Sept. 12, 1967 R. W. SHOUP 3,340,801

MULTIPLE ITEM PRINTING APPARATUS

Filed May 26, 1965 5 Sheets-Sheet 1

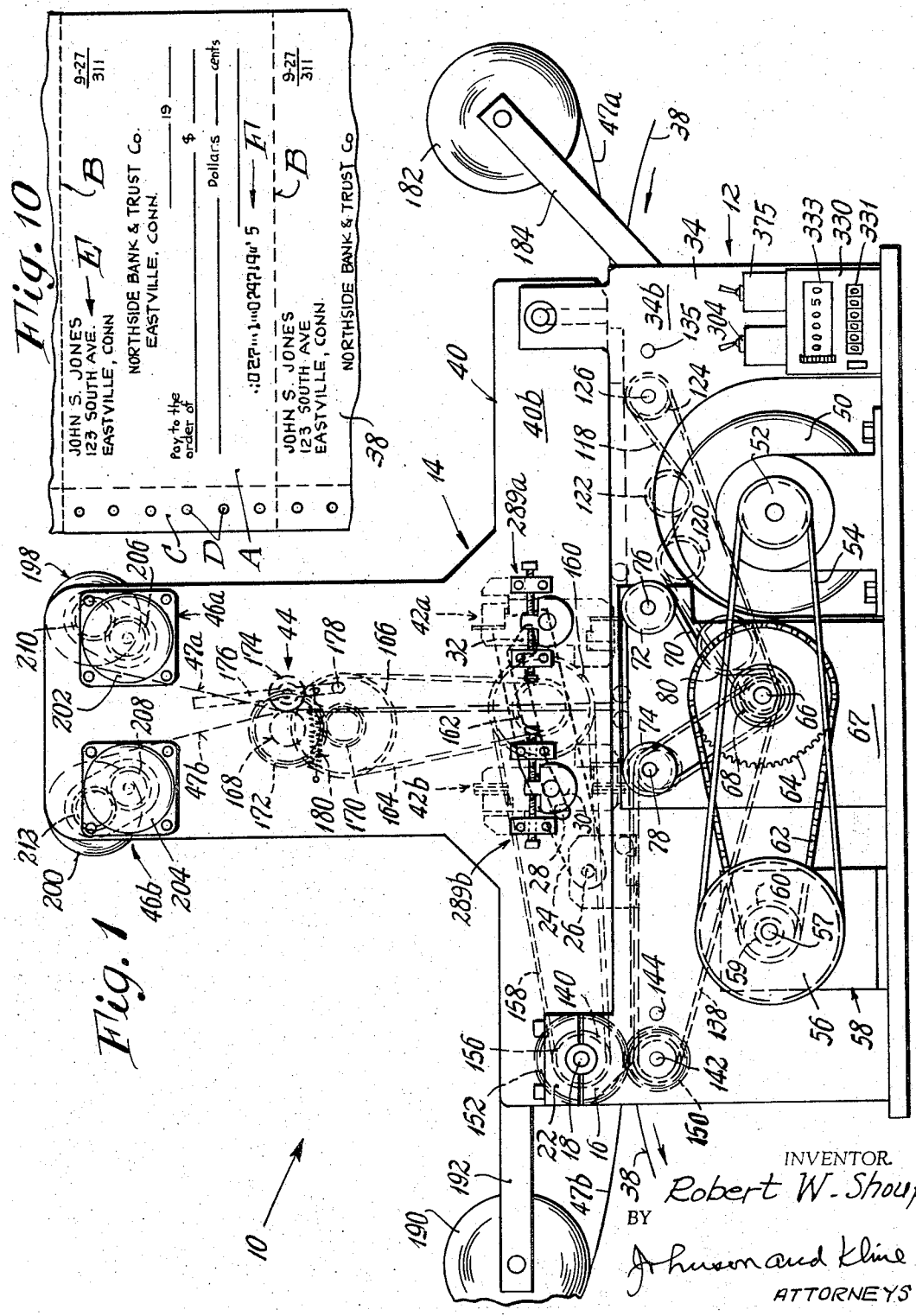


Fig. 10

Fig. 1

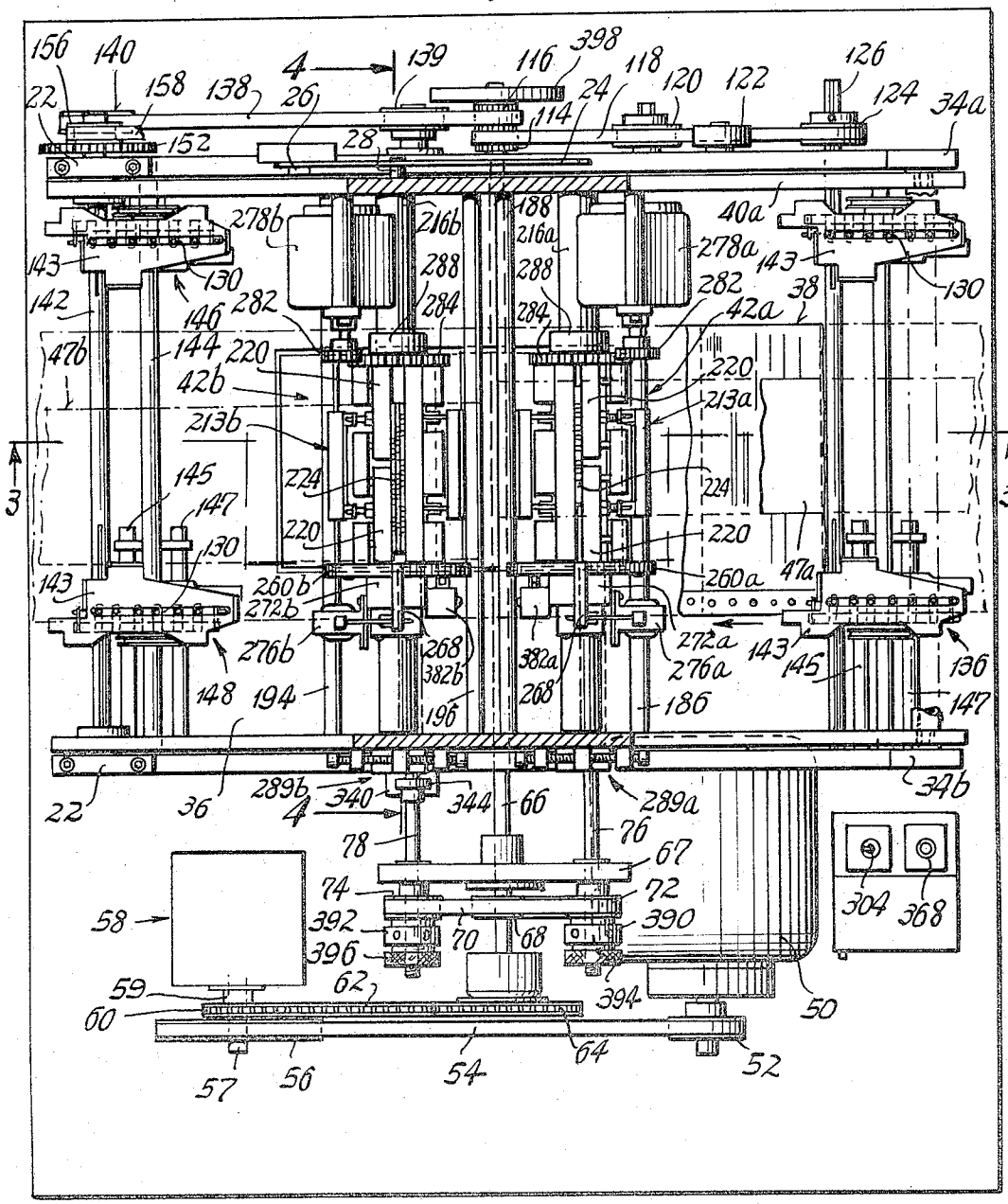
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MULTIPLE ITEM PRINTING APPARATUS

