

Nov. 2, 1965

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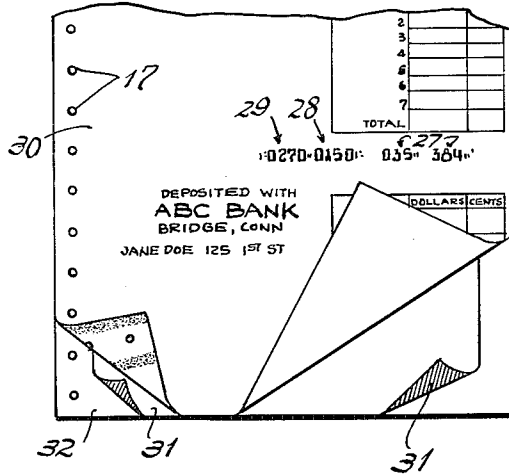
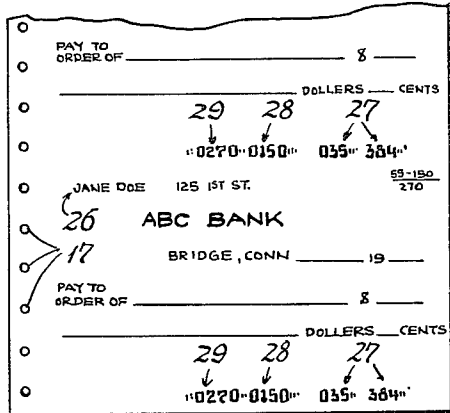
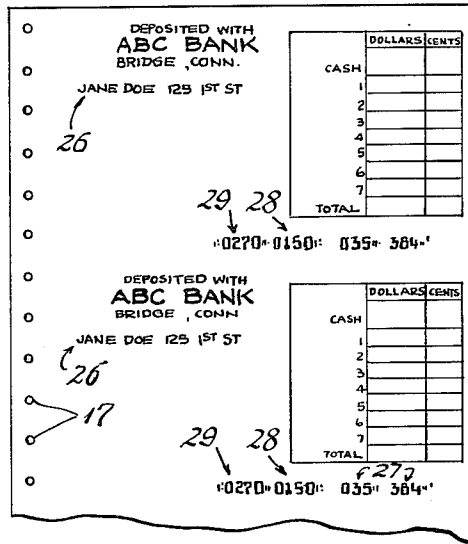
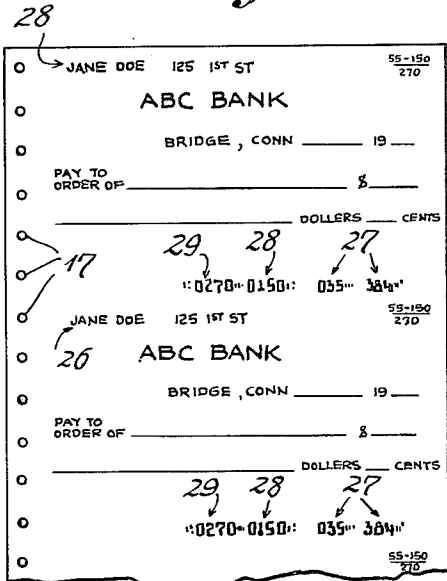
APPARATUS FOR PRINTING

