions when the printing characters are embossed on the plate such as 41 in the present instance.

Printing devices are initially introduced into the machine by stacking them in a magazine M at the rear end of the printing device guideway 243. Chains, such as 244, are mounted at each side of the printing device guideway and are directed about sprockets 245 and 246 respectively mounted on shafts 247 and 248 mounted in the frame 225 beyond the front and rear ends of the printing device guideway 243. Pawls, such as 249, are provided at spaced intervals on the chains 244 and these pawls successively move into position to engage the lowermost printing device in the magazine M and then as a step by step

movement is imparted to the chains the printing devices are successively moved through stations until they reach printing position below the platen P after which they are discharged past the guide 250 to be collected in the usual manner.

A step by step movement is imparted to the chains 244 from a rocker 251 carrying a pawl 252 successively engageable with spaced pins 253 mounted in the sprocket 245. The rocker 251 is mounted on a shaft 254 journaled in the frame 225. An arm 255 is fast on the shaft 254 and as the shaft 225 rotates the arm 255 and rocker 251 are rocked to successively disengage the pawl 252 from one of the pins 253 and engage it with the succeeding pin and to then impart an advancing movement to the chains 244 as the newly engaged pin 253 is driven forwardly.

The platen P is carried by a platen arm 261 pivotally mounted as at 262 on the frame 225. The platen arm carries a pair of rollers 263 and another pair of rollers 264 which respectively engage pairs of conjugated cams 265 and 266 that are releasably connected to the shaft 226 and which when connected cooperate with the rollers 263 and 264 on the platen arm 261 to move the platen on said arm downwardly to make an impression from a printing device during an at-rest interval in the step by step movement thereof through the guideway and to elevate the platen out of engagement therewith at a time when a feeding movement is imparted to the printing devices. It is, of course, to be understood that if desired the feed of the printing devices can be so controlled that more than one impression can be made therefrom prior to their discharge from printing position, arrangements for this purpose being well understood in the art.

In a manner which is more fully explained in my co-pending application Serial No. 65,376 an impression operation of the platen P may be arrested in event no sheet is fed into engagement with the stop finger 236, and therefore operation of the platen P is under control of the sheets fed through the machine.

After an impression has been made on a sheet S by the platen P the stop finger 240 is raised from engagement with the sheet whereupon the roller 242 feeds the sheet to the left toward the form printing couple wherein the form F is printed on the check C. If more than one impression is to be made from each printing device, one or more stop fingers would be provided to the left of the stop finger 240 and such fingers would be located so as to stop the sheet in position below the platen P to receive impressions in proper relation to other impressions thereon.

The form printing couple illustrated in the accompanying drawings is of the kind shown in the application of Horace P. Brownsey, Serial No. 74,044, filed April 13, 1936, and includes a printing cylinder and a platen cylinder 271 arranged thereover and which are operable in synchronism through gears as 279.

An endless belt 284 is passed about the pulley 283 and a pulley 285 fast on the shaft of the motor 286 mounted on the frame 225 of the printing machine to enable the motor to drive a gear 288 and the shaft on which it is fast. A bevel gear 292 on the shaft 291 meshes with a bevel gear 293 fast on the shaft 294. So long as the motor 286 is kept in operation the printing cylinder and platen cylinder 271 are rotated as are the shafts 291 and 294.

For a purpose to be explained more fully hereinafter, the armature of an electromagnet 310,

Fig. 21, carries a pin 313 engageable with a contact 314 to force this contact into engagement with the contact 315 when the electromagnet is energized.

The method and means of printing the form F on the check C are more clearly and particularly described in my co-pending application Serial No. 65,376, and after leaving the printing couple afforded by the printing cylinder and platen cylinder 271 the sheets pass to a suitable collecting tray H.

It will be apparent that in the machine as thus far described a web may be withdrawn from a roll and impressions may be made at spaced intervals on the web and thereafter the web may be divided into sheets intermediate the spaced impressions made thereon. Then the sheets may be passed to a variable printer wherein impressions may be made thereon under control of the printing devices and thereafter the sheets may be passed to an arrangement such as an addressing machine to have impressions made thereon directly from printing devices and then the sheets are passed to a printing couple wherein a form is printed on the sheets. It is believed that it will be apparent from this that business instruments, such as checks, notices, bills and the like, may be printed in this machine and that impressions may be made thereon directly from and also under control of printing devices sequentially fed through the machine so that an identification such as a name and numerical accounting data such as a sum of money may be printed thereon and also so that a form and other pertinent data may be printed thereon. The numerical accounting data to which reference has just been made is in the present instance representative of the sum of money to be paid by the check and is printed in the variable printer of this invention.

The variable printer of this invention is preferably associated with a calculating machine, which in the present instance is an adding machine, so that the amounts printed on the checks may be totaled to facilitate verification and preferably the amounts printed on the business instruments by the variable printer are also printed on a detail strip in the calculating machine to afford a record useful for checking purposes and the like.

The printing members of the variable printer of this invention may be set up in a number of different ways. I have in the present instance shown these printing members as being positioned by the slide bars that are under control of the keys of the adding machine, but it is to be understood that other means, independent of the adding machine, may be employed for this purpose.

The variable printer illustrated in Figs. 6 to 15 inclusive, includes a frame 350, Figs. 7 and 8, in which a drive shaft 351 is journaled. Power is imparted to this drive shaft 351 from a motor 352 mounted on the frame 350 and having a pinion 353 on the shaft thereof. The pinion 353 meshes with a gear 354 mounted on a stud shaft carried by the frame 350 and the gear 354 in turn meshes with a gear 355 fast on a stud shaft 356. A pinion 357 also fast on the stud shaft 356 meshes with a gear 358 rotatably mounted on the drive shaft 351.

The gear 358 includes a hub 359 (Fig. 8) having clutch teeth 360 thereon engageable with the clutch teeth 361 on a collar 362 slidably but non-rotatably mounted on the drive shaft 351. A stud

363 (Fig. 7) on the collar 362 is engageable with a cam surface 364 (Fig. 8) on a plate 365 pivotally mounted on the frame 350 at 366. A shoulder 367 is provided on an arm 368 carried by the armature 369 of the electromagnet 370 that is slidable vertically on the guides 371. When the electromagnet 370 is energized, the armature 369 is moved upwardly correspondingly moving the arm 368 whereupon the shoulder 367 engages the free edge of the plate 365 and pivots this plate upwardly to disengage the cam surface 364 from the stud 363, whereupon the springs 372 force the collar 362 toward the hub 359 to thereby engage the clutch teeth 361 with the clutch teeth 360 whereupon the shaft 351 is connected to the gear 358 to rotate therewith, and so long as the electromagnet 370 is energized the shaft 351 will continue to rotate. When, however, the electromagnet 370 is deenergized the armature 369 thereof resumes the position shown in Fig. 8 and the shoulder 367 disengages the free edge of the plate 365 which thereupon pivots back into the position shown in Fig. 7, and at a predetermined time in the rotation of the collar 362 with the shaft 351 the stud 363 engages the cam surface 364 and moves over this cam surface to disengage the teeth 361 from the teeth 360, thus interrupting operation of the shaft 351. The variable printer and the calculating machine are operated from the shaft 351. A reciprocatory movement is imparted to a link 373 from a crank fast on the shaft 351 in each rotation of the shaft 351. The link 373 is pivotally connected to a crank member 374 fast on the main operating shaft 375 of the calculating machine. The variable printer is operated directly from the shaft 351.

It has been explained heretofore that nine rows of openings are provided in the frame 40 of the printing device D and that these nine rows of openings afford the indication for the digits of a nine place number. In the present instance, however, I have equipped the variable printer to print a seven place number and as a result the two left hand rows of openings, as the printing device is viewed in Fig. 3, are not employed in the machine as illustrated. Furthermore, since the present machine is adapted for preparation of checks and more particularly dividend checks, I have arranged the variable printer so that it will print dollars and cents. By reference to Fig. 2 it will be noted that the cents digits are spaced considerably from the dollar digits on the check C, in the present instance the words "Dollars and" appearing between the last digit of the dollars and the first digit of the cents amount. Thus in the machine as illustrated I provide a pair of type segments 376 and 377 for printing the cents amounts on the checks. The type segment 377 is spaced from a type segment 378, the type segment 377 being adapted to print the first digit of the cents and the type segment 378 being adapted to print the last digit of the dollars in the amount E on the check C. Other type segments 379, 380, 381 and 382 are provided in side by side relation with the type segment 378 for printing the other digits of the dollars of the amount E. The type segments are bifurcated at their lower ends and a shaft 383 is embraced in these bifurcations whereby the type segments are supported for rockable movement on the shaft 383, spacing collars 384 being mounted on the shaft 383 between the respective type segments and the adjacent parts of the frame 350.

Each of the type segments includes a type car-

rying head 385. Eleven key slots 386 are formed in the upper surface of the type heads 385 and type members 387 are adapted to be removably mounted in these key slots. All of the key slots are utilized in the dollar printing type segments, type members for printing figures 0 to 9 being provided as well as a type member for printing a star (*). As best shown in Fig. 10, the type member for printing the numeral 9 is arranged in the outermost position on the type heads 385 and the type members for printing the other figures and the star are arranged in declining order inwardly from the type member for printing the numeral 9, the star being last. As best shown in Fig. 9, the type heads 385 of the cents printing type segments do not carry a type member for printing a star.

A rocker 388 is rockably mounted on the shaft 383 and carries a pair of rollers 389 and 390 which respectively engage conjugated cams 391 and 392 on the shaft 351. A stop bar 393 is connected to the rocker 388 and has arms 394 at opposite ends that are pivotally mounted on the shaft 383. Each of the type segments is acted on by a spring 395 and these springs urge the type segments into engagement with the stop bar 393. When the machine is at rest the rocker 388 and stop bar 393 are positioned as shown in Fig. 9, and the type segments which are engaged therewith are so positioned that the innermost of the slots 386 is positioned just forwardly of the opening 396 in the bottom of the sheet guideway G through which opening impressions are made from the type members 387 in a manner to be described presently.

At a predetermined time in the rotation of the shaft 351, as will be explained more fully hereinafter, the cams 391 and 392 cause the rocker 388 to be moved clockwise in Fig. 9. This retracts the stop bar 393 from engagement with the type segments and the type segments may then be set up to have an impression made therefrom. Such set-up of the type segments is effected by the devices now to be described.

The type segments for printing dollar figures of the amount E on the checks are equipped, as stated, with stars and these stars are printed on the checks to the left, as the check is viewed in Fig. 2, of the first dollar digit. The type members which print such stars and the type members, on all type segments, which print the zeros are set up in a manner explained hereinafter. The type members on all type segments which print the digits 1 to 9 may be positioned in printing position in a variety of ways. However, in the illustrated embodiment I show these members as being positioned under control of devices in the adding machine, but it is to be understood that such devices or similar devices could be employed without being incorporated in an adding or other calculating machine.