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Fig. 2

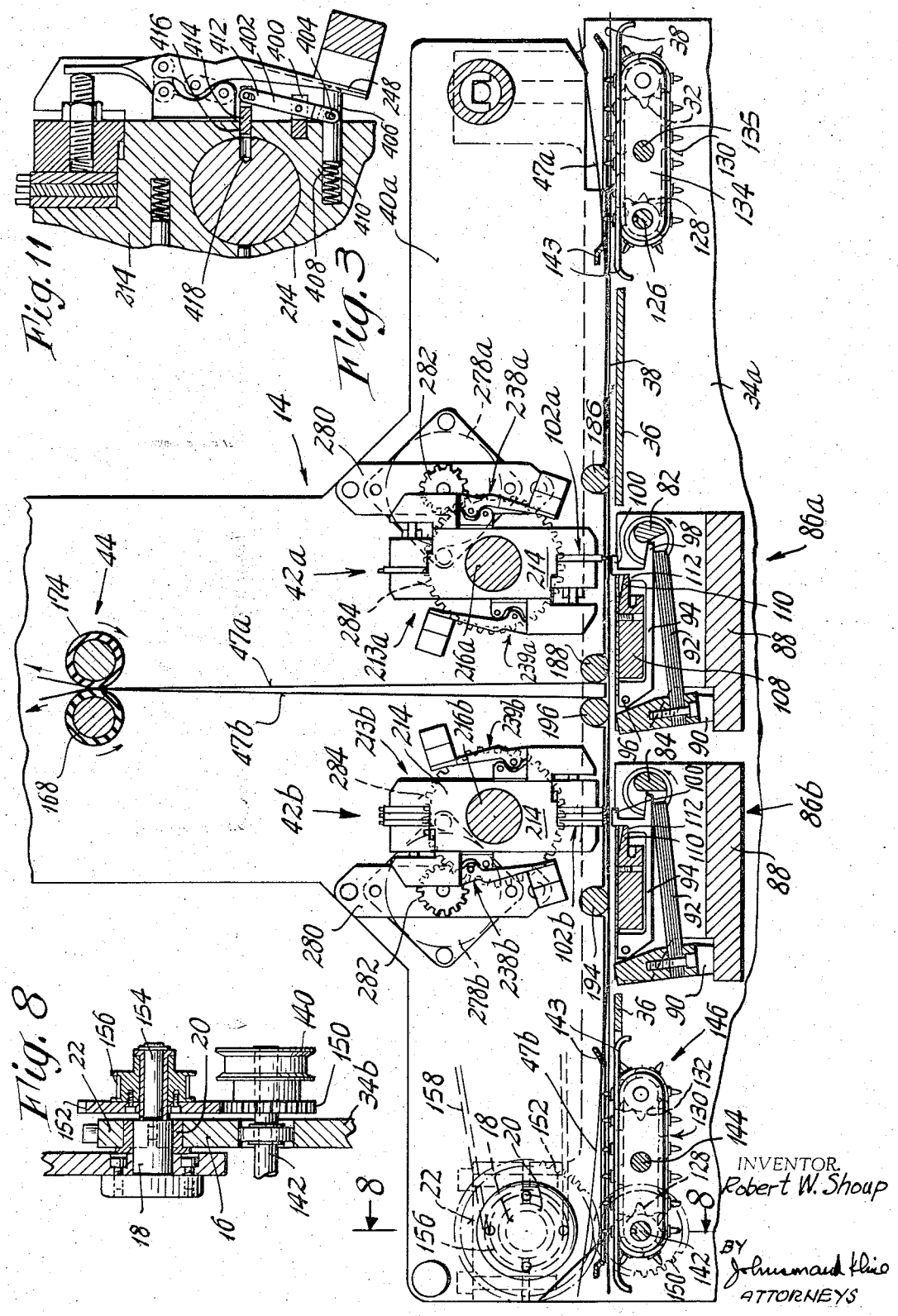


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MULTIPLE ITEM PRINTING APPARATUS

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MULTIPLE ITEM PRINTING APPARATUS

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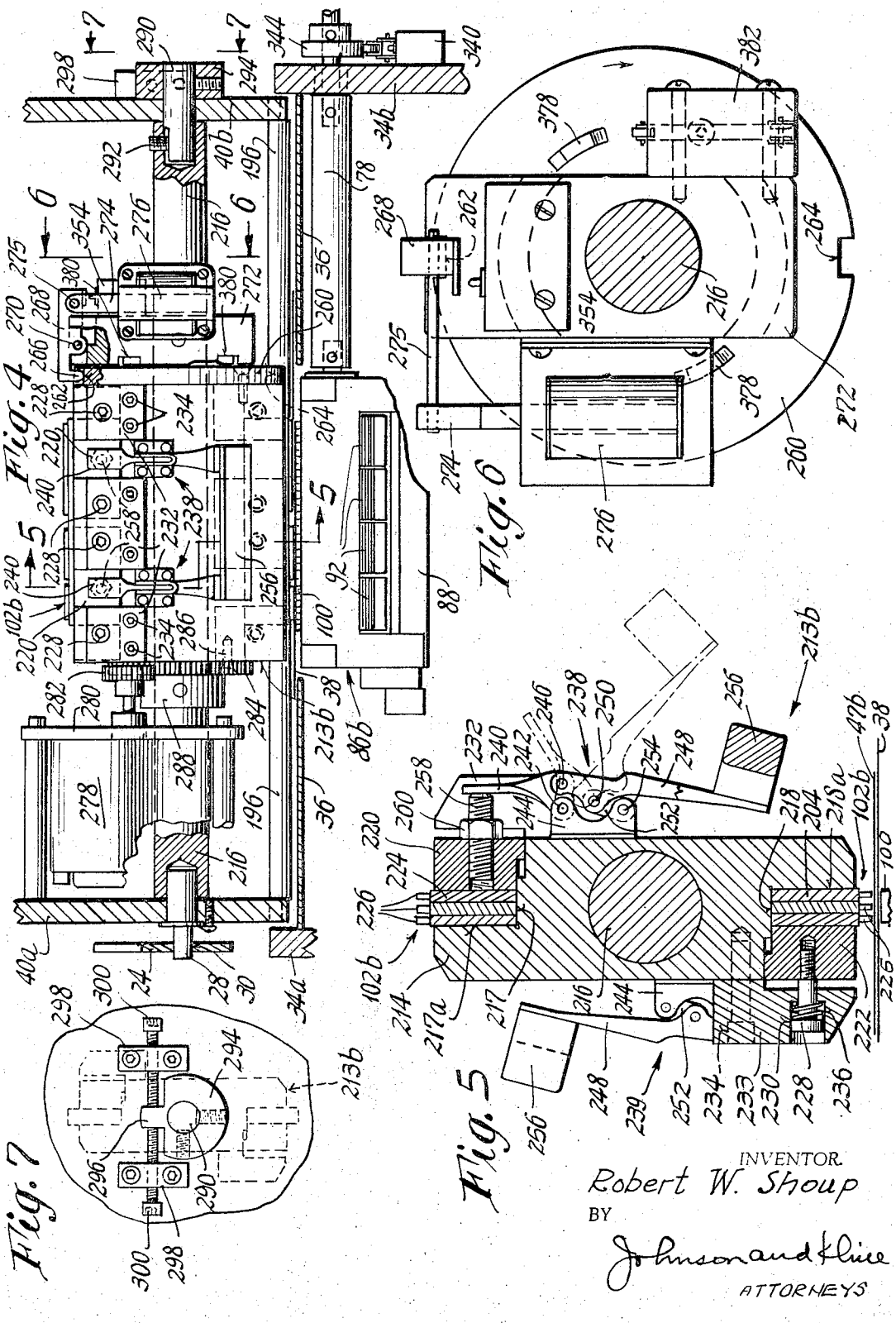