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2 Sheets-Sheet 1

Fig. 1

Fig. 2



10

32

31

31

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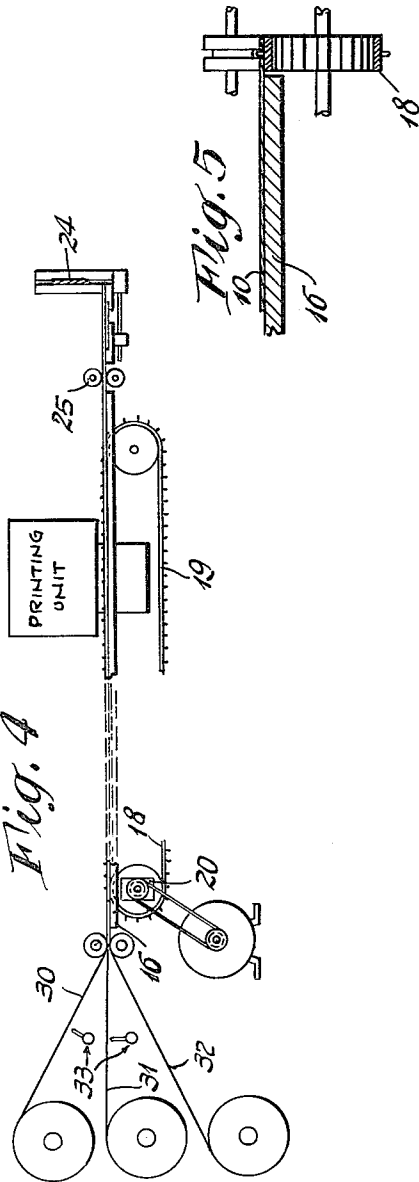
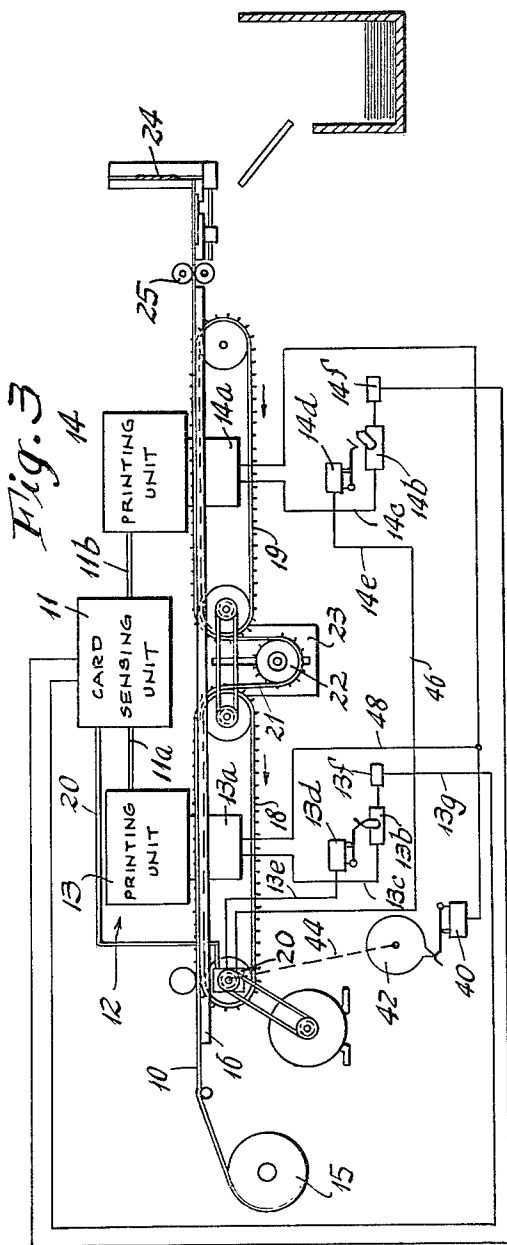
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APPARATUS FOR PRINTING

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2 Sheets-Sheet 2



INVENTOR  
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3,215,069

**APPARATUS FOR PRINTING**

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 Filed Feb. 1, 1965, Ser. No. 429,492  
 3 Claims. (Cl. 101-93)

This invention relates to an improved method of printing checks, deposit slips, and other business and like documents.

This application is a continuation-in-part of my copending application Serial No. 125,029, filed July 3, 1961, which in turn is a continuation-in-part of my copending application Serial No. 21,313, filed April 11, 1960, now abandoned.