The illustrated devices which position such digit printing type members include a slide bar, such as 400, which in the present instance is the usual slide bar provided in the adding machine. In Fig. 10 I have illustrated but one of these slide bars and I will now describe the arrangement and operation of this slide bar and the type segment with which it cooperates but it is to be understood that the other slide bars and type segments are arranged and operated in a similar manner.

A comb 402, Fig. 9, is supported on the frame 350 below the plane of the slide bar 400 and another comb 403 is carried by the frame 350 well

above the slide bar. An upright slide 404 is mounted in aligned teeth in the combs 402 and 403 and, as indicated at 405, is suitably connected to the slide bar 400. A stop arrangement under control of the vertical slide 404 positions the type segment which is under control of the slide bar 400, as is explained in detail hereinafter.

A row of nine keys 406 representative of the digits 1 to 9 is arranged above the slide bar 400 and when a digit from 1 to 9 is to be printed the key 406 corresponding to the selected digit is depressed, and in the present machine this is effected automatically, as will be explained hereinafter. Each of the keys 406 is urged upwardly by a spring 418 against a positioning stop 420.

Nine stops 407 are provided on the slide bar 400. These stops are alternately positioned on opposite sides of the slide bar and starting from the right hand end, as viewed in Fig. 10, each of the stops 407 is progressively spaced further from the stop to the right thereof than the preceding stop is positioned from the stop to its right. Each of the stops is adapted to cooperate with one of the keys and the first key and stop from the right are adapted to cooperate to position the type member on the type segment that will print the digit 1 in printing position below the opening 396, while the last of the keys and stops are adapted to cooperate to so position the type member which prints the digit 9 and the intervening keys and stops cooperate to position the type members corresponding to their numerical positions intermediate the first and last stops.

It has been explained that the stops 407 are unequally spaced one from the other and that a particular key is adapted to cooperate with each of the stops. Thus when the spring 401 acting on the slide bar 400 is permitted to move this slide to the right it does so until one of the stops 407 encounters the depressed key, and since the stops are unequally spaced apart there will be a different movement of the slide bar 400 for each different stop engagement with its particular key. The least movement will be imparted to the slide bar 400 when the first stop engages the first key and the greatest movement is imparted, that is to say, the movement for positioning the type member for the digit 9, when the last stop is to engage the last key.

When one of the keys 406 is depressed, it is locked in its depressed position until after a printing operation has been performed from the resultingly positioned type member whereupon the key is released. To this end a notch 408 is provided in the side of each key. A member 410 has a plurality of fingers 409 thereon and each of these fingers cooperates with a notch 408 and when one of the keys 406 is initially depressed the finger aligned with this key moves into the notch 408 therein and holds it down until the locking means engages this depressed key.

A boss 411 is provided on each of the keys 406 and an opening 412 is provided in each of these bosses. A slide bar 413 includes a plurality of fingers 414 that are adapted to selectively move into the openings 412, a finger 414 moving into the opening 412 on the depressed key. The slide bar 413 is urged toward the right, as viewed in Fig. 10, by a spring 415, Fig. 7, and is held against the action of this spring by a ball, such as 417, that engages the rod 416 to which the slide bar 413 is connected. The ball 417 frees the rod 416 each time the crank member 374 is reciprocated and therefore in each cycle of operation any key that has been depressed will be locked down until

released from the finger 414 engaged in the opening 412 therein.

It has been explained that it is desirable to prepare a detail strip by making impressions thereon corresponding to the impressions made on the checks C and to also accumulate a total of the amounts printed on the checks. While the total may be accumulated in any desirable way, one means suitable for this purpose is described hereinafter. In order to prepare a detail strip, type segments are provided which in the present instance make impressions on the detail strip 443 withdrawn from the roll 444 mounted in the bin 454, the detail strip passing from the roll 444 through an opening 455 in the cover plate 456 and about the platen roller 442 and thence back out through the opening 455 and through the bin 454 to coil up exteriorly of the cover plate 456, as illustrated in Fig. 7. In the manner well understood in the art the platen roller 442 is advanced step by step intermediate impression operations on the detail strip 443.

The type segment of the kind which make impressions on the detail strip 443 is indicated by 440 and includes type members 441 which are selectively forced against the detail strip 443 on the platen roller 442 in the manner common in adding machines as, for example, by the hammer 440' released by devices in the adding machine at a predetermined time. The type segment 440 is carried by the arm 439 of a bell crank 435 fast on the shaft 436. The bell crank 435 also includes an arm 437 which is pivotally connected to the vertical slide 404 and the slide bar 400 at 405. Thus, each time the slide bar 400 moves to the right the bell crank 435 is correspondingly moved and since the type members 441 are positioned relative to the type members 387 a type member corresponding to one of the type members 387 will be positioned relative to the platen roller 442 to make an impression on the detail strip 443.

The type segment 440 is held in normal position illustrated in Fig. 7 by a stop bar 445 carried by an arm 434 pivotally mounted on the shaft 436. A pin 433 on the arm 434 is urged into engagement with the cam surface 432 on the crank arm 431 by a spring 446. The crank arm 431 is part of a crank structure 422 that is fast on a shaft 421. The arm 424 of the crank structure 422 is pivotally connected to a link 423 that is in turn pivotally connected to the crank member 374. Each time the crank member 374 is reciprocated by the link 373 movement is imparted to the crank structure 422 and the arm 431 is raised and the pin 433 rides over the cam surface 432 under the action of the spring 446 to thereby free the arm 437 and therefore the slide bar 400 and vertical slide 404 from the stop bar 445 which, as it is carried by the arm 434, is retracted away from the arms 437 when the pin 433 rides over the cam surface 432.

A pin 429 on the arm 430 of the crank structure 422 rides over a cam surface on the arm 428 of the bell crank 425 each time the crank member 374 is reciprocated. The bell crank 425 is pivotally mounted on a shaft 427 and includes arms 426 of the ball 417. Thus each time the pin 429 moves clockwise along the cam surface on the arm 428 the spring 415 may retract the slide bar 413 rearwardly to engage a finger 414 in the opening 412 of a depressed key, but when the pin 429 moves along said cam surface counterclockwise the slide bar 413 is moved against the action of the spring 415 and the engaged finger 414 is retracted from the opening 412 per-

mitting the spring 418 acting on the depressed key to raise it up against the stop 420.

After one of the fingers 414 has engaged in an opening 412, the member 410 is rocked to disengage the fingers 409 from the keys 406. To this end an arm 419 is provided on the member 410 and this arm is connected to a slide bar 447 including an angle portion 448 against which the foot 449 of the rocker 450 bears. A spring 451 acts on the slide bar 447 to urge the angle portion 448 against the foot 449, and this spring also has the effect of holding the cam follower 452 on the rocker 450 in engagement with the cam 453 (Fig. 7) which is provided on a part of the crank structure 424, and these parts so operate that after the finger 414 has been disengaged in the manner above described and the depressed key 406 has reengaged the stop 420 the follower 452 attains a position on the cam 453 which enables the spring 451 to so actuate the slide 447 that the member 410 repositions the fingers 409 for engagement with the keys 406.

A shaft 460 is provided in the variable printer and a plurality of stop plates, such as 461, are rotatably mounted thereon adjacent each of the type segments 376 to 382, inclusive. In Fig. 10, the stop plate 461 and associated parts for a dollar printing type segment are shown while in Fig. 9 the stop plate is shown in the arrangement in which it cooperates with a cents printing type segment. Referring first to Fig. 10 it will be noted that a gear segment 462 is provided on the stop plate 461 and that a rack 463 on a bar 464 meshes with this gear segment. The bar 464 is connected to the vertical slide 404 to move therewith.

The stop plates 461 normally rest against a stop rod 465 and when engaged with this stop rod the stop plates position all type segments to print zeros when the type segments engage therewith. This positioning of the type segments is effected by the engagement of a block 466 on the type segment with a stop 467 on the stop plate 461 when a zero is to be printed or with a stop 468, Fig. 11, on the stop plate 461 when "9" is to be printed, and when digits 1 to 8 are to be printed the block 466 engages stops on the stop plate 461 successively positioned intermediate the stops 467 and 468. In order to print "0" or any digit from 1 to 9, one of the stops on the stop plate 461 is disposed in position to be engaged by the block 466 and the manner in which the stops on the stop plate are positioned to effect this will be explained presently.

However, the dollar printing type segments are equipped to print a star and on these type segments the star is positioned to the right of the zero, as viewed in Fig. 10. Thus a stop arm 469 is provided which is mounted on a shaft 470 and this stop arm is adapted to position the dollar printing type segments so that a star may be printed therefrom, and to this end it should be noted that the stop 471 on the stop arm 469 is positioned forwardly of the zero printing stop 467 on the stop plate 461.

A stop plate 461 is associated with each of the type segments 378 to 382, inclusive, but a stop arm 469 is associated only with the stop plates 461 that control the dollar printing type segments 378 to 382, inclusive. Furthermore, it has been explained that it is desirable to print stars to the left, as viewed in Fig. 2, of the first digit in the amount E and it is for this reason that the stop 471 is positioned forwardly of the stop 467 for if the stop 471 is not moved out of the path

of the block 466 the block 466 will engage therewith and position a star below the opening 396 to have an impression made therefrom. However, after a digit has been printed it is desirable to print zeros where necessary in the dollars portion of the amount E, and in order that this may be accomplished it is necessary to move the stop 471 out of the path of the block 466 so that the block 466 may engage the stop 467 and to this end the following arrangement is provided.

In Fig. 12 I have illustrated the stop arms 469a to 469e that are adapted to be respectively associated with the type segments 378 to 382, inclusive. A pin 472 is mounted in the stop arm 469e and projects toward the stop arm 469d, as indicated at 473. The upper half of the part 473 of the pin 472, however, is cut away. A pin 474 is mounted in the stop arm 469d and includes a part 475 which projects toward the stop arm 469e but the lower half of this part 475 is cut away so that the part 475 may rest on the part 473. The pin 474 includes a part 476 similar to the part 473, and a pin 477 in the stop arm 469c includes a part 478 which rests on the part 476 of the pin 475. Likewise a pin 479 in the stop arm 469b includes a part 480 which rests on the part 481 of the pin 477 and a part 482 of the pin 483 in the stop arm 469a rests on the part 484 of the pin 481. A pin 485, Fig. 10, is fast in each of the stop plates 461 associated with the dollars printing segments and these pins are respectively disposed below the stop arms 469a to 469e, inclusive.