Fig. 4

Fig. 5

Fig. 6

Fig. 7

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MULTIPLE ITEM PRINTING APPARATUS

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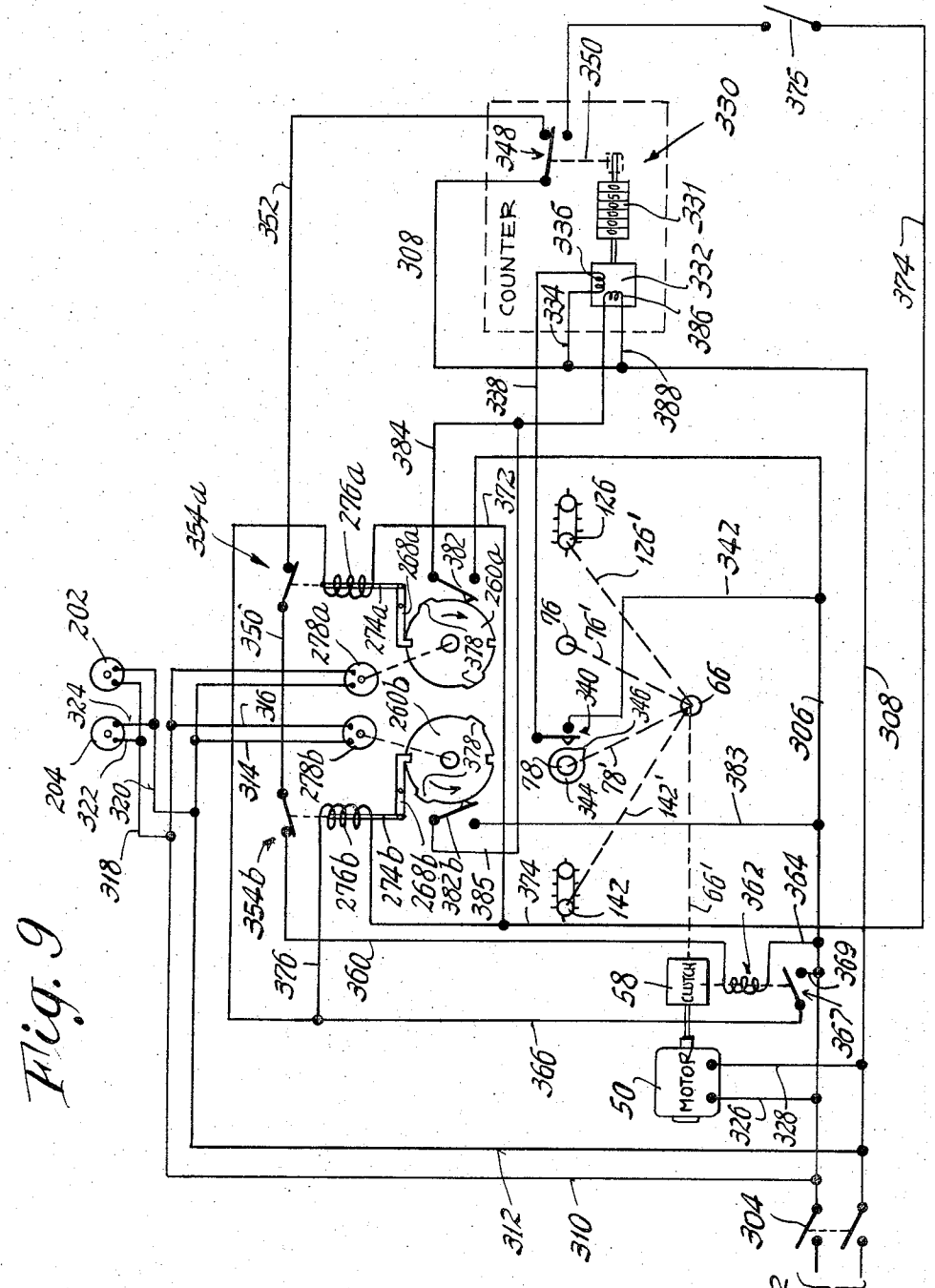


Fig. 9

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3,340,801

MULTIPLE ITEM PRINTING APPARATUS

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Filed May 26, 1965, Ser. No. 458,891
31 Claims. (Cl. 101—90)

This invention relates generally to an apparatus for printing individual indicia on multiple items, bank checks, bank deposit slips and the like for example, formed into a continuous strip, and more particularly to an apparatus for high speed printing of a plurality of groups of items, each having indicia common to all the groups, with indicia individual to each group.

In common with known apparatus, the present invention provides apparatus for printing a plurality of groups of checks, deposit slips and like commercial forms with personalized indicia, such as the name of a depositor and his bank account number, on two separate lines of a form, the forms being preprinted with the indicia conventional to such forms and being joined together in a continuous strip of sufficient length to print a large number of groups each consisting of a relatively small number of items.

This is accomplished in one such apparatus by providing a pair of spaced apart printing units having individually settable non-traveling printing wheels which are automatically set to indicate a single line of individual indicia to be printed by each unit in response to signals received from electronic punch card reading and memory storage components associated with the printing units, the signals being transmitted to the printing units in accordance with data stored on the punch cards which is indicative of the lines of alphabetic and numeric indicia.

Such apparatus while efficient when used to print groups of items with few items in each group was quite complicated and quite expensive to produce.

In another form of known apparatus for printing checks and the like with individual indicia for different groups substantially as described above, this is accomplished by means of a plurality of fixed type slugs, which are carried by a hinged chase manually movable between a closed printing position and an open position where the slugs are accessible for removal and for replacement when changing from the printing of one group of items to another.

Such apparatus while efficient when used to print groups of items with a large number of items in each group was quite simple and relatively inexpensive to produce but its operation involves considerable loss of time since the printing had to be stopped while changing the printing slugs from one group job to the next.

It is an important object of this invention to provide an apparatus for printing checks and the like in the above described manner for use when the number of items in each groups falls between the small number involved in the first described apparatus and the large number involved in the second described apparatus and yet which combines the high speed of operation and flexibility of information and format obtainable from continuous strip advancement past settable non-traveling printing elements with the availability of plural and lengthy lines of indicia and simplicity and inexpensiveness of structure resulting from the use of preformed type slugs carried by a chase.

A further object of this invention is to provide an apparatus for printing checks and the like in the above manner which is fully or semi-automatically cyclically operable to print a plurality of groups of checks without interruption except for a brief moment required to alter the position of preformed type slugs carried by a chase.

A significant feature of this invention, in achieving the foregoing object, is the provision of means for having

the preformed type slugs of one group of items in position to be accessible to an operator of the apparatus for manual removal from a slug holder while the slugs of a different group of items are in a printing position and printing therefrom is being performed, thereby permitting the exchange of type slugs while the apparatus is in operation and eliminating the downtime normally encountered in changing slugs in a single chase or in changing chases. A quick-acting manually operable locking means facilitates the rapid change of type slugs during the period of time required to print a moderate size group of checks.

A further object is to provide a printing device having novel printing element holding and releasing structure particularly suited for use with the apparatus of this invention.

Another object is to provide a printing device having printing element holding and releasing structure which is constructed and arranged such that manually operable members or handles thereof are similarly oriented and manually movable in the same direction when the printing device is in either of two operating positions.

A still further object is to provide an apparatus for printing items in the above described manner in which at least two spaced apart printing units are effective to print sequentially on a continuously moving strip from non-traveling printing elements with the lines of alphabetic indicia printed by one unit and the line of numeric indicia printed by another unit appearing on each item closer together than the spacing between the printing units.