At the present time, it is customary to base print a supply of checks and like documents with the name of a bank and other indicia which is common to all checks in use by such bank, and later to print limited quantities of such items with indicia such as the name, address, and the account number of an individual bank customer. This has been done conventionally by locking up in a press chase rigid type or printing plates made therefrom relating to the individual bank customer, then, printing the number of checks required, for example 100 units, and then removing the type or printing plates from the chase of the printing press and inserting newly prepared type or plate material required by and related to the next bank customer. It is not practical, however, by this conventional printing and preparatory method, to produce personalized and account numbered checks or deposit slips in quantities less than 100 units because of the cost of the preparatory work and the press make-ready in relation to the quantity of documents produced therefrom and for the reason that the manufacturer must set the selling price of the product and service so produced higher than the purchaser will pay. However, there exists a great demand for such small quantities of personalized and account numbered bank documents. Up to the present time, this demand cannot be satisfied.

An object of this invention is to provide an economically practical apparatus for personalizing and account numbering of any quantity of checks or deposit slips in multiples of ten units, for instance, with the minimum quantity to be ten units.

It is a further object of this invention to eliminate the need for all conventional preparatory work common to conventional printing methodology such as typesetting, proofing, platemaking, and press make-ready. As will be seen in the disclosure to follow, this objective has been met without the usual wastage of type and/or printing plate material common to conventional printing methodology resulting from the necessity of changing from one press make-ready to another upon completion of the small quantity of personalized and account numbered batch run and without the necessity for preliminary typesetting, proofing, and platemaking.

Another object of this invention is to avoid the necessity for interrupting the printing process for the purpose of making the type change required upon completion of one small batch quantity run to the start of the next.

A yet still further object of this invention is to provide a practical mechanically and electronically controlled mechanism whereby wheels bearing on their periphery the alphabetic and numeric characters are automatically set up according to predetermined instructions to electronic storage and memory units forming an integral component part of the equipment represented by the invention, in less than ten seconds of time and once so set

according to these predetermined instructions, such as bank customer name and assigned account number, such type is locked in all respects in accurate alignment and positioned for the highly precise printing requirements of the type of printing to be referred hereinafter to as Magnetic Ink Character Recognition.

In order to reduce the effort and time required in banks, means have been devised and are now in use whereby indicia on checks, deposit slips, etc., may be optically, magnetically, or electrically sensed for the purpose of sorting, routing, and identification with the customer as by bank number, branch number, or account number respectively.

For this purpose, certain areas are designed to receive the respective indicia and certain standardized characters known as Magnetic Ink Recognition Characters, numeric in format, are used, and these, having been imprinted with magnetic ink, may be sensed by automatic equipment and be translated thereby into various kinds of actions or responses in machinery such as sorting, computing, and/or high speed data processing machines. However, such indicia, for the purpose required by the banks, must be unique to each bank customer separately and different from required indicia for each other bank customer.

What has been said about bank checks applies also to deposit slips and other documents which must be identified with one customer and one customer only. In the majority of cases, each bank customer requires only small quantities of documents such as deposit slips for use over a period of many months. To obtain such small batch quantities, each different from all others, is a problem solved by this invention. Here, again, the deposit slips and other pieces are preprinted in large quantities in general or standard form with some indicia applicable to all individuals and banks or bank branches, etc., and the indicia unique to and identifying each customer is after-printed on a limited number of pieces with the apparatus of this invention in the same manner as with checks.

Another object of this invention is to provide a simple and expedient apparatus for after-printing such pieces with such individual and/or general indicia without the necessity of feeding such workpieces one by one to a printing press.

To do this according to the present invention, the checks or other pieces are printed in continuous form with the standard indicia, and while still in such form are after-printed seriatim by one or more printing units. The printing units may be provided with the usual font of characters or with special characters and the printing may be performed with ordinary and/or special ink or transfer material according to the requirements. Thereafter, the continuous strips are severed into separate checks or pieces and are stacked and bound for distribution and use. The after-printing is preferably performed by settable wheels carrying on their peripheries letter and/or number and/or symbol type faces.

According to the present invention, the after-printing for each kind of workpiece is controlled by a prepared card such as a tabulating card having punch holes so positioned that when presented to an interpreting or sensing mechanism they will control the setting of the printing wheels in one or more printing units and determine the number of checks or pieces to be after-printed. The cards for the various kinds of workpieces are stacked so that after the wheel setting is performed according to one card the next card is presented to the scanning mechanism.