When the type segment 382 is positioned to print a digit from 1 to 9, the stop plate 461 is rotated to bring one of the stops behind the stop 467 thereon into the path of the block 466. This movement of the stop plate is transmitted through the pin 485 to raise the stop arm 469e associated with this stop plate 461. It will be noted that the part 473 of the pin 472 in the stop arm 469 is below the part 475 of the pin 474 in the stop arm 469d and that progressively to the left, as viewed in Fig. 12, each of the pins in one of the stop arms 469a to 469d is below a part of the pin fast in the stop arm to the left of its position. Hence, when the stop plate 461 associated with the type segment 382 is raised all of the stop arms 469a to 469e are raised. However, if no digit from 1 to 9 is to be printed by the type members carried by the type segment 382 but a digit is to be printed from the type member carried by the type segment 381 then a stop on the stop plate 461 associated with the type segment 381 and behind the stop arm 469e is positioned to engage the block 466. This will cause the pin 485 in the stop plate 461 associated with the type segment 381 to raise the stop arm 469d in the manner previously described. This will cause all of the stop arms to the left of the stop arm 469 to be raised but the part 475 on the pin 474 in the stop arm 469d will move away from the part 473 of the pin 473 in the stop arm 469e with the result that the stop arm 469e will remain in the position illustrated in Fig. 10, and therefore when the block 466 on the type segment 382 engages with the stop 471 on this stop arm the type segment 382 will be so positioned that a star will be printed therefrom but all of the type segments to the left of the segment 382, as viewed in Fig. 8, will either print digits from 1 to 9 or a zero depending upon the position of the stop plate 461 associated therewith.

Normally the zero stops 467 on the plates 461 are in position to be engaged by the stop blocks 466, provided of course on the dollars printing

type segments the stop arms 469 are moved as above described. No stop arms are associated with the cents printing type segments since these will either print digits from 1 to 9 or zeros and normally in connection with the cents printing type segments the stops 467 are in position to be engaged thereby. However, when a digit from 1 to 9 is to be printed it is necessary to move one of the other stops on the stop plates into position to be engaged by the stop block 466 and this is effected from the slide bars 400. When the slide bars 400 move to engage depressed keys in the manner previously described, the vertical slides 404 are moved through the teeth in the combs 402 and 403 in an amount corresponding to the amount of movement of the slide bars with which they are connected. This movement of the vertical slides 404 is transmitted through the arms 464, racks 463, gear segments 462 to the stop plates 461 and this movement so rotates the stop plates 461 that a stop corresponding to the digit represented by the depressed key is in position to be engaged by the stop block whereupon the type member 387 for this digit is positioned below the opening 396 to have an impression made therefrom by the platen P'.

The platen P' is carried by a plate 490 which is bent downwardly at its rear end to provide a knife edge 492 (Fig. 9) rested in a groove in the table top 202 of the variable printer. An opening 493 is provided in the plate 490 and a post 494 passes through this opening to retain the plate 490 in position. A spring 495 carried by the post 494 and its support acts on the plate 490 to urge it downwardly. An arm 496 (Fig. 7) depends from the rear end of the plate 490 and carries a pin 497 that is engaged by one end of a rocker 498 pivotally mounted on the frame 350 and carrying a block 499 engageable with a cam 499' fast on the shaft 351. The block 499 follows the cam 499' and at a predetermined time in the rotation of the shaft 351 the block 499 is forced into a relieved part on the cam 499', and this permits the platen P' to quickly move toward the type segments which will be positioned therebelow at this time and an impression is made from the type segments through an ink ribbon IR' by the platen P' on a sheet S positioned in the variable printer.

It has been explained in my co-pending application Serial No. 65,376 that the shutter 200 is moved from and into engagement with the pan 198 to insure passage of a sheet S from the pan down into the sheet guideway G and to then insure that the sheet will move below the pan 198 and also that the roller 207 is moved into cooperating relation with the roller 206 when the sheet S is to be fed from the variable printer. This is effected under control of a peripheral cam 500 on the shaft 351. A roller 501 on an arm 502 follows the cam 500. The arm 502 is connected to a shaft 503 by a link 504 connected to the shaft and after an impression has been made by the platen P' the roller 501 moves from a dwell on the cam 500 into a relief on the cam and rotates the shaft 503 to lower the arm 504' on which the roller 207 is mounted and thereupon the roller 207 cooperates with the roller 206 and feeds the sheet S out of the variable printer. A pin 505 on the shaft 503 is positioned below the rod 506 carrying the shutter 200, said rod 506, as best illustrated in Fig. 8, being bent so as to clear the arm 504'. The rod 506 is pivotally mounted in a bracket 508 mounted on the table top 202 of the variable printer. The rod 506 is urged by gravity into engagement with the pin 505 and follows the

movement of this pin with the shaft 503 as the roller 501 follows the cam 500. It will thus be seen that when the roller 207 is retracted from clamping cooperation with the roller 206 the pin 505 elevates the rod 506 and therefore the shutter 200 so that a sheet passing from the pan 198 moves below the shutter down into the guideway G to be forced into printing position below the platen P' by the roller 197, and that after an impression has been made by the platen P' the roller 207 is moved into clamping cooperation with the roller 206 to feed the sheet out of printing position below the platen P' and at this time the shutter 200 is engaged with the pan 198 to insure movement of the sheet therebelow.

The roller 197 forces the sheet into printing position below the platen P' quite rapidly and the sheet moves into engagement with a stop 509 carried by a rod 510 adjustably mounted in a block 507 mounted on the rod 506. The rod 510 may be shifted through the block 507 to enable proper orientation of the sheet S below the platen P. To prevent rebounding of the sheet S when it engages the stop 509, a whisker 511 is provided adjacent the stop 509 and this whisker engages the sheet about the same time as the sheet engages said stop. The whisker 511 at the free end of a rod 512 is carried by a block 513 pivotally mounted on the rod 506 and it will thus be seen that the whisker 511 is urged by gravity into engagement with the sheets.

It has been explained that the type segments 440 make impressions on the detail strip 443 that correspond to the impressions made on the checks by the variable printer. After a series of checks have been printed it may be desirable to obtain a total of the amounts printed thereon which are likewise printed on the detail strip 443. Hence accumulators 440a, Fig. 13, are provided such as are common in adding machines. Each of these accumulators is equipped with a pinion 441a adapted to mesh with a rack 400a on each slide bar 400. Each accumulator includes a lug 442a adapted to engage a stop 443a when the accumulator is in zero position.

Subsequent to the time a slide bar has been arrested in its rearward movement to set up its type segment in the variable printer and a type segment 440, the cam 444a on the shaft 421 moves into such a position that the follower 445a on the bell crank 446a moves into a relief portion thereon under the action of the spring 447a whereupon the bell crank 446a moves from the position shown in Fig. 13 into the position shown in Fig. 14, and the trip latch 448a thereon engages the end of a slide bar 449a and immediately prior to the time the slide bar 400 is returned to its normal position against the action of the spring 401 the toggle 450a is straightened, due to the return of cam 444a to the position shown in Fig. 13, and through the link 451a pivots the arms 452a carrying the accumulator so that the pinion 441a meshes with the rack 400a and the accumulator is operated when the slide bar 400 is returned to normal position against the action of the spring 401 so that the digit printed by a type member 441 and a type member 387 is entered in this accumulator. While the cam 444a is being restored to the position shown in Fig. 13, and at a predetermined point in the rearward movement of the slide bar 449a, the trip latch 448a engages the stop 443a to be disengaged from the end of the slide bar 449a, thereby permitting the spring 401a to restore the slide bar 449a to its initial position. This operation is repeated each

time a slide bar 400 is operated so that the digits printed on the checks and detail strip are entered in the accumulator, suitable carry-over devices being associated with the accumulators for the well understood purpose.

When it is desired to take a total the button 454a which extends through the casing 456 is depressed to force the bar 455a downwardly and a latch 456a locks the bar in its downward position. The bar 455a carries pins 457a between which the slide bar 449a is passed and when the slide bar is forced downwardly in this manner the shoulder 458a thereon moves into the path of the rocker 459a. A follower 460a on this rocker is urged into engagement with the cam 444a by a spring 461a, the shaft 421 carrying the cam 444a being set in operation in a total taking operation, that is, when the button 454a is depressed in a manner described more fully hereinafter. Normally the shoulder 458a is out of the path of reciprocation of the rocker 459a but when it is moved into alignment with this rocker and the rocker is moved by the cam 444a, the toggle is straightened at the beginning of an operation and the pinion 441a is meshed with the rack 400a at the start of such movement. Then when the slide bar 400 is released in the manner previously described at the beginning of a movement and moves rearwardly under the influence of the spring 401, the lugs 442a engage the stops 443 and arrest rearward movement of the slide bar but in this movement of the slide bar the type segments 440 are set up and when the hammer 440' is released it strikes the type member 441 aligned therewith and makes an impression on the detailed strip 443, which impression is a digit of the total that has been entered in the accumulator 440a.

An arm 462a on the shaft 421 engages the latch 456a at the time the total impression is made whereupon the spring 463a restores the bar 455a and button 454a to upper position, which disengages the shoulder 458a from the rocker 459a and the toggle 450a is broken. Then the slide bar 400 is restored to its initial position but at this time the pinion 441a is disengaged from the rack 400a and therefore the accumulators remain in zero position.

When the slide bar 449a is forced downwardly by the bar 455a it engages the pin 464a on the latch 465a which releases the retaining dog 466a that then moves into engagement with a pin 467a on the bell crank 446a and prevents movement of this bell crank by the spring 447a. A pin 468a on the cam 444a restores the dog 466a into engagement with the latch 465a at the end of a total taking operation.

It will be understood that an accumulator is associated with each slide bar and that the above description specifically applied to one slide bar is applicable to each slide bar, and while I have shown one form of total taking arrangement it is to be understood that others could be employed without departing from the purview of my invention.

The set-up of the variable printer is under control of the printing devices moving through the printing device guideway 243 and a detector 525 (Figs. 5, 16 and 17) is associated with the printing device guideway in a position to cooperate with the printing device in a station two removed from printing position below the platen P, the reason for such positioning of the detector being explained more fully hereinafter. It has been explained that, and as shown in Fig. 3, the

openings 43 and the control card 44 are located in one upper corner of a printing device D and the detector 525 is positioned to cooperate with such part of the printing devices as they move through the printing device guideway. The detector 525 is carried by a bracket 526 pivotally mounted in the frame of the printing machine, as indicated at 527. A lug 528 is provided on the upper side of the detector 525 and the lower end of a link 529 is pivotally connected thereto. A rocker 530 (Fig. 5) is pivotally mounted on a rod 531 mounted in the frame of the printing machine and the rocker 530 includes an arm 532 to which the upper end of the link 529 is connected. An arm 533 is also provided on the rocker 530 and carries a roller 534 that follows the cam 535 fast on the shaft 226. The cam 535 imparts a rocking movement to the rocker 530 to thereby lower and raise the link 529 to correspondingly raise and lower the detector 525 and inasmuch as such movement is effected from the shaft 226 it occurs in timed relation with the operation of the platen P and the movement of the printing devices D through the printing device guideway 243, and the detector 525 is moved into cooperating relation with the printing device D therebelow during an at-rest interval in the step by step movement of the printing devices through the printing device guideway.