These and other objects and advantages of the invention will be hereinafter pointed out or made readily apparent when the specification is considered in conjunction with the accompanying drawings in which:

FIGURE 1 is a side elevation of an apparatus embodying the principles of this invention;

FIG. 2 is a plan view, partly in section, of the apparatus illustrated in FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken on the line **3—3** of FIG. 2 through the upper unit and on the line *3a—3a* and of FIG. 2 through the impression devices of the lower unit;

FIG. 4 is an enlarged fragmentary sectional view taken on the line **4—4** of FIG. 2;

FIG. 5 is a further enlarged sectional view of the chase carrier taken on the line **5—5** of FIG. 4;

FIG. 6 is a sectional view similar to FIG. 5 taken on the line **6—6** of FIG. 4;

FIG. 7 is a fragmentary side view of the chase carrier adjustment of FIG. 4;

FIG. 8 is a fragmentary sectional view taken on the line **8—8** of FIG. 3;

FIG. 9 is a schematic wiring diagram of the apparatus of this invention;

FIG. 10 is a fragmentary view of one illustrative form capable of being printed by the apparatus of this invention; and

FIG. 11 is a fragmentary view similar to FIG. 6 illustrating an alternate embodiment of the apparatus.

Concept of the invention

The apparatus of this invention is intended primarily to print a variety of commercial forms and documents with indicia individual to a given customer, of which a typical bank check A as illustrated in FIG. 10 is an example. The check is initially prepared in the form of a continuous strip **38** of indefinite length having a plurality of such checks printed thereon in blank form with the customary information of the bank name and location, and the date, amount, payee, and signature lines. Each check A is separated on the strip by a weakened line B to facilitate later separation of the checks, and the strip is provided with a marginal portion C contain-

ng pin holes D by which the strip is fed through the pparatus hereinafter described after which the portions ? may be removed.

The apparatus receives the strip **38** and prints successively on each check A one or more upper lines of alphaetic indicia E which may typically comprise a depositor's ame, street address, and city and state location. This nformation is printed by one printing device. A lower ine of numeric indicia F is printed by another printing levice which prints preferably in "magnetic ink character ecognition" symbols suitable for sensing by commercial utomated check sorting machines. Thus the checks merge from the apparatus of this invention imprinted with the individualized information as illustrated in FIG. 10 after which the checks for a plurality of customers each in predetermined quantity are separated from he strip and each other, sorted and forwarded to the several customers.

It is to be understood that while a typical check has been illustrated in FIG. 10, the apparatus is intended to mprint such information on a wide variety of preprinted forms with one or more lines of information disposed in any desired location on the form, either in conventional character type and ink or "magnetic ink character recognition" type and ink, or both.

Major components and power supply

Referring now to FIG. 1, the principles of this invention are embodied in one form of printing apparatus **10** which generally comprises a lower unit **12** which includes a paper strip feeding means, impression devices and actuating means therefor, and power means for operating both the feeding means and the actuating means for the impression devices. The apparatus **10** also generally comprises an upper unit **14** which supports the printing devices and carbon strip guiding and feeding mechanism for effecting transfer of print to the strip of preprinted joined items.

The upper unit **14** is suitably hinged to the lower unit **12** by means of a pair of hinge supports **16** on opposite sides of the lower unit and a pair of stub shafts **18** on the upper unit which rotate in a bushing **20** (see FIG. 8) secured to the supports **16** by clamping blocks **22**. A retaining bracket **24** pivotally supported on the lower unit as at **26** is rotated by means of pin **28** riding in the slot **30** as the upper unit **14** is raised, and locks the upper unit in open position when the pin **28** catches in the recess **32** formed in the end of the slot **30**. Thus the upper unit **14** may be raised to an almost vertical position to facilitate inserting the paper strip at the beginning of a run, and also for service or repair of the apparatus.

The lower unit **12** comprises a frame **34** having spaced apart side members **34***a* and **34***b* (FIG. 2) upon which the foregoing structure is mounted, and a top member **36** which forms a supporting bed for the paper strip **38** being fed thereover. The upper unit **14** also comprises a frame **40** having spaced apart side members **40***a* and **40***b* (FIG. 2) which support at least one and preferably first and second printing devices **42***a* and **42***b*, and carbon strip feeding means **44** take-up means **46***a* and **46***b* for first and second carbon transfer strips **47***a* and **47***b*. Thus, as the lower unit feeds the paper strip **38** from right to left as viewed in FIG. 1, and cyclically operates the impression means hereinafter described, the desired indicia is transferred from the printing devices **42***a* and **42***b* carried by the upper unit by means of the carbon strips which are advanced by the carbon strip advancing and take-up means **44** and **46***a* and **46***b* of the upper unit.

Referring now to FIGS. 1 and 2, the lower unit **12** more particularly includes a motor **50** secured to a lower portion of the frame **34** and has a drive pulley **52** connected by a belt **54** to an input pulley **56** mounted on the rod shaft **57** of any suitable clutch mechanism **58** having a sleeve shaft **59** which supports an output sprocket **60** which is alternately engageable and disengageable with the continuously operated input pulley **56**. Preferably, though not necessarily, the clutch **58** is of the electromagnetic type, or any suitable mechanical clutch operated by a solenoid and effective to engage or disengage the drive from the motor **52** to the operating mechanism of the apparatus **10**.

The clutch output sprocket **60** is connected by a chain **62** to a sprocket **64** mounted on a main drive shaft **66** suitably journaled in the opposite side frame members **34***a* and **34***b* and in an upstanding supporting plate **67**. A pulley **68** mounted on shaft **66** is connected by a belt **70** to pulleys **72** and **74** which respectively are mounted on shafts **76** and **78**. An idler pulley **80** adjustably mounted on the plate **67** maintains proper tension in the belt **70**. Thus when the motor **50** operates and the clutch **58** engages the input pulley **56** with the output sprocket **60**, shafts **76** and **78** are driven in synchronism. As best seen in FIG. 2, shafts **76** and **78** are journaled in the plate **67** and the side frame member **34***b*, and, as seen in FIG. 3, have intermediate portions **82** and **84** respectively which constitute cam shafts to operate the impression devices generally indicated as **86***a* and **86***b* respectively and more fully described below. Thus by the foregoing drive train, the motor **50** is effective to cause actuation of the impression devices **86***a* and **86***b* in synchronism.

Impression devices

Referring now to FIG. 3, the impression devices **86***a* and **86***b*, being identical in construction and operation, each comprises a generally box-like frame **88** through which the shafts **76** or **78** pass and in which the cam portions **82** or **84** are located. Each frame **88** supports a mounting bracket **90** which in turn supports a plurality of leaf springs **92** (see FIG. 4) which bear at their free ends on the underside of a U-shaped oscillating impression element hereinafter referred to as a print hammer **94**. The latter is pivotally mounted on the frame **88** as at **96** and has a forwardly projecting finger **98** which is engaged by one of the cam portions **82** or **84** of the shafts **76** or **78** as the latter rotate in the direction of the arrow to effect downward movement of the print hammers **94** against the tension of the leaf springs **92**. Each print hammer **94** is also provided with an upstanding anvil **100** which effects momentary printing contact between the paper strip **38**, a carbon transfer strip, and type slugs generally indicated as **102***a* and **102***b* held in printing position by the printing devices **42***a* and **42***b*, the latter to be more fully described hereinbelow.

A combined bridge and stop plate **108** is secured between side plates of each frame **88** to properly space them apart and is received within the U-shaped print hammer **94**. Each plate **108** is provided with a projecting lip **110** which engages a shoulder **112** formed on the upstanding portion of the print hammer **94** to thereby define an upper limiting position for the print hammer **94**. It will now be apparent that with each rotation of shafts **76** and **78** and coresponding rotation of cam portions **82** and **84**, the print hammers **94** of the impression devices **86***a* and **86***b* are pivoted in a clockwise direction until the end of the cam portions **82** and **84** ride beyond the lips **98** whereupon the springs **92** force the print hammers **94** and their anvils **100** upwardly with great force and into momentary printing contact with the paper strip **38** and carbon strips **47***a* and **47***b* under the type slugs **102***a* and **102***b*.