In the preferred form of my invention, the continuous strip is accurately and positively advanced intermittently

to the printing unit or units by a longitudinal row of feed perforations usually in one margin of the strip engaging suitable pin bearing devices such as a wheel or belt. The feeding operations of the strip may be controlled coordinately with the operations of printing units so that the strip of workpieces is stationary while the after-printing is being done.

Thus it is merely necessary, according to this invention for the printer to have on hand a supply of preprinted checks or pieces with indicia general to all accounts and a punched card for each account and use the latter when filling an order for personalized checks or a reorder thereof at any time.

According to the present invention, the position of the lines of after-printing on the checks may be controlled by adjusting the printing unit or units longitudinally along the path of travel of the strip, or by forming a loop in the web between adjacent printing units. Thus the imprints may be located in any desired position of a check for instance, from the uppermost transverse margin to the lowermost.

The printing units may include a printing wheel for each letter-space across the check and therefore the after-printing may be done on any place on the check from one edge to the other.

In many cases only a single ply preprint strip is after-printed. However, in the other cases, particularly deposit slips, it is desired to have several copies of each transaction and, therefore, the strip will be multi-ply.

Other features and advantages will hereinafter appear. In the accompanying drawings:

FIGURE 1 shows a continuous strip of workpieces printed according to the present invention and before the workpieces have been severed from the continuous strip.

FIG. 2 is a view like FIG. 1 but shows superposed continuous strips to provide a plurality of sets of assembled workpieces.

FIG. 3 is a schematic view of apparatus that may be employed for printing strips of checks or the like, such as the strip shown in FIG. 1 according to one form of the present invention.

FIG. 4 is a fragmentary view showing apparatus which may be used for printing and assembling the strips shown in FIG. 2—only the introductory and delivery ends of the apparatus being shown, the intermediate portions being the same as in FIG. 3.

FIG. 5 is a detail sectional view showing the belt for feeding the continuous strip and the driving means therefor.

As a prerequisite to operation of the apparatus of this invention, it is necessary first to print by conventional means a large supply of continuous strips, such as the strip 10 shown in FIG. 1 which contains a succession of printed checks having indicia which is common to the individual checks of many kinds for instance, the name of the bank and other indicia such as shown. The continuous strips of checks are stored until needed.

Thereafter it is necessary to prepare a printing control card, such as a tabulating card, having punch holes indicative of specific indicia relating to a particular customer or account and indicative of the number of checks to be printed successively for that customer or account.

A similar control card is prepared for each customer or account and these are stacked in a card-sensing unit indicated by the reference number 11 in FIG. 3. Any suitable card-sensing unit, such as those disclosed and described in detail in the patents to Daly, No. 2,531,873, issued November 28, 1950, or Nolan, No. 2,770,188, issued November 13, 1956, will suffice to sense the necessary items of data from the punch cards and transmit this data to printing units. The continuous preprinted strip 10 is then fed into an auxiliary printing machine 12 having a plurality of printing units one for each line to be printed.

FIG. 3 is a schematic view in which there are shown two printing units 13 and 14 to which the preprinted strip

10 may be fed to receive the after-printing as controlled by the punch cards. These printing units may be of the type disclosed and described in detail in the patent to Rabenda, No. 2,569,829, issued October 2, 1951, either as disclosed therein or as modified to operate in the manner disclosed and described in detail in the aforementioned Daly patent in which an impression member strikes the strip for effecting printing contact with the type wheels rather than shifting the type wheels relative to a stationary platen as disclosed in the Rabenda patent. The end of the strip 10 may be taken from a supply roll 15 and may be guided through the printing machine 12 by a paper table 16. Preferably the feeding of the strip is controlled by marginally punched holes 17 therein which engage pin-carrying feeding bands 18 and 19. The strip 10 is advanced step-by-step at check-length intervals by intermittently operated feeding means 20 which is under the control of the card-sensing unit through a lead 20a and is initially placed on the feeding band 18 so that the line of the check to be imprinted will register with the printing elements of the printing unit 13 when the strip comes to rest. It is preferable that both printing units 13 and 14 operate simultaneously, and in order that the line of print from the unit 14 may fall on the desired printing line of the check, the apparatus is arranged so that the relative position between the check to be printed and the printing unit 14 can be varied.