A plurality of detector pins 536 are mounted in the housing 537 of the detector 525. The housing 537 is preferably made of insulating material and the detector pins 536 are reciprocally mounted in pockets 538 formed in this housing. The pins are urged downwardly by springs 539. Nine rows of detector pins are provided transversely across the detector 525 and five pins are provided in each of these rows, and it will thus be seen that there is a detector pin 536 for each opening 43 in the frame 40 of the printing device D. A metallic plate 540 is mounted in the housing 537 and an electrical conductor 541 is connected thereto. Openings 542 are provided in the plate 540 in alignment with the first four pins 536 in each of the nine rows of openings and plungers 543 provided on these pins 536 slide in the openings 542. A metallic bar 544 is mounted in the housing 537 and is insulated from the plate 540 by an insulating strip 545 and has an electrical conductor 546 connected thereto. Openings 547 are provided in the bar 544 in alignment with the last pin in each of the nine rows of openings and plungers 548 on these pins slide in these openings. It will thus be seen that the first four pins in each of the nine rows of openings may be connected in an electrical circuit of which the conductor 541 is a part, while the last pin in each of the nine rows of openings may be connected in another electrical circuit of which the conductor 546 is a part.

In the printing device guideway below the detector 525 at what is referred to hereinafter as detecting position, a block 549 of insulating material is provided. A plurality of contacts 550 are mounted in this block 549 in alignment with the detector pins 536 which is to say in alignment with the openings 43 in the printing device D in detector position, and if no printing device were interposed between the detector pins 536 and the contacts 550 and the detector 525 was moved toward the printing device guideway each pin 536 would engage a contact 550.

It has been explained heretofore that the control cards on each of the printing devices D have perforations therein in alignment with selected

of the openings 43 to thereby indicate digits from 1 to 9 in the various rows of openings. Hence, when a printing device D moves into detector position the control card 44 therein will be perforated and when the detector 525 is lowered toward the printing device guideway the pins 536 aligned with the openings in the control card 44 will pass through these openings and engage the aligned contacts 550 to thereby establish an electric circuit, but the pins 536 aligned with unperforated portions of the control card 44 will engage the control card and be prevented from passing through the control card into engagement with the contacts 550. Thus circuit is established only to the contacts 550 aligned with perforations in the control card 44 which, in accordance with the system or code heretofore explained, means that circuit is closed to contacts which are indicative of particular digits. The circuit established through the contacts 550 includes control devices, timing devices and means which operate the keys 406 to depress the keys and effect positioning of the slide bars 400, in the manner previously explained.

The operating means for the keys includes solenoids and in the present instance certain of the solenoids operate keys representative of two different classes of digits, it having been explained previously that, in accordance with the code or system employed in this invention, the digits 1, 3, 5 and 7 constitute one class while the digits 2, 4, 6 and 8 constitute another class and the digit 9 still a third class. The certain solenoids referred to are adapted to operate on one digit in each of the first two classes.

The necessary association of a digit from each of the first two classes one with the other is accomplished by providing toes on keys 406. The manner in which this is accomplished will now be explained for the keys 406 cooperating with the slide bar 400 which controls the type segment 382, and it is to be understood that the rows of keys aligned with the slide bars for the other type segments are similarly arranged. Thus a toe 551 is provided on the key 406 representative of the digit 1 and another toe 552 is provided on the key 406 representative of the digit 2, and the toes 551 and 552 are faced toward each other as clearly illustrated in Figs. 7 and 10. Similarly, a toe 553 is provided on the key for the digit 3 and a toe 554 is provided on the key for the digit 4, and these toes are faced toward each other as are the toes 555 and 556 respectively provided on the keys for the digits 5 and 6. Likewise the toes 557 and 558 for the digits 7 and 8 are faced toward each other.

A solenoid 559 includes an armature 560 shiftable into position over either the toe 551 or the toe 552. Another solenoid 561 includes an armature 562 adapted to cooperate with either the toe 553 or the toe 554. Furthermore, another solenoid 563 includes an armature 564 adapted to cooperate with either the toe 555 or the toe 556, while a solenoid 565 includes an armature 566 adapted to cooperate with either the toe 557 or 558. Thus the armatures 560, 562, 564 and 566 of the solenoids 559, 561, 563 and 565 are each adapted to cooperate with a digit from each of the first two classes of digits.

The key 406 for the digit 9, the third class of digits, includes a toe 567 with which the armature 568 of a solenoid 569 is adapted to cooperate, this armature operating only on the toe piece 567.

The armatures 560, 562, 564 and 566 are in the form of cranks and are normally positioned above

the keys for the digits of the second class, that is to say, the keys for the digits 2, 4, 6 and 8. These armatures are passed through slots in a plate 570 so that the crank-shaped armatures may be moved in unison into position for the keys for the first class of digits, that is, the digits 1, 3, 5 and 7. In order to effect such shifting of the armatures 560, 562, 564 and 566, a crank 571 in the present instance is fast in the upper end of the armature 566. This crank 571 is pivotally mounted in a plate 572 on the armature 573 of a solenoid 574. A spring 575 normally acts on the plate 572 to hold the armatures 560, 562, 564 and 566 in their normal positions above the keys for the digits of the second class. However, when the solenoid 574 is energized the crank 571 is turned to position the armatures above the keys for the digits of the first class. The manner in which the various solenoids are energized will now be explained.

When a printing device D having predetermined perforations in the control card 44 thereof moves into position below the detector 525 and comes to rest in this position, the cam 535 acting through the roller 534 and arm 533 moves the rocker 530 forcing the arm 529 and therefore the detector 525 downwardly, and the pins 536 aligned with the predetermined perforations in the control card 44 pass through these perforations and the aligned openings 43 and these pins engage the aligned contacts 550, as best shown in the wiring diagram (Fig. 21). The contacts 550 are respectively connected by conductors 576 with the solenoids 559, 561, 563, 565, 569 and 574 and depending upon which of the pins 536 pass through perforations in the control card 44 and openings 43 circuit is established through the engaged contacts 550 to selected of the solenoids. It will be recalled that the armatures of the solenoids are normally positioned above the keys for one class of digits and that the shifting of these armatures is under control of the solenoid 574, and therefore when the armatures of the solenoids are to operate on keys for the digits of the first class, that is, the odd digits 1, 3, 5 and 7, it is necessary that the solenoid 574 be energized to shift the armatures. It will also be recalled that under the system or code illustrated in Fig. 4 the odd digits 1, 3, 5 and 7 are indicated by two perforations one of which, as heretofore explained, is always aligned with the uppermost of the openings 43. Thus whenever a pin 536 moves through a perforation aligned with an uppermost opening 43 the solenoid 574 is energized. It has also been explained that when a perforation is provided in a particular row only in alignment with the uppermost opening 43 this is indicative of the digit 9 and by referring to the wiring diagram (Fig. 21) it will be noted that the solenoid 569 for operating the key for the digit 9 and the solenoid 574 are connected to the same conductor 576. It has also been explained that the pins 536 adapted to cooperate with the uppermost openings 43 are energized from a plate 544 whereas the other pins 536 are energized from a plate 540. The plates 544 and 540 are energized independently and in timed relation, in a manner now to be explained.

All of the printing devices in a sequence passed through the printing machine are not always used in such a manner that impressions are made directly therefrom and under control thereof and this is determined by employing identifying means on the printing devices. The identifying means may be removable tabs T which may be connected to the frames 40 of the printing devices

in any suitable manner such as that described in Patent 1,082,505, patented December 30, 1913 or other suitable identifying means may be provided. As explained in my just referred to patent, tabs such as the tab T may be secured to the printing device in any one of a plurality of positions. In the present instance when an impression is to be made from a printing device D, a tab T is removably fastened in the printing device in the first of the tab receiving positions and suitable means in the machine cooperate with this tab T to arrange the machine so that impressions will be made directly from the printing device and also under control thereof. However, when a tab is not provided in this position impressions are not made directly from and under control of the printing device.

In order to determine whether or not an impression is to be made from the printing device a detector bar 577 (Figs. 16 and 17) is provided. The detector bar 577 is carried by arms 578 pivotally mounted, as indicated at 579, on the side members of the frame 526. Pins 580 and 581 are provided at opposite ends of the bar 577 and rest against the upper edges of the side frame members to limit downward movement of the detector bar 577 and also for the purpose of operating switches in a manner to be described presently. A plurality of openings 582 are provided in the bar 577 and a feeler pin, such as 583, is selectively mounted in these openings 582 to engage a tab such as the tab T in the various possible positions of the tabs on the printing devices D. In the present instance where impressions are to be made directly from and under control of the printing devices when a tab T is located in the first position on a printing device the pin 583 is located in the first of the holes 582, as illustrated best in Fig. 16. Thus since the bar 577 rests on the frame 526, when said frame is lowered with the detector 525 in the manner previously described the pin 583 engages a tab T when one is on the printing device D in detector position. The engagement of the pin 583 with such a tab T arrests downward movement of the bar 577 and when movement of the bar 577 is so arrested switches controlled by the pins 580 and 581 are closed.

The switches controlled by the pins 580 and 581 are best illustrated in Figs. 16 and 17. In Fig. 17 a block 584 of insulating material is fast on one of the side frame members of the frame 526. Blades 585, 586, 587 and 588 are mounted in the block 584 one above the other. The blade 585 carries a contact 589 adapted to cooperate with a contact 590 on the blade 586. The blade 587 carries a contact 591 adapted to cooperate with a contact 592 on the blade 588. A block of insulating material 594 is provided on blade 587 and when blade 586 is moved upwardly the contacts 591 and 592 are engaged.

A conductor 595 (Figs. 17 and 21) is provided and a conductor 596 leads from the conductor 595 to the blade 587 and a conductor 597 leads from the conductor 595 to the blade 585. The conductor 548 connects the blade 586 with the conductor bar 544. The conductor 541 connects the blade 588 with the contact plate 540. Thus when the contacts 589 and 590 are engaged circuit is established between the blades 585 and 586 prior to the time the contacts 591 and 592 establish circuit between the blades 587 and 588 and therefore current is supplied to the bar 544 prior to the time it is supplied to the plate 540.

The conductor 576a interconnects the con-

tact 550a which is aligned with the pins 536 having plungers 548 connected to the strip 544 and this conductor 576a is connected to the solenoids 569 and 574. Therefore, since current will be supplied to contact 550a prior to the time it is supplied to the other of the contacts 550 the solenoids 569 and 574 will be energized prior to the time the other solenoids are energized. Thus if there is a perforation in the card 44 in alignment with the uppermost opening 43, the solenoid 574 will be energized to shift the armatures 560, 562, 564 and 566 from position above the keys for the even digits 2, 4, 6 and 8 into position above the keys for the digits 1, 3, 5 and 7 so that if one of the digits of the latter class is to be printed the armature for that key will be thereabove. Then when current is supplied to the strip 544 the proper solenoid will be energized and the armature thereof moved downwardly to depress one of the keys 406 and lock this key in depressed condition, as previously described. However, if there is no perforation in alignment with the uppermost opening 43, the solenoids 569 and 574 will not be energized and there will be no shifting of the armatures 560, 562, 564 and 566 and these armatures will remain above the keys for the even digits 2, 4, 6 and 8 so that if one of the solenoids for these armatures is subsequently energized by engagement of the contacts 591 and 592 the proper key 406 will be depressed.