It will be noted from FIG. 3 that the angular relationship of the cam portions **82** and **84** is not the same, the cam portion **82** being slightly advanced in the direction of rotation of the cam portions relative to the cam portion **84**. Thus as the shafts **76** and **78** rotate together, the cam portion **82** depresses and releases the printing hammer **94** of the first impression device **86***a* in a given timed relationship before the cam portion **84** releases the printing hammer **94** of the second impression device **86***b*, thereby causing the impression devices to operate sequentially in timed relationship rather than simultaneously. It is there-

fore apparent that when the first impression device **86***a* operates to cause the printing of the trailing numeric line F by the type slug **102***a* of the first printing device **42***a* on a given check, the desired location of the leading alphabetic lines E of that check will not as yet have reached the second printing device **42***b*. Since the strip **38** is continuously moving, the location on the said check of the leading alphabetic lines E will reach the second printing device **42***b* at the instant that the cam portion **84** releases the printing hammer **94** of the second impression device **86***b* for contact with the strip **38** and the type slugs **102***b*, at which time the numeric line F will be disposed between the two printing devices **42***a* and **42***b*. Thus by the sequential operation of the impression devices **86***a* and **86***b* coupled with continuous movement of the strip **38**, the leading and trailing lines of print E and F, respectively, are caused to appear on a given check spaced apart closer than the physical distance of the printing devices **42***a* and **42***b*.

Paper strip feeding mechanism

The paper strip feeding mechanism which is also incorporated in the lower unit **12**, is driven by a power train which is located on the side of the machine opposite from that on which the power train for the impression devices is located, and commences with the main drive shaft **66**. Referring to FIGS. 1, 2 and 3, the shaft **66** terminates outwardly of the lower side frame member **34***a* and rotatably carries a pair of pulleys **114** and **116**, the pulley **114** driving a belt **118** toward the front of the apparatus and which is passed around adjustably mounted tensioning idler rollers **120** and **122**, and drives a pulley **124** fixed on a shaft **126** which is journaled for rotation in the lower side frame members **34***a* and **34***b*. The shaft **126** carries a sprocket **128** which drives a suitable pin tractor **130**, the latter passing around another sprocket **132** rotatably mounted on a bracket **134** carried by the shaft **126** and fixed on a shaft **135** carried by the side frame members **34***a* and **34***b*. The shafts **126** and **135** have similar sprockets and a pin tractor mounted thereon adjacent the other side of the machine as indicated generally by the numeral **136**.

The other pulley **116** on the main drive shaft **66** drives a belt **138** which in turn drives a pulley **140** (see FIG. 8) carried on a shaft **142** journaled for rotation in the side frame members **34***a* and **34***b*, this shaft and the adjacent fixed shaft **144** carrying and driving a pair of sprockets and pin tractors identical to that described above and disposed on oposite sides of the rear end of the machine and designated generally as **146** and **148**. Thus it is seen that the motor **50** is effective to feed the continuous paper strip **38** by means of the marginal pin holes D in synchronism with the successive actuations of the impression devices since the power for both the impression devices **86***a* and **86***b* and the paper strip feeding mechanism is taken from the main drive shaft **66**, and any deviation in the rate of operation of one mechanism will result in a coresponding deviation in the rate of operation of the other.

Suitable paper guide devices **143** having upper and lower plates between which the strip **38** passes are provided with each pin tractor to assure proper contact between the pin tractors and the pin holes D. The guide devices on at least one side of the machine are adjustably slidably mounted as on the shafts **145** and **147** to accommodate for different widths up the strip **38**.

Carbon strip feeding and take-up mechanism

As briefly described above, the upper unit **14** supports a carbon strip transfer material feeding device **44** and take-up mechanism **46***a* and **46***b*. The feeding device **44** comprises a gear **150** carried by the pin tractor drive shaft **142**, which meshes with another gear **152** carried on a stub shaft **154** (see FIG. 8) and which drives a pulley **156** connected by a belt **158** to another pulley **160** to which is connected a smaller pulley **162** which drives a belt **164** connected to a pulley **166** mounted on an upstanding portion of the side frame members **40***a* and **40***b*. The pulley **166** drives a pinch roller **168** journaled in the side frame members **40***a* and **40***b* by means of the gears **170** and **172**. Another pinch roller **174** is rotatably mounted on brackets **176** which are pivotally suported on frame members **40***a* and **40***b* at **178**, and urged toward the pinch roller **168** by springs **180** whereby the roller **174** is maintained in frictional feeding engagement with the roller **168**.

As noted above, there are separate carbon transfer strips **47***a* and **47***b*, one for each of the printing devices **42***a* and **42***b*. One of the carbon strips **47***a* is stored on a supply roll **182** rotatably supported by brackets **184** secured to the frame members **34***a* and **34***b* adjacent the front end of the machine. The carbon strip passes from the supply roll **182** over the bed **36** of the lower unit **12** in overlying relationship to the paper strip **38**, under guide rollers **186** and **188** and thence upwardly between the pinch rollers **168** and **174**. The carbon strip **47***a*, being associated with the printing device **42***a* which prints the trailing numeric line F on the checks A, preferably though not necessarily carries ink of the magnetic ink character recognition type which is sensible by well known automated document sorting machines.

The other strip **47***b* is provided on a supply roll **190** supported on brackets **192** mounted on the side frame members **40***a* and **40***b* of the upper unit **14** and located at the back end of the machine. The strip passes over the bed **36** of the lower unit in overlying relationship with the paper strip **38**, under guide rollers **194** and **196** and thence upwardly between the pinch rollers **168** and **174** so that both carbon transfer strips will advance simultaneously by the pinch rollers **168** and **174**. Each strip **47***a* and **47***b* is taken up on identical take-up mechanism **46***a* and **46***b* respectively which comprise take up spools **198** and **200**, each spool being driven by a separate stall torque motor **202** and **204**, the motors being conveniently mounted on the frame member **40***b* and each having driving gears **206** and **208** respectively which mesh with gears **210** and **212** provided on the take-up spools **198** and **200**.

From the foregoing it is apparent that the carbon transfer strip feeding mechanism **44** is also driven by the motor **50** and in synchronism with the actuation of the impression devices and the feeding of the paper strip **38**, since the power train for the carbon strip feeding mechanism **44** is taken directly off the same driving shaft **142** which drives the rear strip feeding mechanisms **146** and **148**. The motors **202** and **204** are of the type which are constantly energized and exert a continuous pull on the carbon strips as they are fed by the pinch rollers. The carbon strips are fed at a much slower rate of speed than is the paper strip **38** by virtue of the speed reduction between the gears **150** and **172**, since the carbon strips need only be fed a small increment each time a print cycle takes place.

Printing devices

The printing devices **42***a* and **42***b* which are carried by the upper unit **14** in overlying relationship with the carbon transfer strips and the paper strip **38**, are identical in construction and operation, and accordingly only one need be described in detail. Although two are included in the form of the apparatus shown, it should be understood that only one or any number desired may be utilized with this apparatus, and they may be put into operation selectively in accordance with the information desired to be imprinted on the items of the strip **38**.

Referring to FIGS. 2, 3, and 4–7, the printing device **42***b*, considered for the purpose of description, comprises a rotatably mounted chase carrier **213***b* which holds and carries a plurality of peripherally disposed type slugs **102***b* which in the embodiment illustrated comprises two oppositely disposed sets of slugs which are alternately movable between a printing position and an accessible posi-

ion, each chase carrier being rotated in timed sequence with the stopping and starting of the strip **38** by means hereinafter more fully described. The chase carrier **213***b* comprises an elongated block **214** (see FIG. 5) rotatably mounted on a shaft **216**, the latter being fixedly but adjustably supported by the opposite side frame members **40***a* and **40***b* as seen in FIG. 4. The block **214** is hollowed out at diagonally opposite corners to form type slug receiving and positioning recesses **217** and **218**, each having a fixed positioning wall **217***a* and **218***a* acting in cooperation with clamping bars **220** and **222** movably disposed in the recesses **217** and **218** to alternately clamp and release one or a plurality of type slugs **102***b*, each type slug having a body portion **224** with raised type faces **226** formed thereon. The clamping bars **220** and **222**, in cooperation with the block **214** constitute a chase or slug holder.