This may be accomplished as shown in FIG. 3 by providing a loop 21 in the strip between the printing units 13 and 14 and regulating the length of the loop so that the position of the check to be printed by the unit 14 can be advanced or retracted when threading the web through the printing machine to cause the line of print and the printing line to coincide. The extent of the loop may be controlled by a pin wheel 22 adjustably carried in a slotted bearing plate 23.

The printing units 13 and 14, as seen in the aforementioned Rabenda or Daly patents, are preferably of the type comprising a row of wheels bearing type faces on their peripheries and suitable mechanism, operated in response to signals transmitted through leads 11a and 11b, to position the type wheels under the control of a punched card so that at each operation of the printing units 13 and 14 a single line of type impressions is made by each of the printing units. When the type wheels are positioned, impact devices 13a and 14a, such as those disclosed in the aforementioned Daly patent function to cause ink carried by the type faces or transfer material carried by an interposed ribbon to print the lines on the check. After the first and second lines, in the example given, have been printed on the check, the feed mechanism may advance the strip of checks one check-length and bring the next checks into position to be printed.

As illustrated in FIG. 3, the impact devices 13a and 14a may be caused to operate simultaneously, for example, by means of a momentary contact switch 40 which is actuated by a cam 42 mounted on a shaft 44 which is driven continuously by the same infeed power that drives the intermittent feed means 20. The cam 42 is driven in timed coordination with the cycling of the intermittent feed means 20 so that the switch 40 is actuated during the instant that the strip 10 is not moving. The switch 40 is effective to actuate the impression means 13a and 14a simultaneously through the leads 46 and 48.

According to the present invention, the continuous strip is separated into individual checks which may be stacked as shown in FIG. 3 where checks of the same kind may be collected in groups and bound together or otherwise disposed of. This may be accomplished by providing a cutter 24 which may be adjusted to register with the line (delineated or not) between adjacent checks.

The marginal edge of the strip having the feed holes 17 may be removed before the strip is cut into check lengths by known cutter mechanism 25 or it may be allowed to remain on the checks and be used for binding the checks into book form.

As indicated above, the number of checks to be printed is also controlled by the punched cards, and this may be accomplished by having the punching on the card control a descending totalizer for each printing unit operated by the impressions made by its printing unit so that if twenty checks of the same kind are required the descending totalizer will be set for twenty and when it reaches zero it will temporarily interrupt the operation of the printing unit.

Again referring to FIG. 3, each printing unit 13 and 14 has associated therewith a descending totalizer 13b and 14b, each totalizer being effective to be preset to determine the number of checks to be printed by its corresponding printing unit, and also effective to interrupt the operation of the feeding tractors 18 and 19 and the impression means 13a and 14a such as by each totalizer consecutively interrupting the operation of the infeed power means for the intermittent feed mechanism 20 and the impression means actuating cam 42. Thus it is seen that each totalizer is connected to its corresponding printing unit by a lead 13c and 14c respectively which, by way of example, energizes the totalizer to descend from a preset quantity by one unit each time that the corresponding impression means is actuated. When the totalizers reach a zero setting, they actuate switches 13d and 14d respectively, each of which is effective to interrupt the operation of the power means for the intermittent feeding means 20 and the impression means actuating cam 42 through leads 13e and 14e respectively. Each totalizer is also provided with a resetting motor 13f and 14f respectively by which the totalizers are reset in response to signals received from the card sensing unit 11 through leads 13g and 14g respectively. The construction of the descending totalizers is disclosed and described in detail in the aforementioned copending application Serial No. 125,029.