If there is an opening in the card 44 in alignment only with the uppermost opening 43 in a particular row both the solenoids 569 and 574 will be energized but insofar as energization of the solenoid 574 is concerned this is ineffective. The energization, however, of the solenoid 569 will cause the armature 567 thereof to be lowered and lowering of this armature will depress the key aligned therewith and lower this key into stopping relation with the stop 407 for the digit 9. Of course this stop is lowered every time an odd digit is to be printed but this stop is ineffective in these operations because the stop 407 with which it cooperates is spaced from the stop for the digit 8 in an amount greater than the stops 407 for any of the other digits are spaced from the stop for the next lower digit. Thus it is only when no other key is depressed in a particular row that the stop controlled by the armature 567 is effective in positioning the slide bar 400, and hence the type segment controlled by this slide bar is only set up to print the digit 9 when no other digit is to be printed and this is true even though the stop controlled by the armature 567 be lowered along with another stop.

If a printing device D is not equipped with a tab T in the first tab position, the variable printer is not to be operated and in the machine as illustrated the cylinders 51 and 52 are rendered inoperative as well as the parts associated therewith so that impressions are not made on the web and a sheet is not severed from the web. This is under control of a switch 598 mounted on the side member of the frame 526 opposite that on which the block 584 is mounted and this switch 598 is under control of the pin 581. When a printing device has a tab T in the first tab position and movement of the bar 577 is arrested, the pin 581 closes the switch 598, said switch including a blade 599 carrying a contact 600 and a blade 602 carrying a contact 601, and the contacts 601 and 602 are moved into en-

gagement with each other when the switch 598 is closed.

Current is supplied to the machine from the line wires 603 and 604 through the main switch 595 to the conductors 606 and 607. A conductor 608 leads from the conductor 607 and has a switch 609 therein, which when opened shuts off the variable printer. The solenoids 559, 561, 563, 565, 569 and 574 are connected to the line 606 by a conductor 574', and therefore circuit to the set-up devices of the variable printer is made to both sides of the line.

A conductor 610 is connected to the conductor 606 and to a conductor 610' connected to blade 602. A conductor 611' is connected to one terminal of the solenoid 370 of the clutch controlling the variable printer. The opposite terminal of this solenoid is connected by conductors 612' and 613' to the blade 627 of a switch described more fully hereinafter. This switch includes normally closed contacts 629 and 628 and a blade 626 that is connected to conductor 607 by conductor 626'. Whenever pin 581 closes the normally open contacts 600 and 601 and so long as the normally engaged contacts 628 and 629 are engaged the solenoid 370 is energized through the above described circuit and the clutch teeth 360 are engaged with the clutch teeth 361 and the shaft 351 is driven.

A cam 617 (Figs. 7, 8 and 21) is fast on the shaft 351 and a lobe on this cam is engageable with an extension on the blade 618 carrying a contact 619 which, when the lobe of the cam 617 engages the blade 618, engages a contact 620 on a blade 621. A conductor 622 connects the blade 618 with a conductor 623 that is connected to one terminal of the winding of solenoid 73. The other terminal of this solenoid is connected to conductor 607 by conductor 622'. The blade 621 is connected by conductor 621' with the conductor 606. Hence whenever the contacts 619 and 620 are engaged current may flow from conductor 606 through conductor 621', the blades 621 and 618 through the conductors 622 and 623 to the electromagnet 73 and thence through conductor 622' to conductor 607. Thus at a predetermined time in the rotation of the shaft 351 the lobe on the cam 617 closes the contacts 619 and 620 and energizes the electromagnet 73, thereby engaging the clutch teeth 65 with the clutch teeth 67 to operate the cylinders 51 and 52 and the parts associated therewith. Therefore, unless the contacts 600 and 601 are engaged with each other by the pin 581 the variable printer and the cylinders 51 and 52 are not operated.

The motors 56, 286 and 352 are all connected to the conductors 606 and 607 so that when the main switch 605 is closed these motors are set in operation.

With the exception of the form printing couple the operation of the various devices from the aforesaid motors is controlled through electrically operated clutches, the printing operations of the form printer being controlled by devices associated therewith. The other printing and allied operations in the machine are controlled so that in event sheets are not fed or other abnormal conditions in the machine occur operation is interrupted.

In event no sheets are fed it is desirable to interrupt operation of the machine and to this end sheet detecting devices are provided at various places along the sheet guideway. Such sheet detecting devices are more particularly described in my copending application Serial No. 65,376.

One such device is provided in the variable printer and is indicated by 625. This sheet safety device 625, Fig. 21, includes four switch blades 626, 627, 615 and 612. The switch blade 615 includes an extension 630 and the switch blade 626 includes an extension 631 that is disposed above a block 631' of insulating material on the extension 630.

A pin 632 of insulating material is suitably supported above the bed plate 202 of the variable printer in alignment with a pin 633, Fig. 8, that is normally urged by a spring down into engagement with a plate 634 pivotally mounted on the frame of the variable printer. A rod 635, Fig. 7, is connected to the plate 634 and is engaged in a bushing 636 on an arm 637 passed up through the bed plate 202 and provided with a finger button 638. The rod 635 also passes through a plate 639, a spring 640 being interposed between the bushing 636 and the plate 639. The plate 639 is pivotally mounted, as indicated at 641, and includes a cam follower 642 engaged with a cam disc 643 on the shaft 351. At a time in the operation of the machine when a sheet should have been fed into engagement with the stop 509 a rise on the cam disc 643 elevates the rod 635 which so pivots the plate 634 that the pin 633 is moved upwardly through an opening in the bed plate 202 into engagement with a sheet S if one is engaged with a stop 509. Such engagement of the pin 633 with the sheet arrests further upward movement of the pin and as a result the engaged contacts 613 and 614 and 628 and 629 are not engaged. When, however, there is no sheet above the opening in the bed plate, the pin 633 moves into engagement with the pin 632 and moves this pin into engagement with the extension 630 which is thereupon moved upwardly so that it subsequently engages the extension 631 which is also moved upwardly. When the extension 630 moves upwardly the contact 628 is disengaged from the contact 629 and circuit to the electromagnet 370 is interrupted and an operation of the variable printer is prevented. The purpose of the disengagement of the contact 614 from the contact 613 will be explained presently. When the machine is initially set in operation, the finger button 638 is engaged to prevent upward movement of the rod 635 until a sheet has been moved into position over an opening in the bed plate.

As has been explained, after a sheet leaves the variable printer it moves into engagement with a stop finger 236, and switches 645 and 646 are provided which are controlled by a sheet engaged with the stop finger 236. After moving from engagement with the stop finger 236 the sheet moves into engagement with the stop finger 240 and a switch 647 is provided which is adapted to cooperate with a sheet engaged with this stop finger.

Each of the switches 645, 646 and 647 is associated with a stop finger and the manner in which the stop fingers and switches cooperate is more fully explained in my co-pending application Serial No. 65,376.

When no sheet engages the stop finger 240 the plunger 656, Fig. 21, of the switch 647 is engaged to separate the contacts 658 and 659 of this switch, thereby opening the switch.

The switch 645 is similar to the switch 647 and includes a plunger 661 which engages the blade 662 carrying contact 663 which engages contact 664 on blade 665 so that when there is no sheet in engagement with the stop finger 236 the switch 645 is opened.

The switch 646 differs from the switches 645 and 647 in that the contacts 666 and 667 thereof

are normally separated. These contacts are carried by blades 663 and 666', a plunger 669 engaging the blade 666' to engage the contacts when no sheet engages the stop finger 236.

5 When it is desired to set the machine in operation, the button 683 is pressed whereby the contacts 685 and 684 are closed. Current is supplied to the blade 686 carrying the contact 685 from conductor 607, through conductor 626, contact 628, contact 629, conductor 613' and conductor 10 612'. The blade 681 carrying contact 684 is connected by a conductor 681' to blade 670 carrying a contact 670' normally engaged with a contact 671' on a blade 671. A conductor 673' leads from 15 blade 671 to one terminal of the winding of electromagnet 310. A conductor 688 leads from the other terminal of this electromagnet to a blade 689 carrying a contact 690 normally engaged with a contact 691 on a blade 692. A conductor 692' connects the blade 692 with the conductor 607 so that whenever the button 683 is pushed downwardly the electromagnet 310 is energized which sets the drive shaft of the addressing machine and the form printing couple in operation. A 20 lamp 692a is connected in parallel with the conductor 692 and this lamp indicates that circuit to the electromagnet 310 is closed.

When it is desired to open circuit to the electromagnet 310, the button 693 is pushed downwardly separating the contacts 690 and 691 which open circuit to the electromagnet.

When the electromagnet 310 is energized, the contacts 314 and 315 are engaged to close the safety circuit when all of the other devices in the circuit are closed. This engagement of the contacts 314 and 315 maintains the electromagnet 310 energized. However, the other devices in this safety circuit will not be closed until the machine is fully in operation, that is to say, until the sheets are moving through the printing device guideway. Hence the button 683 is manually held down until sheets are moving through the printing device guideway in a normal manner.

The circuit in which the contacts 314 and 315 are included is as follows: A conductor 615' is connected to the conductor 607 and leads to blade 615 that carries a contact 614 that is normally engaged with contact 613 on blade 612 which is connected by conductor 675 with blade 676 that carries a contact 677 that is normally engaged with contact 678 on blade 679. A conductor 680 leads from blade 679 to blade 662 of switch 645. A conductor 673 connects blade 665 of switch 645 with blade 667 of switch 647. A conductor 674 connects blade 660 of switch 647 with contact 315. A conductor 675' connects contact 314 with conductor 673' that leads to the electromagnet 310. It is this just described circuit that must be closed before the button 683 can be released to maintain the electromagnet 310 energized.

It has been explained that a control card 44 is provided above the opening 43 to indicate the digits of a number or other data and it has also been explained that pins 536 on the detector 525 are moved toward this control card and that some of the pins 536 are to be arrested while others are to pass through perforations in the control card to thereby set up the variable printer and the calculating machine. It is therefore important that a control card be provided on each printing device and that this control card be accurately positioned so that the proper digits will be set up in the variable printer. Thus I provide means for 75 ascertaining whether or not each printing device

is provided with a control card 44 and I so arrange this means that it insures accurate positioning of the control card on each printing device. This means is fully described in my co-pending application Serial No. 65,376 and includes 5 the pin 711, Fig. 21, engageable with an extension 712 on a switch blade 670 carrying a contact 670' normally engaged with a contact 671' on the blade 671, the blades 671 and 670 being mounted in an insulating block along with the blades 676 and 10 679. Blades 718 and 719 are also mounted in the insulating block and respectively carry normally separated contacts 720 and 721, an extension 722 being provided on the blade 718 and carrying a block 723 of insulating material disposed below 15 an extension on the blade 679.

An extension 532, Fig. 5, is provided on the rocker 530 on which a vertically extending arm 726 is pivotally mounted, as indicated at 727. A spring 728 acts on the arm 726 to pivot it clockwise, as viewed in Fig. 5. A cam 729 is provided on the arm 726 engageable with a pin 730 on the bracket 731 mounted on the front of the magazine M. The arm 726 carries a hook 732 engageable with the boss on the lower edge of an arm 23 of a bell crank.