There are two clamping bars **220** for the upper set of type slugs, and two clamping bars **222** for the lower set, and each individual clamping bar **220** or **222** is movably carried within clamping and releasing limit positions by a pair of bolts **228** slidingly received in recesses **230** provided in a plurality of upper and lower stop blocks **232** and **233** respectively which in turn are fixedly secured to the chase carrier block **214** by means of bolts **234**. Thus the pairs of clamping bars **220** or **222** are movable between the clamping position illustrated in FIG. 5 and an open position in which the outer face of the pairs of clamping blocks **220** or **222** abut the inner face of the stop blocks **232** or **233** respectively. A spring **236** mounted on each of the bolts **228** urges the clamping bars toward the release position. The inward extent of movement of the clamping bars toward the clamping position may be adjusted by rotation of the bolts **228** in order to securely clamp 1, 2 or 3 type slugs **224** in the chase.

The pairs of clamping bars **220** and **222** are moved between the aforementioned limit positions by means of corresponding pairs of quick release, preferably snap acting, latch mechanisms **238** and **239**, which are identical, each mechanism comprising a lever **240** having one end pivotally mounted at **242** on a bracket **244** secured to the block **214**, the lever **240** also being pivotally connected at **246** to one end of an operating lever **248** which itself is pivotally connected at **250** to a link **252**, the latter being pivotally connected at **254** to the bracket **244** remote from the pivotal connection **242** of the lever **240** to the bracket **244**, thus forming a toggle clamp. The pivot points **246**, **250** and **254** are disposed in out of line relationship such that movement of operating lever **248** by the handle **256** from the full line position of FIG. 5 to the dotted line position of FIG. 5 pulls the pivot point **250** over dead center between the pivots **246** and **254** to release the toggle and move the lever **240** from its full line position to its dotted line position, thus releasing the clamping bars **220** for movement outwardly in response to the springs **236** on the bolts **228**. When the handle **256** is returned to its full line position, the pivot point **250** is again snapped over center and the lever **240** is forced against a threaded post **258** connected to the clamping block **220** and held in position by a lock nut **260** in order to again move the clamping bar **220** to securing position. As seen in FIG. 4, identical upper toggle clamps **238** are provided for each of the clamping bars **220**, and identical lower toggle clamps **239** are provided for each of the lower clamping bars **222**, with the handles **256** connecting the toggle clamps of each pair **238** or **239** for simultaneous operation. The construction and arrangement of the clamps **238** and **239** is such that the handle, and other parts of each clamp, is similarly oriented and movable in the same direction relative to the body **214** when the chase carrier is rotated to alternately move the chases to the exposed position for removal of the slugs.

It is apparent from the foregoing that while the lower type slugs **224** are in printing position, and the machine is in operation and printing is taking place, the upper type slugs **224** are in an accessible position and may be manually removed and changed for other type slugs bearing different type face indicia **226** by manipulation of the handle **256** of the pair of upper toggle clamps **238**. This is an important feature of the present invention since it permits the printing elements of the apparatus to be changed in a simple and efficient manner from the specific indicia required for one customer which has been printed to that required for another customer which is yet to be printed and while the machine is printing the indicia required for still another customer, so that when the printing of the predetermined number of items for any given customer has been completed, the only down time required between the printing of indicia of different customers is that required to rotate the printing devices **42***a* and **42***b* through the half revolution necessary to place the new type slugs in printing position and dispose the type slugs from which printing has just been completed in the accessible position for replacement by the operator of the apparatus. The printing device rotation is accomplished in a very short period of time by the mechanism now to be described.

Means are provided for locking the chase carriers **213***a* and **213***b* in a fixed position during the printing portion of a machine cycle, and for releasing them for rotation upon completion of the printing portion of the machine cycle, providing the change-over of type slugs has been completed. The following structure is identical for both chase carriers, and reference will be now made to chase carrier **213***b* illustrated in FIGS. 2, 4, and 6, wherein it is seen that a combined lock and cam disk **260** is suitably secured to the block **214** of each chase carrier for rotation therewith, the disk having a pair of oppositely disposed stop positions in the form of depressions **262** and **264** to alternately receive a detent **266** mounted on the end of a dog **268** forming a locking member and pivoted at **270** to a bracket **272** fixedly carried by the shaft **216**. When the chase carrier is stationary with one set of type slugs in printing position and the other set in the accessible position, the detent **266** is received within one of the recesses **262** or **264**, preferably the upper one as illustrated, to lock the chase carrier against movement. The dog **268** is rotated in a clockwise direction to withdraw the detent **266** from the recesses **262** by means of downward movement of the armature **274** of a solenoid **276** suitably secured to the bracket **272**, the armature **274** being connected to the dog **268** by a pin **275**. The solenoid is actuated by appropriate electrical components to be hereinafter more fully described.

Upon release of the cam disk **260** by the dog **268**, the chase carrier is rotated preferably, though not necessarily, by any suitable continuously energized source of rotative force applied to the chase carrier, such as the electric stall torque motor **278** suitably mounted on a bracket **280** secured to the upper side frame member **40***a*, the motor having a driving gear **282** which meshes with a driven gear **284** fixedly connected to the block **214** of the chase carrier as by screws **286**. A collar **288** fixedly secured to the shaft **216** acts in cooperation with the bracket **272** to properly locate the chase carrier on the shaft **216** and prevent any shifting movement thereof.

It is now apparent that when the detent **266** is raised out of the recess **262**, the motor **278** will then be effective to rotate the chase carrier 180° whereupon the detent **266** will drop into the recess **264** since, by this time, the solenoid **276** will have been de-energized and the armature **274** thereof is spring biased to urge the dog **268** in a counterclockwise direction. The solenoid **276** is actuated each time the printing of a predetermined number of checks for a given customer is completed so that a half turn of the chase carrier is cyclically effected automatically at the termination of each printing run.

Provision is also made for adjusting the stationary position of the chase carriers **213***a* and **213***b* so that the type faces **226** of the type slugs **102***a* and **102***b* are posi-

tioned directly over the anvils **100** of each impression device **86***a* and **86***b*, and are in absolute parallel planar juxtaposition from the top to the bottom of each type character with the paper strip **38** so that the impression of each character is uniform from top to bottom thereof. This adjustment is effected through minute adjustment of the angular position of the shafts **216***a* and **216***b* to which the chase carriers are locked when they are stationary. The shafts **216***a* and **216***b* are adjusted by the adjustment means **289***a* and **289***b* illustrated in FIGS. 1 and 2, both being identical, and the adjustment means **289***b* being illustrated in FIGS. 4 and 7. This means comprises a stub shaft **290** connected to the shaft **216** by means of the set screw **292**, the stub shaft being rotatably supported on the side frame member **40***b* and extending outwardly thereof far enough to fixedly receive a collar **294** having an upstanding boss **296**. A pair of brackets **298** secured to the outer face of the side frame member **40***b* threadedly receive locking screws **300** which engage opposite sides of the boss **296**. It is apparent that similar directional rotation of the screws **300** will angularly shift the boss **296**, and consequently rotate the stub shaft **290** and the shaft **216** clockwise or counterclockwise by a small amount depending upon the direction of rotation of the screws **300**, thus affording a virtual micrometer control over the position of the shaft **216**. After appropriate adjustment is made the screws **300** are tightened to securely hold the stub shaft **290**, the shaft **216** and the chase carrier in the selected position.