The data interpreting machine 11 within which the punch cards are placed is set up so that after the printing wheels have been set on each unit by signals through leads 11a and 11b, the setting remains locked. The card sensing unit 11 is effective to commence operation of the apparatus in response to a signal through lead 20a, and simultaneously printing by both printing units continues until the desired number of impressions has been made by the printing unit 13, at which time the totalizer 13b stops operation of the apparatus. At this point the next card is positioned by the card sensing unit 11 to be sensed to unlock and cause another setting and relocking of the type wheels of the printing unit 13 and another setting of the descending totalizer 13b in accordance with the indicia on the next punch card for the next group of checks to be printed. Upon completion of these settings and relocking of the type wheels, the card sensing unit commences operation of the apparatus to cause printing until the printing unit 14 has completed printing the indicia individual to the first group of checks as indicated by the totalizer 14b, at which time operation of the apparatus is again interrupted. The card sensing unit 11 is then effective to unlock and cause another setting and relocking of the type wheels of the printing unit 14 and another setting of the totalizer 14b in accordance with the information from the second punch card, and is thereafter effective to resume operation of the apparatus to continue the printing of the second group of checks until the totalizer 13b again reaches its zero setting. This cycle of operation is repeated until there are no further punch cards to be sensed.

Thus, by successively setting the printing units, no loss of checks will be incurred by the change over from one kind of check to another.

According to the present invention, one of the printing units 13 or 14 has on its type wheels printing characters which are specially formed for "magnetic ink character recognition" and the other unit may have type faces or ordinary characters. Thus, in the examples shown in

FIG. 1, the name and address of the bank customer may be printed as at 26 in ordinary type with ordinary ink or ink ribbon, while the branch and account number indicated at 27, ABA bank number indicated at 28 and the routing for bank clearance purposes indicated at 29 will be printed with magnetic material so that those items can be sensed on a "magnetic ink character recognition" machine. It is a matter of choice and convenience whether the magnetic characters are printed by the unit 13 or by the unit 14.

It should be understood, of course, that while in describing the apparatus of this invention, bank checks are referred to, the apparatus may be used for other purposes where a preprinted form is to have after-printing made thereon in limited quantities, and in this connection one such different use is that of preparing bank deposit slips in limited quantities. The apparatus as it applies to such use will now be described in connection with FIGS. 2 and 4 of the drawings.

In this embodiment of the invention, the workpiece includes an original copy strip 30, a transfer strip 31 and a copy strip 32, and if additional copies are required extra transfer and copy strips may be provided. As shown, these are prepared in continuous form and contain indicia which is common to the individual deposit slips of many kinds, for instance, the name of the bank and other indicia such as shown.

The continuous strips are preferably in separate packages such as rolls or zigzag packs, and when needed the strips are guided to the auxiliary printing machine 12 where the record and copy sheet is aligned by pin wheels and the transfer strips are adhesively secured together by mechanism 33 at the margin to make joined sets of strips. The continuous strips are fed over the paper table 16 and their feeding movements are controlled by marginally punched holes 17 in the strips which engage pin-carrying feeding bands 18 and 19 as in the form of the invention shown in FIG. 3. The feeding and imprinting operations are performed in the same manner as referred to in connection with FIG. 3, the printing units 13 and 14 successively operating on the pile of strips, the original strip being printed by ink applied to the printing wheels or through a transfer member and the copy strip having the same indicia printed on it through the medium of the interposed transfer strip.

The other aspects of operation are the same as described above in connection with FIG. 3, but the end product in this situation is a plurality of groups of deposit slip booklets all of the same kind and identified with a particular customer or a particular account, each top sheet of the booklet having the preprinting, one line of after-printing in ordinary type, and the other line of after-printing with "magnetic ink character recognition" type.

Thus it will be seen that the present invention completely obviates the necessity for preliminary and preparatory work such as typesetting, proofreading, platemaking and make-ready which would be required by previous methods of after-printing checks and the like.