It has been explained heretofore that the conductors 675 and 680 respectively connected to the blades 676 and 679 are included in the circuit to the electromagnet 310 and it will thus be seen that when the normally engaged contacts 677 and 678 are separated circuit is broken to the electromagnet 310 which interrupts operation of the shaft 376 and therefore the feed of printing devices through the machine. A feeler is 35 normally prevented from moving from the track of the printing device guideway by engagement of the hook 732 with the boss on the bell crank as just described. The feeler is for the purpose of detecting whether or not there is a printing device in the first station in front of the magazine M and when no printing device is in this station the feeler will ride off the track and engage the bottom of the printing device guideway after the hook at a predetermined time is 45 disengaged from the boss to pivot the feeler. This controls the operation of pin 711 which is prevented from disengaging the contacts 677 and 678 and 670' and 671' and engaging the contacts 720 and 721. Suitable means are provided to reposition the parts in normal position. All of these means provide that the electromagnet 310 will not be deenergized when no printing device is in the first position in front of the printing device magazine, all of which is more particularly described in my co-pending application Serial No. 50 65,376. Likewise, in my just mentioned co-pending application, means are provided for establishing a circuit from the conductor 607 through the conductor 735 to blade 718 through engaged contacts 720 and 721, blade 719, and conductor 736 to the lamp L which will be located at a suitable place in the machine to indicate that the electromagnet 310 has been deenergized by reason of the fact that a printing device has moved into 65 the first position in front of the magazine M which does not bear a control card 44. The lamp L is connected by a conductor 736' to the conductor 606. It is necessary that the printing devices be positioned accurately so as to prevent grounding of the pin 536 on the metallic frames of the printing devices. Furthermore, it is essential that the pins 536 move through proper openings in the card 44 so as to prevent the entry of something other than the indicated digit. To 75

this end each printing device has a notch 750 in one edge thereof engageable with the block 752 which is mounted on a leaf spring 751. A cam 753 is provided on the leaf spring 751 engageable with an adjustable pin 754 to force the block 752 through the opening 755 in the side of the printing device guideway to cooperate with the notch 750 in the printing device to accurately position the printing device. All of this just described mechanism is more fully described in my co-pending application Serial No. 65,376.

A switch 775 operable by a push button 776 is connected in parallel with the contacts 619 and 620 and when the switch 775 is closed this has the effect of energizing the electromagnet 73 to set the printing couple comprising the cylinders 51 and 52 in operation as well as the parts associated therewith.

Another switch 777 operable by a push button 778 is connected in parallel with the contacts 600 and 601 and may be manually closed to set the variable printer in operation independently of the presence or absence of a printing device in detecting position equipped with a tab T in the desired tab position.

In operation of the machine a roll of paper is mounted in the stand 50 and a web is drawn therefrom and passed between the cylinders 51 and 52 and through the bight of the feed rollers as 127 and beyond the cutter. A stack of printing devices D is introduced into the magazine M. The main switch 605 is closed setting the motors 56, 286 and 352 as well as the motors for the feed rollers in operation.

When initially setting the machine in operation the button 776 is depressed to close the switch 775 which energizes electromagnet 73 which sets the cylinders 51 and 52 in operation to print a signature, number and date on the web. The cutter is also operated to sever a sheet from the web. The button 776 is closed only momentarily and at the end of a cycle of operation the electromagnet 73 is deenergized which disengages the clutch interposed between gear 62 and shaft 63. The clutch is therefore a one revolution clutch and at the end of each cycle of operation this clutch disengages to stop rocker 134 in its upper position. The sheet severed from the web in this first position is manually removed from the machine.

The foregoing operation is repeated three more times, the second and third sheets also being manually removed from the machine. When the fourth sheet extends beyond the cutter the machine is operated in the following manner, this fourth sheet being the first sheet bearing a signature, number and date.

In the next, or fifth, cycle of operation the switch 775 is again closed and the button 633 is manually depressed to retract the pin 633 from the path of movement of sheets into the variable printer. In this cycle of operation the sheet S severed from the web is fed into the variable printer, this sheet being the first bearing a signature, number and date, as stated.

The sheet so fed into the variable printer holds the pin 633 down. The button 683 is manually depressed to start the next, or sixth, cycle of operation and this button is manually held depressed until a later time in the operation of the machine, as will be explained. Pressing this button 683 energizes the electromagnet 310 and sets the shaft 226 in operation with the form printing couple. Inasmuch as there is no printing device in detecting position the contacts 600

and 601 will not be closed, and therefore the variable printer will not be operated (the switch 775 being open) and since the variable printer is not operated the contacts 619 and 620 will not be engaged and the electromagnet 73 will not be energized. In the first cycle of operation effected by depressing the button 683 (the sixth cycle of operation of the machine) a printing and control device will be moved into the first station in front of the magazine and a detector will determine the presence or absence of a control card thereon. If there is no control card on this device the contacts 670' and 671' will be separated and circuit to the electromagnet 310 will be broken even though button 683 is held depressed. The lamp L will be rendered operative when the contacts 670' and 671' separate to indicate why the machine stopped. Inasmuch as no sheet is engaged with the stop finger 236 the switch 646 will be closed and the platen P will not make an operation.

If there is a card on the first printing and control device and the button 683 is held depressed the machine will start another, the seventh, cycle of operation and in this cycle of operation a printing and control device moves into detecting position. The machine is now set up for an operation in which the variable printer and parts associated therewith and controlled thereby will operate.

Assuming that the printing and control device shown in Fig. 3 is below the detector and that the check shown in Fig. 2 is to be printed, the machine will operate as follows: Immediately after the start of the seventh cycle of operation the pins 536 in detector 525 engage the printing and control device D therebelow.

The pins 536 in the fifth row from the right, as the detector is viewed in Fig. 18, will enter the two uppermost openings 43 in the corresponding row on the printing and control device, the card 44 thereon having perforations therein in alignment with these two openings to indicate the digit 7, the first digit of the amount to be printed on the check C. Then when the contacts 589 and 590 are engaged the fifth solenoid 574 from the bottom in Fig. 6 will be energized and the plate 570 for the corresponding row of solenoids for the keys will be shifted so that when the contacts 591 and 592 are subsequently engaged the solenoid 565 of this row is energized to lower the armature 566 thereof into engagement with the toe 556 of the "7" key of this row of keys whereby this key is depressed.

Since the next digit of the amount on the check C is a "0" there are no openings in the control card in alignment with the fourth row of openings 43 on the printing and control device and no keys in the fourth row of keys are depressed.

The pin 536 in the third row thereof passes through an opening in the control card aligned with the next to the lowermost opening 43 in this row which indicates the digit 4, the next digit in the amount on the check C. The solenoid 574 for this row will not be energized because there is no opening in the control card 44 in alignment with the uppermost of the openings 43 in this row and the plate 570 for this row will not be shifted. Hence when the contacts 591 and 592 are engaged (this being the same engagement thereof referred to above) the solenoid 559 in the third row is energized and the armature 560 thereof engages the toe 552 for the "2" key of this row and this key is depressed.

The "1" and "2" keys in the second and first rows respectively, are also depressed in the above described manner and therefore keys 406 are depressed to indicate "704 12".

5 Almost simultaneously with the depressing of the keys 406 the electromagnet 370 is energized, by the closing of contacts 600 and 601, if this printing and control device bears a tab T in the proper position. Energization of this magnet
10 sets the shaft 351 in operation. Shortly after the shaft 351 starts to rotate the lobe on cam 617 closes contacts 619 and 620 and sets the printing couple comprising the cylinders 51 and 52 in operation as well as their associated parts
15 which, with reference to the variable printer, operate rather slowly. Shortly after the shaft 351 starts to operate the slide bars 400 move into engagement with the stops of the depressed keys and set up the type segments of the variable
20 printer and the calculating machine.

The type segment 380 is moved to position the type member 387 thereon for the digit "7" below the opening 396. This positioning of this type segment is under control of the stop plate 461
25 therefor which in turn is positioned by the slide bar 400 therefor. When this stop plate 461 moved to effect such positioning of the type segment 387 the pin 485 on this stop plate raised the stop arm 469c engaged thereby which, as heretofore explained, raises the stop arms 469b and 469a but will not raise the stop arms 469d and 469e. Hence these latter two stop arms remain
30 in stopping position and position the type segments 381 and 382 to print stars or other blanking characters. Since the stop arm 469b is raised the type segment 379 will engage the stop 467 on the stop plate 461 associated with this type segment and the "0" printing type member 387 on this segment will therefore be disposed
35 below the opening 396 inasmuch as the slide bar 400 for this stop plate does not engage a depressed key, no key in this row being depressed, as explained.

The stop plates 461 associated with the type
45 segments 378, 377 and 376 are respectively positioned by their slide bars 400 to position the type members 387 on these respective type segments for the digits "4", "1" and "2" below the opening 396.

50 Hence the type segments 382, 381, 380, 379, 378, 377 and 376 are respectively set upon to print —*704 12— and immediately after they are so set up the platen P' makes an impression therefrom. This impression is the amount represented by the perforations on the control card
55 44 on the printing and control device in detecting position. The type segments 440 in the calculating machine were set up similarly to the type segments of the variable printer and an impression is made from these type segments on the detail strip 443. Furthermore, the amount printed from these type segments is entered in the accumulator 440a.

65 As soon as the platen P' has made an impression on the sheet in the variable printer the roller 207 engages this sheet and feeds it out of the variable printer and then the sheet which was severed by the cutter in this cycle of operation moves into the variable printer. The printed
70 sheet which passes out of the variable printer moves into engagement with the stop finger 236. In the latter part of this cycle of operation the printing and control device which set up the
75 variable printer moved from detecting position

into a position intermediate detecting position and printing position.

The button 683 is still held manually depressed for the next or eighth cycle of operation which is like that just described, an impression being
5 made by the variable printer, and the calculating machine being operated under control of the second printing and control device in the series thereof. Near the end of this cycle of operation the sheet first printed in the variable printer
10 moves from engagement with the stop finger 236 into engagement with the stop finger 240 and the first printing device to attain detecting position moves into printing position.

Sheets are now below all of the safety switches
15 and the button 683 may be released and the machine will continue in operation until one of the safety devices is rendered operative to stop the machine or the stop button 683 is depressed. In this next, or ninth, cycle of operation the first
20 sheet receiving an impression in the variable printer receives an impression directly from the printing and control device in printing position which is the same device under control of which the variable printer was set up to make an im-
25 pression on this sheet. After the platen P has made an impression on this first sheet the stop finger 240 is retracted and the sheet advances through the sheet guideway into engagement with the next stop finger. In other respects this
30 cycle of operation is like the two immediately preceding cycles of operation.

In the next, or tenth, cycle of operation the next stop finger is retracted and the first sheet receiving an impression in the variable printer
35 and from the printing and control device moves between the form printing cylinders and the form is printed thereon. This finishes the printing operations on the sheet and it moves into the collecting tray H. This tenth cycle of operation
40 is like the ninth cycle of operation and subsequent operations are similar to these ninth and tenth operations unless one of the safety devices operates.