Electric control components and circuitry

FIG. 9 illustrates diagrammatically the electrical components and circuitry necessary for the operation of the apparatus in connection with the consecutive printing of a plurality of groups of personalized items with a predetermined number of items for each group. Thus there is provided a suitable source of power **302** which is connected through a main off-on switch **304** with leads **306** and **308** to supply current to the several actuating and control components of the apparatus. A pair of leads **310** and **312** provide a circuit to the chase carrier operating motors **278***a* and **278***b*, which are connected in parallel by the leads **314** and **316**. Another pair of leads **318** and **320** provide a circuit to the carbon strip takeup motors **202** and **204** which are also connected in parallel by the leads **322** and **324**. Thus the chase carrier rotating motors **278***a* and **278***b* and the carbon strip takeup motors **202** and **204** are continuously energized once the main switch **304** is closed, but because they are stall torque motors they are operable only when the resistance to movement placed upon them is less than the rotative force put out by the motors.

The main drive motor **50** is continuously energized by leads **326** and **328** connected respectively to leads **306** and **308**, and is effective through the electromagnetic clutch **58** to drive the main shaft **66** as diagrammatically indicated by the broken line **66'**, the shaft **66** in turn driving the impression device actuating shafts **76** and **78** respectively by the power train diagrammatically indicated by the lines **76'** and **78'**. It will be recalled that the shaft **66** is also effective to drive the forward and rear paper feed shafts **126** and **142** respectively by the power train indicated diagrammatically by the lines **126'** and **142'**. The operation of the shaft **66** and the mechanisms connected thereto are controlled by engagement or disengagement of the motor **50** through the clutch **58**.

The apparatus is provided with a counter mechanism generally indicated by the numeral **330** which may be either of the descending or ascending totalizer type, and which is effective, when preset, to count the printing actuations of the apparatus and to stop the operation thereof when a predetermined number is reached. The counter is provided with mechanism for initiating an electrical impulse to actuate the solenoid **276** of each printing device in order to permit rotation thereof when the printing operation stops, and, for safety purposes, provision is made for manually disabling the counter initiated impulse and hence the solenoid **276** so that the chase carriers cannot rotate in the event that for some reason the operator has not completed the change-over from one set of type slugs to another during the printing portion of a machine cycle.

The counter **330** is also automatically reset to its starting position in response to a signal initiated by rotation of the chase carriers whereupon the counter is effective to reestablish the circuit to the clutch **58** to again commence operation of the apparatus.

More specifically, the counter **330** is provided with conventional indicating wheels **331** which indicate initially the number of checks in each group to be printed and which descend to zero in response to the consecutive printing of a predetermined number of checks, or which start at zero and indicate the number of checks printed, depending upon whether the counter is of the descending or ascending type. The counter is provided with conventional mechanism generally indicated at **333** in FIG. 1 for establishing a predetermined number of actuations it will permit before stopping the printing apparatus. An actuating mechanism **332** is illustrated diagrammatically and is responsive to signals from different sources to sequentially step the counter in units in response to a signal from one source, and also to reset the counter to its starting position in response to a signal from another source, both in a manner well known in the counter art and therefore not requisite of further description herein.

The former function is accomplished by a counter stepping mechanism indicated diagrammatically by the resistance **336** and is part of the counter actuating mechanism **332**. A lead **334** connects the stepping mechanism **336** to the lead **308**, and a lead **338** connects the stepping mechanism **336** to a normally open microswitch **340** mounted on the frame member **34***b* (see FIG. 4), adjacent the shaft **78**. A lead **342** connects the microswitch **340** to the lead **306** to complete a circuit through the stepping mechanism **336** when the microswitch **340** is closed. This is accomplished by a cam **344** carried by the shaft **78** and having a lobe **346** which momentarily closes the microswitch **340** each time the shaft **78** makes one revolution.

The counter **330** is also provided with a double acting switch **348** which is operated by conventional counter mechanism indicated diagrammatically as **350**. The switch **348**, when the blade is in the upper position as shown is in a circuit consisting of the lead **308**, a lead **352** which connects with a normally closed safety microswitch **354***a* a lead **356** which connects the microswitch **354***a* in series with another safety microswitch **354***b*, a lead **360** connected to the solenoid **362** or other suitable electromagnetic component of the clutch **58**, and a lead **364** which compensates the circuit to the lead **306**. While the safety switches are illustrated diagrammatically as being actuated by the armatures of the solenoids **276***a* and **276***b*, they are preferably mounted on the brackets **272***a* and **272***b* (FIG. 2) and operated directly by the oscillatory movements of the dogs **268***a* and **268***b* of each chase carrier as best seen in FIGS. 4 and 6. It is apparent that as long as the switch **348** is in this circuit and the two safety switches **354***a* and **354***b* are closed, the clutch solenoid **362** is energized to effect a driving connection from the motor **50** to the main drive shaft **66**. When the stepping mechanism **336** causes the counter to reach its terminal position, whether in ascending or descending order, the mechanism **350** alters the position of the blade of the switch **348** thereby breaking the circuit to the solenoid **362** of the clutch **58** and stopping operation of the machine.

The chase carriers are freed for rotation by the chase motors **278***a* and **278***b* by means of solenoids **276***a* and **276***b*, the armatures **274***a* and **274***b* of which, it will be recalled from above, are connected respectively to the locking dogs **268***a* and **268***b*. The solenoids **276***a* and **276***b* are connected in parallel in a circuit comprising a lead **366** connected to a normally open safety switch **367** which

is closed upon de-energization of the clutch solenoid **362**, the switch **367** being connected by a lead **369** to the lead **306**. The lead **366** is connected to one side of the solenoid **276***a* and a lead **372** connects the solenoid **276***a* to a lead **374**. A lead **376** connects the lead **366** to one side of the other solenoid **276***b*, the other side of which is also connected to the lead **374**. The latter is connected, through a manually operable switch **375**, to the double acting switch **348** in position to have the blade thereof complete a circuit to lead **308** through the solenoids **276***a* and **276***b* when the mechanism **350** moves the blade of switch **348** at the completion of the printing portion of a machine cycle. It will be recalled that such movement of the blade also de-energizes the clutch solenoid **362** which in turn closes the safety switch **367** which is in the just described circuit to solenoids **276***a* and **276***b*.

It will now be seen that movement of the blade of switch **348** initiates an actuating impulse to energize the solenoids **276***a* and **276***b* thereby actuating the dogs **268***a* and **268***b* to free the chase carriers for rotation as described above, assuming that the manual switch **375** is closed. This switch is a safety feature, under the control of the operator, which disables the actuating impulse from the counter to the solenoids **276***a* and **276***b* in the event that the operator has not completed the slug replacement when the counter reaches its terminal position and the apparatus stops printing. The operator opens this switch while changing slugs and closes it when the slugs have been changed and the chases locked.

At least one, though preferably both, of the chase carriers is effective, after a predetermined amount of rotation, to close a circuit to the counter in order to reset it to its starting position. As illustrated, each chase carrier is provided with diametrically opposed cam lobes **378** which, although illustrated diagrammatically in FIG. 8 as being on the periphery of the disks **260***a* and **260***b*, are actually located, as seen in FIG. 6, on the outer flat face of the disk **260**. An appropriate recess **380** is formed in the bracket **272** to permit the cam lobes **278** to pass therethrough.

Referring to the rearward chase carrier **213***b*, and FIGS. 2, 6 and 8, a normally open microswitch **382***b* is suitably mounted on the bracket **272** adjacent the disk **260** in position to be actuated by one of the cam lobes **378** each time the chase carrier rotates through one half turn. The switch **382***b* is in a circuit comprising a lead **383** connected to the main lead **306** and a lead **385** connecting the switch **382***b* to a conventional counter resetting device indicated diagrammatically by the resistance **386** in the actuating mechanism **332**. A lead **388** connected to the lead **308** completes the circuit through the resetting device **386** when the switch **382***b* is closed. The switch **382***a* is connected in parallel with the switch **382***b* to the resetting device **386** by the leads **306** and **384**. Thus the counter **330** is reset to its starting position each time either of he chase carriers, in case only one is being utilized for printing, or both rotate one half turn to change the position of the type slugs prior to the commencement of a new printing run.