By employing settable type-carrying wheels and locking means therefor, the printing characters are automatically positioned in perfect alignment for the precise requirements for printing operations. This is an important consideration in connection with mechanized check handling, otherwise referred to as magnetic ink character recognition, and thus the apparatus of this invention is able to fulfill standard requirements set by the American Bankers Association as standard practices which are increasingly coming into universal use in the banks of this country. The requirements so laid down are of such a precise nature that they cannot be met by normal printing equipment. The apparatus disclosed herein meets these strict and precise requirements on a fully automated basis and in a practical and economical manner and at a substantially lower cost.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. Apparatus for printing a plurality of groups of items each having at least common indicia and also having two spaced apart lines of unique indicia of a different kind for each group in relatively small quantities for each group, said items being joined to form a continuous strip, said apparatus comprising: means for receiving a plurality of punch cards and for sensing therefrom data determinative of the unique indicia of at least two lines of print of one group of items and data determinative of the number of items of said group from one of said cards, printing means including first and second spaced apart printing units each including a plurality of individually settable type carrying elements and means responsive to the indicia determinative data for a selected one of the lines of print for setting up said type elements to indicate a line of unique indicia to be printed by each printing unit and for locking said set type elements, there being a linear length of said strip between said first and second printing units in excess of the length of an item measured longitudinally of the strip, intermittently operable feeding means for feeding said strip past said printing means a distance with each movement equal in length to the spacing between corresponding lines of unique indicia on two consecutive items, whereby said strip is fed step-by-step in substantially item length intervals, impression means, one associated with each printing unit, for causing momentary printing contact between said strip and the type elements of its associated printing unit, power means responsive to operation of said sensing means for causing operation of said feeding means and said impression means to print consecutively a plurality of items of said one group with the lines of said indicia unique to said one group in predetermined spaced relation with each other and in collective predetermined spaced relation with said common indicia, and first and second settable means, one for each printing unit, each responsive to both the number determinative data from said sensing means and to operation of its associated printing unit, for predetermining the number of items of said one group on which its associated printing unit prints a line of unique indicia and for interrupting operation of said power means after its associated printing unit has printed said predetermined number of items whereby the operation of said power means is successively interrupted after each printing unit completes the printing of said predetermined number of items, said sensing means including means responsive to interruption of said power means, when said first printing unit has printed said predetermined number of items, for causing said sensing means to receive and sense another of said punch cards having indicia de-

terminative data and number determinative data of another group, and means for causing, from said other punch card, another setting and locking of said type carrying elements of said first printing unit, another setting of said first settable means, and resumption of operation of said power means to commence the printing of the unique indicia of said other group by said first printing unit and to complete the printing of the unique indicia of said one group by said second printing unit, said sensing means further including means responsive to interruption of said power means, when said second printing unit has printed said predetermined number of items, for causing, from said other punch card, another setting and locking of said type carrying elements of said second printing unit, another setting of said second settable means, and resumption of operation of said power means to commence the printing of the unique indicia of said other group by said second printing unit.

2. Apparatus as set forth in claim 1 wherein said feeding means comprises first and second interconnected feeding elements, one associated with each printing unit, whereby said feeding elements are caused to operate in unison by said power means, each of said feeding elements comprising an endless band carrying a plurality of pins adapted to engage with pin holes formed in a marginal portion of said continuous strip, and there is further included means for adjusting the interconnected position of one of said feeding elements relative to the other for varying the position of an item relative to the printing unit, associated with said one feeding element, whereby the predetermined spaced relation of the line of unique indicia printed by said printing unit relative to the plurality of lines of indicia may be changed to vary the format of said items.

3. Apparatus as set forth in claim 2 further including means defining a loop in the strip disposed intermediate said feeding elements, said means comprising a guiding element disposed out of the normal path of travel of the strip and around which the strip is constrained to pass, and support means for movably carrying said guiding element in response to adjustments of the interconnected position of said feeding elements whereby the length of said loop may be varied to vary the position of an item relative to said printing unit as aforesaid.

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