When a sheet fails to move into the variable
45 printer the contacts of the switch 625 are separated and this prevents energization of the electromagnet 310 either when the button 683 is held depressed manually or when this magnet is held under control of the contacts 314 and 315 and
50 those contacts in series therewith. The contacts in series with the contacts 314 and 315 are in the switches 645 and 647 and in the device for determining the presence or absence of control cards on the printing and control devices fed through
55 the machine. The contacts in the switch 645 are separated when a sheet does not engage the stop finger 236 and the contacts in switch 647 are separated when a sheet does not engage the stop finger 240. The device which determines
60 the presence or absence of a card on the printing and control devices breaks the circuit to the magnet 310 either when the button 683 is held down manually or when this magnet is held by the contacts 314 and 315.

65 In the present machine a sheet receives an impression in the variable printer under control of a printing control device in one cycle of operation and receives an impression directly from that device in a subsequent cycle of operation, there being an intervening cycle of operation between these two cycles. In view of this, selective printing from and under control of the printing and control devices is controlled from
75 the devices when they are in detecting position

When a printing and control device not having a tab T in the selected position moves into detecting position in the machine, the contacts 600 and 601 are not closed and the variable printer does not make an impression.

When the variable printer does not make an operation in a particular cycle of operation, the roller 207 does not cause a sheet to be fed out of the variable printer and no sheet is fed into this printer. The sheet which was fed out of the variable printer in the preceding cycle of operation moves from engagement with the stop finger 236 into engagement with the stop finger 240 in this particular cycle of operation. Thus in the next cycle of operation the switch 645 is opened since no sheet engages stop finger 236 and this opens the circuit to magnet 310 and this also extinguishes lamp 692a. The operator then ascertains from lamp 692a that the safety circuit is opened but, noting the absence of a sheet in engagement with finger 236, presses button 683 restarting the machine. The switch 646 is closed in this cycle of operation energizing magnet 702 so that the platen operating means will be latched against operation in the next cycle of operation.

In the next cycle of operation no sheet is fed into engagement with stop finger 240 whereby switch 647 acts as did switch 645 in the preceding operation. The operator notes the absence of a sheet in engagement with the stop finger 240 and again presses button 683 restarting the machine. In this cycle of operation the platen P does not make an impression inasmuch as the printing and control device now in printing position is the one which did not effect an operation of the variable printer and hence no impression is to be made therefrom.

If the printing and control device following the device referred to above as not bearing a tab T does bear such a tab the machine remains in operation when restarted after being stopped by the switch 647, but if this printing and control device does not bear a tab the above described stopping and restarting of the machine continues until a tab bearing printing and control device is encountered. When a printing and control device not bearing a card is encountered by the detector, the contacts 670' and 671' and 677 and 678 are maintained separated until the detector is manually reset, the lamp L remaining in operation so long as the just named contacts remain open. This prevents a printing device not bearing a control card passing through the machine and therefore proper operation of the variable printer is assured, particularly since the detector insures correct engagement of the control card with the stop z on the printing and control devices.

The clutches controlled by the electromagnet 370 are one revolution clutches and stop the parts operated therethrough at the end of each cycle of operation even though the operations of the machine are to take place consecutively automatically, and it is for this reason that the variable printer and the parts associated therewith and controlled thereby may be operated in the manner previously described.

The printing and control devices may be passed through the machine merely to have impressions made directly therefrom and when this is to be done the switch 609 is opened and means are provided for feeding the sheets out of the variable printer.

However, it may more often be desired to pass the printing and control devices through the ma-

chine to make impressions under control thereof or merely to operate the calculating machine. When this is to be done the switches 645 and 647 are maintained closed, a convenient way of doing this being to insert small pieces of paper which will not be fed by the feeding means of the machine in the path of the control means for these switches, this being resorted to when it is not desired to print sheets but merely to operate the variable printer to operate the calculating machine.

It will be seen that when printing and control devices are passed through the machine under this condition amounts indicated on the printing devices will be entered in the calculating machine and printed on the record strip, and a total will be accumulated in the accumulators 440a. Of course a special machine could be provided through which the printing and control devices might be passed for interpreting that part of the record provided thereon by the control devices.

When the accumulators 440a are actuated either in the normal operation of the machine or when only the calculating machine is being operated, a total may be taken therefrom by depressing the button 454a and then closing the switch 777 because closing of this switch sets the variable printer in operation whether or not the contacts 600 and 601 are engaged and, as heretofore explained, the button 454a renders operative the total taking devices of the calculating machine.

I have provided a machine wherein a business instrument may be completely printed, and I have explained that the machine may be used for printing directly from or under control of printing and control devices and that when business instruments are being printed preferably impressions are made both directly from and under control of the printing devices. Because of this a record may be provided on each of the printing and control devices, the more permanent part of this record being incorporated thereon by type characters and the more transitory part of the record being provided thereon by a control card. It will thus be seen that the transitory part of the record may be changed easily and inexpensively when so desired.

The variable printer which I have provided enables the printing of variable matter such as the amount of checks issued to stockholders of a corporation in payment of a dividend. In many instances, as has been explained, corporations have a very large number of stockholders, many of whom own an unequal number of shares of stock. Consequently each check for such stockholders will be for a different amount and the variable printer provides for the printing of these variable amounts on separate checks passed through the machine. Provision has been made for the printing of an amount comprising a plurality of digits. Different stockholders will be entitled to different amounts, sometimes varying greatly, depending upon the number of shares owned. Consequently provision has been made for printing amounts from one cent on up to a large number of dollars. When printing many amounts less than the capacity of the variable printer, provision has been made for printing a blanking character such as a star (*) to the left of the first significant digit in the amount, and likewise provision has been made to print zeros to the right of the first significant digit wherever a significant digit is not printed. The

result of this is that no blanking characters will ever be printed to the right of the first significant digit. The variable printer provided is entirely automatic in this respect, namely, that blanking characters will always be printed where necessary to the left of the first significant digit and zeros will be printed where necessary to the right of the first significant digit. It is obvious therefore that I have provided a universal variable printer adapted to operate properly under any conditions to produce a proper impression therefrom.

I have explained the printing of a check and more particularly a check for the purpose of paying dividends, but it is to be understood that checks for any purpose, or other business instruments such as, for example, notices, bills and the like, may be prepared in the machine without departing from the purview of my invention.

I have illustrated and described a preferred form of my invention, but it is to be understood that I do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as may be desired to enable the invention to be used for the purpose for which it is or may be adapted.

I claim:

1. A variable printer for printing numerical accounting data and including a plurality of means each bearing type characters for printing the characters 0 to 9 and a blanking character, a platen for making impressions from said type characters, means for operating said platen, means associated with each of said type character bearing means for moving said type character bearing means into position to dispose the type characters thereon in cooperative relation with said platen, a stop plate associated with each of said type character bearing means and operable to selectively position a type character from 0 to 9 in cooperative relation with said platen, a stop arm associated with each of said type character bearing means and normally arranged to cooperate therewith to position the corresponding blanking character in cooperative relation with said platen, means for operating said stop plates, means operable by each of said stop plates, when the latter are moved, to move the corresponding one of said stop arms out of cooperative relation with said type character bearing means, and means on each of said stop arms adapted to cooperate with adjacent stop arms disposed in a given direction therefrom to move said adjacent stop arms out of cooperative relation with said type character bearing means when any one of said stop arms is moved out of cooperative relation with its associated type character bearing means by its associated stop plate.

2. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which one group of digits in said record are represented by a predetermined number of said perforations and in which another group of digits in said record are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the

said movable member, and a plurality of fixed means each of at least two of which includes a part movable relative to the remainder of such means for selectively moving selected stop members into position to engage said movable member, the selected stop members and the moving means therefor being arranged in groups and the aforesaid parts of the means for moving said stop members in one of said groups thereof being responsive to said predetermined number of perforations and the aforesaid parts of the means for moving said stop members in the other of said groups thereof being responsive to the said other and different number of said perforations.

3. In a printing machine through which control devices, each provided with perforations representing variable data divided into at least two groups, are sequentially fed, and in which one group of said data is represented by a predetermined number of said perforations and in which another group of said data is represented by another and different number of said perforations, the combination of, movable type-carrying means, means for moving the type-carrying means into effective or printing position, and means for controlling the movement of said type-carrying means into effective or printing position, said controlling means including a movable member, stop members engageable with the said movable member, and a plurality of fixed means each of at least two of which includes a part movable relative to the remainder of such means for selectively moving the selected stop members into position to engage the said movable member, selected stop members and the moving means therefor being arranged in groups and the aforesaid parts of the means for moving said stop members in one of said groups thereof being responsive to said predetermined number of perforations and the aforesaid parts of the means for moving said stop members in the other of said groups thereof being responsive to the said other and different number of said perforations.

4. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which one group of digits in said record are represented by a predetermined number of said perforations and in which another group of digits in said record are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the movable type-carrying means into effective or printing position, means for arresting the movement of said type-carrying means in printing position, and means for controlling the movement of said movement-arresting means including fixed devices responsive to a predetermined number of said perforations, at least two of said devices each including a part movable relative to the remainder thereof, the parts of said devices coacting with said movement-arresting means to arrest movement of said type-carrying means in position to print digits in one of said groups and other fixed devices each including a part movable relative to the remainder thereof and coacting with said movement-arresting means to arrest movement of said type-carrying means in position to print digits in the other of said groups.

5. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed,

and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except one that is represented by a particular perforation, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the said movable member, and fixed means including parts movable relative thereto for selectively moving the stop members into engagement with said movable member, the stop members and the moving means therefor being arranged in groups and the means for moving the stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the said stop members in the other of said groups being responsive to the said other and different number of said perforations and the means for moving still another stop member being responsive to the aforesaid particular perforation.

6. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except the digit nine that is represented by a particular perforation, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the said movable member, and fixed means including parts movable relative thereto for selectively moving the stop members into engagement with said movable member, the stop members and the moving means therefor being arranged in groups and the means for moving the stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the stop members in the other of said groups being responsive to the other and different number of said perforations and the means for moving still another stop member being responsive to the aforesaid particular perforation.

7. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except one that is represented by a particular perforation, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means for moving the type-carrying means into effective or printing position, and means for controlling the movement of said type-carrying means into effective or printing position, said controlling means including a movable member, stop members engageable with the said movable member, and fixed means including parts movable relative thereto for selectively moving the

stop members into engagement with said movable member, the stop members and the moving means therefor being arranged in groups and the means for moving the stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the stop members in the other of said groups being responsive to the other and different number of said perforations and the means for moving still another stop member being responsive to the aforesaid particular perforation.

8. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except one, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the said movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the said movable member, and means for selectively moving the said stop members into engagement with the said movable member, the said stop members and the said moving means therefor being arranged in groups and the means for moving the said stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the said stop members in the other of said groups being responsive to the said other and different number of said perforations, said movement-arresting means also including a stop member engageable with the said movable member to stop the latter and the said type-carrying means in position to print the said one digit.

9. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except the digit nine, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the said movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the said movable member, and means for selectively moving the said stop members into engagement with the said movable member, the said stop members and the said moving means therefor being arranged in groups and the means for moving the said stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the said stop members in the other of said groups being responsive to the said other and different number of said perforations, said movement-arresting means also including a stop member engageable with the said movable member to stop the latter and the said type-carrying means in position to print the digit nine.

10. In a printing machine through which control devices, each provided with perforations rep-

representing a numerical record, are sequentially fed, and in which all of the even numbered digits are represented by a predetermined number of said perforations and in which all of the odd numbered digits, except one, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means for moving the said type-carrying means into effective or printing position, and means for controlling the movement of said type-carrying means into effective or printing position, said controlling means including a movable member, stop members engageable with the said movable member, and means for selectively moving the said stop members into engagement with the said movable member, the said stop members and the said moving means therefor being arranged in groups and the means for moving the said stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the said stop members in the other of said groups being responsive to the said other and different number of said perforations, said controlling means also including a stop member engageable with the said movable member to stop the latter and the said type-carrying means in position to print the said one digit.

11. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said record are represented by a predetermined number of said perforations and in which all of the odd numbered digits in said record, except the digit nine, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the said movable type-carrying means into effective or printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, stop members engageable with the said movable member, and means for selectively moving the said stop members into engagement with the said movable member, the said stop members and the said moving means therefor being arranged in groups and the means for moving the said stop members in one of said groups being responsive to said predetermined number of perforations and the means for moving the said stop members in the other of said groups being responsive to the said other and different number of said perforations, said controlling means also including a stop member engageable with the said movable member to stop the latter and the said type-carrying means in position to print the digit nine.

12. In a printing machine through which control devices, each provided with perforations representing data classifiable in two groups, are sequentially fed, and in which all of the data in one group are represented by a predetermined number of said perforations of which one perforation common to all representations also represents datum normally included in the other group and in which all of the data in the other group, except said one, are represented by another and different number of said perforations, the combination of, movable data reproducing means, means normally urging the movable reproducing means into effective position, and means for arresting the movement of said reproducing means in effective position, said move-

ment-arresting means including a movable member, a plurality of stop members arranged in three groups and selectively engageable with said movable member for arresting movement of the movable member and the reproducing means, and means including devices operatively responsive to said predetermined number of perforations in said control devices, representing data in said one group for selectively moving the said stop members in one of said groups into engagement with said movable member and also including devices operatively responsive to said predetermined number of perforations in said control devices, representing data in said other group for selectively moving the stop members in another of said groups into engagement with the movable member and further including a device operatively responsive to said common perforation for moving a stop member in still another of said groups into engagement with the movable member, the last named device operating each time devices responsive to representations of data in said one group are operated, said stop members and the means cooperable therewith being constructed and arranged to render said one device effective only when the common perforation only represents the afore-said datum.

13. In a printing machine through which control devices, each provided with perforations representing a numerical record, are sequentially fed, and in which all of the even numbered digits in said numerical record are represented by a predetermined number of said perforations of which one perforation common to all representations also represents an odd digit, and in which all of the odd numbered digits in said record, except said one, are represented by another and different number of said perforations, the combination of, movable type-carrying means, means normally urging the movable type-carrying means into printing position, and means for arresting the movement of said type-carrying means in printing position, said movement-arresting means including a movable member, a plurality of stop members arranged in three groups and selectively engageable with said movable member for arresting movement of the movable member and the type-carrying means, and means including devices operatively responsive to said predetermined number of perforations in said control devices, representing said even numbered digits, for selectively moving the stop members in one of said groups into engagement with said movable member and also including devices operatively responsive to said predetermined number of perforations in said control devices, representing the odd numbered digits, for selectively moving the stop members in another of said groups into engagement with said movable member and further including a device operatively responsive to said one perforation for moving a stop member in still another of said groups into engagement with the movable member, the last named device operating each time devices responsive to representations of the even numbered digits are operated, said stop members and the means cooperable therewith being constructed and arranged to render said one device effective only when the one perforation only represents said odd numbered digit.

14. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning

of said type-carrying member and the type thereon, a plurality of devices for determining operation of said positioning means, a plurality of operating means at least one of which includes a part movable relative to the remainder thereof, such part being accurately positioned to be co-operable with a plurality of said devices and being operative to selectively render effective one or another of the said devices with which it is co-operable, and means for controlling the operation of said operating means.

15. In a device of the class described, an operating member, means for effecting selective positioning of the operating member, a plurality of devices for determining operation of said positioning means, a plurality of operating means at least one of which includes a part movable relative to the remainder thereof, such part being accurately positioned to be co-operable with a plurality of devices and being operative to selectively render effective one or another of the devices with which it is co-operable, and means for controlling the operation of the operating means.

16. In a printing machine through which control devices, each provided with perforations, representing variable data, are sequentially fed, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the type thereon, a plurality of devices for determining operation of said positioning means, a plurality of operating means at least one of which includes a part movable relative to the remainder thereof, such part being accurately positioned to be co-operable with a plurality of said devices and being operative to selectively render effective one or another of the devices with which it is co-operable, and means under the control of the perforations in said control devices for controlling the operation of said operating means.

17. In a printing machine through which control devices, each provided with control means, representing variable data, are sequentially fed, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the type thereon, a plurality of devices for determining operation of said positioning means, a plurality of operating means at least one of which includes a part movable relative to the remainder thereof, such part being accurately positioned to be co-operable with a plurality of said devices and being operative to selectively render effective one or another of the devices with which it is co-operable, and means under the control of the control means on said control devices for controlling the operation of said operating means.

18. In a printing machine through which control devices, each provided with perforations, are sequentially fed, the said perforations in each of said control devices representing variable data and being arranged in at least two groups, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of the type-carrying member and the type thereon, a plurality of devices for determining operation of the said positioning means, a plurality of operating means at least one of which includes a part movable relative to the remainder thereof, such part being accurately positioned to be co-operable with a plu-

rality of said devices and being operative to selectively render effective one or another of the devices with which it is co-operable, means under the control of the perforations in one of the groups of perforations for actuating said operating means to move said part into co-operable relationship with one of the devices with which it is co-operable, and means under the control of the perforations in the other of said groups of perforations for actuating said operating means to move said part into co-operable relationship with the other of the devices with which it is co-operable.

19. In a device of the character described, a platen, a row of movable type-carrying members, means for moving each of the said type-carrying members in a direction to dispose the type characters carried thereby in cooperative relation with said platen, means for selectively arresting the movement of the said type-carrying members including a row of stop members each engageable with one of the said type-carrying members, means for operating the said stop members, and an interconnecting member on each of said stop members co-operable with a like member on the adjacent stop members to operatively interconnect a plurality of the said stop members in said row for movement as a unit, said interconnecting members being constructed and arranged to operatively interconnect all of the said stop members in one direction therefrom, in said row, for movement as a unit when a selected one of said stop members in said row is actuated but leaving all of the other stop members in said row located in the opposite direction from the said selected one of said stop members, if any, stationary.

20. In a machine through which unitary printing and control devices are sequentially fed, a platen, a row of movable type-carrying members, means for moving each of said type-carrying members in a direction to dispose the type characters carried thereby in cooperative relation with said platen, means for selectively arresting the movement of said type-carrying members including a row of stop members each engageable with one of the said type-carrying members, means for operating the said stop members, and an interconnecting member on each of said stop members co-operable with a like member on the adjacent stop members to operatively interconnect a plurality of the said stop members in said row for movement as a unit, said interconnecting members being constructed and arranged to operatively interconnect all of the said stop members to the left thereof in said row for movement as a unit (when the type on the respective type-carrying members are arranged to produce impressions readable from right to left) when a selected one of said stop members in said row is operated but leaving all of the other stop members in said row to the right of the said selected one of said stop members, if any, stationary.

21. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the type thereon, a plurality of devices for determining operation of said positioning means, a plurality of fixed electrically operated operating means at least one of which includes a part movable relative to the remainder of such means and co-operable with a plurality of said devices, such part being operative to selectively render effective

tive one or another of the devices with which it is co-operable, means for closing circuit to said operating means to effect operation thereof, and other means operative to selectively position said part in cooperative relation with one or another of the said devices with which it is co-operable.

22. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said positioning means, a plurality of fixed electrically operated operating means at least one of which includes a part movable relative to the remainder of such means and co-operable with a plurality of said devices, such part being operative to selectively render effective one or another of the devices with which it is co-operable, means for closing circuit to said operating means to effect operation thereof, and other means operative to selectively position said part in cooperative relation with one or another of the said devices with which it is co-operable.

23. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the said type thereon, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and means for positioning said core in cooperative relation with one or another of the said devices with which it is co-operable.

24. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said

positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and means for positioning said core in cooperative relation with one or another of the said devices with which it is co-operable.

25. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the said type thereon, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and other means including a solenoid operable to selectively position said core in cooperative relation with one or another of the said devices with which said core is co-operable.

26. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and other means including a solenoid operable to selectively position said core in cooperative relation with one or another of the said devices with which said core is co-operable.

WALTER T. GOLLWITZER.

CERTIFICATE OF CORRECTION.

Patent No. 2,133,136.

October 11, 1938.

WALTER T. GOLLWITZER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 19, second column, line 34, claim 3, strike out the article "the" before "selected"; page 21, first column, line 62, claim 12, for "in" read --into--; and second column, lines 9 and 15, same claim, after "group" insert a comma; page 22, first column, line 9, claim 14, strike out "said"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of November, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

tive one or another of the devices with which it is co-operable, means for closing circuit to said operating means to effect operation thereof, and other means operative to selectively position said part in cooperative relation with one or another of the said devices with which it is co-operable.

22. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said positioning means, a plurality of fixed electrically operated operating means at least one of which includes a part movable relative to the remainder of such means and co-operable with a plurality of said devices, such part being operative to selectively render effective one or another of the devices with which it is co-operable, means for closing circuit to said operating means to effect operation thereof, and other means operative to selectively position said part in cooperative relation with one or another of the said devices with which it is co-operable.

23. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the said type thereon, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and means for positioning said core in cooperative relation with one or another of the said devices with which it is co-operable.

24. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said

positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and means for positioning said core in cooperative relation with one or another of the said devices with which it is co-operable.

25. In a device of the class described, a type-carrying member having a plurality of type thereon, means for effecting selective positioning of said type-carrying member and the said type thereon, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and other means including a solenoid operable to selectively position said core in cooperative relation with one or another of the said devices with which said core is co-operable.

26. In a device of the class described, an operating member, means for effecting selective positioning of the said operating member, a plurality of devices for determining operation of said positioning means, a plurality of fixed solenoids at least one of which includes a core movable to be co-operable with a plurality of said devices and which core is operative to selectively render effective one or another of the said devices with which it is co-operable, means for selectively rendering said solenoids operative, and other means including a solenoid operable to selectively position said core in cooperative relation with one or another of the said devices with which said core is co-operable.

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