Operation

From the foregoing detailed description of the apparatus of this invention together with electrical components and circuitry thereof, the cyclical operation of the apparatus as now described will be readily apparent. If it is assumed that the paper strip **38** and the carbon transfer strips **47***a* and **47***b* have been positioned in the apparatus, and appropriate type slugs have been inserted and locked into the accessible chases of each chase carrier, the main switch **304** has been closed, the counter has been set to a predetermined number, and the safety switch **367** is closed since the clutch solenoid **362** is de-energized, the apparatus is ready to commence operation. The operator closes the safety switch **375** which closes the parallel circuits through the solenoids **276***a* and **276***b* for each printing device whereupon the dogs **268***a* and **268***b* are rotated to release the chase carriers for rotation by the motors **278***a* and **278***b*. Simultaneously with the movement of the dogs **268***a* and **268***b*, the normally closed microswitches **354***a* and **354***b* are opened so that the clutch **58** is rendered inoperable until the chase carriers have completed their rotation and have been locked in the new printing position by the dogs **268***a* and **268***b*.

As the chase carriers rotate, the advancing cam lobe **378** momentarily closes the switches **382***a* and **382***b* to energize the counter resetting device **386** to set the counter mechanism to its starting position and also to move the blade of the switch **348** by virtue of the mechanism **350** to its upper position. As indicated above, this movement of the blade does not start the operation of the apparatus until the safety switches **354***a* and **354***b* are closed upon completion of rotation of the chase carriers.

When the latter event occurs, the circuit is closed through the clutch solenoid **362** whereby the clutch **58** engages the drive shaft **66** with the motor **50** to commence simultaneous operation of the pin feed shafts **126** and **142**, the impression device actuating shafts **76** and **78**, and the carbon transfer strip feed mechanism **44** all in the manner described above. At the same time, the safety switch **367** is opened by the clutch solenoid to render the chase carrier solenoids inoperable during the printing operation in the event of some malfunction of the counter **330**. As the impression device actuating shafts **76** and **78** are rotated in synchronism with the pin feed shafts **126** and **142**, the impression devices **86***a* and **86***b* are actuated by the cam portions **82** and **84** to cause momentary printing contact between the type faces **226** of the slugs **224** with the continuously moving strip **38** through the carbon transfer strips. The feed of the strip is so synchronized with the operation of the impression devices **86***a* and **86***b* that the lines of print effected by each of the printing devices appear in a prescribed or predetermined location on each item being printed.

Since the cam shaft portion **82** of the impression device **86***a* is angularly advanced in relation to the cam shaft portion **84** of the impression device **86***b*, the printing of the trailing numeric line F is effected by the printing device **42***a* on a given check A, and, after a short interval of time during which the strip **38** continues to move, the printing of the advanced alphabetic lines E is effected by the printing device **42***b* when the cam portion **84** actuates the impression device **86***b*. At this moment the printing of a given check on the strip is completed, while the printing of the next succeeding check on the strip has not yet commenced since the desired location of the trailing numeric line F of such next succeeding check has not yet reached type slug **102***a* of the printing device **42***a*.

Since it is the operation of the second impression device **86***b* which determines the completion of printing of an individual check, it is desirably the actuation of this impression device which causes stepping of the counter **330** and ultimate determination of the completion of printing of a predetermined number of checks for a group, so that when the apparatus stops, a preceding check is fully printed and the next succeeding check is completely unprinted, thereby eliminating wastage of checks when changing from the indicia of one group to that of another. Accordingly each time the actuating shaft **78** of the impression device **86***b* rotates, the microswitch **340** is momentarily closed by the cam **344** to actuate the counter stepping device **336** to advance the counter one unit towards its terminal position. When this position is reached and the predetermined number of checks has been printed, the mechanism **350** is effective to again move the blade of the switch **348** to its lower position in circuit with the lead **374** whereupon the solenoid **362** is de-energized and the clutch **58** disengages the motor **50** from the drive shaft **66**, thereby stopping the printing operation of the apparatus.

While the apparatus was in printing operation, and commencing with the completion of rotation of the chase carriers, the operator changed the type slugs **102***a* and **102***b* disposed in the accessible position in each chase carrier by first opening the safety switch **375** and then opening the toggle clamps **238***a* and **238***b* of each chase carrier, and either initially inserting appropriate type slugs for the next group of checks to be printed if the printing of a first group of checks has just been commenced, or by removing the type slugs from which printing has just been completed and inserting a new set of type slugs in each chase carrier if one or more groups of checks has previously been printed. Upon completion of the initial insertion or change-over of type slugs, as the case may be, the operator closes the toggle clamps and then closes the safety switch **375**. Inadvertent or accidental energization of solenoids **276***a* and **276***b* through malfunction of the counter **330** is prevented since the safety switch **367** is open as long as the clutch solenoid **362** remains energized. When the current printing is completed, and if the operator has completed the change-over of type slugs and has closed the switch **375**, the clutch solenoid **362** closes the switch **367** to complete a circuit through the counter switch **348** and the solenoids **276***a* and **276***b* to cause the chase carriers to be freed for rotation and commence another cycle of machine operation. This is fully automatic operation. If the operator leaves the switch **375** open after completion of the type slug change-over, the apparauts is then semi-automatic, requiring a manual restart by momentarily closing switch **375** until the chase carriers have rotated to a new printing position.

Additional features and modifications

The apparatus is provided with means for varying the timed relationship of the sequential operation of the impression devices by adjusting the relative angular positions of the cam portions **82** and **84** without altering the rate of operation of the shaft **66** and hence the speed of the strip feeding mechanism, so that the spacing between the alphabetic and numeric lines of print on a check of a given size may be altered in order to vary the format of the check. This is accomplished as best seen in FIG. 2, by means of collars **390** and **392** which are releasably secured to the shafts **76** and **78**, the collars **390** and **392** being fixed to the pulleys **72** and **74** respectively, with the latter being otherwise unconnected to the shafts **76** and **78**. By loosening either the collar **390** or **392** or both, the shaft **76** or **78** or both may be independently rotated as by the handle wheels **394** and **396** fixed on the shafts **76** and **78** respectively. Thus any desired angular relationship of the cam portions **82** and **84** may be set, after which the collars **390** or **392** are again secured to their respective shafts to re-establish a driving connection to the pulleys **72** or **74** or both as the case may be. It is apparent that any alteration in the angular relationship of the cam portions **82** and **84** will alter the timed relationship of the actuation of the impression devices **86***a* and **86***b* and thereby the spacing between the alphabetic and numeric lines of print, assuming of course that the strip **38** continues to advance at a constant rate of speed.

Provision is also made for changing the spacing between the alphabetic and numeric lines of print in proportion to a corresponding change in the size of the individual checks measured along the longitudinal axis of the strip of checks. This is accomplished by changing the linear speed of the strip as it advances through the printing apparatus without changing the rate of rotation of the shaft **66** or actuating cam portions **82** and **84** of the impression devices **86***a* and **86***b*. As best seen in FIG. 2, the main drive shaft **66** is provided with a removably end fitting **398** such as a small flywheel or the like which holds the drive pulleys **114** and **116** on the shaft **66**. These pulleys are removably mounted on the shaft **66** and are drivingly connected to the shaft by any suitable means such as a slot and key arrangement. By removing the fitting **398**, pulleys **114** and **116** of a given diameter may be removed and other pulleys of a different diameter substituted therefor, with appropriate adjustment of the adjustable idler pulleys **120** and **139** being made to keep the belts **118** and **138** taut. It is therefore apparent that if drive pulleys **114** and **116** are removed and other pulleys of twice the diameter are substituted therefor, the paper strip **38** will be driven by the pin tractors at twice the linear rate of speed without effecting the rate of actuation of the impression devices **86***a* and **86***b*. If the pulleys **114** and **116**, therefore, are effective to properly space the alphabetic and numeric lines of print on a conventional three inch high check, the foregoing substitution of drive pulleys would produce a check having the same lines of print positioned in the same relative locations on a document six inches in height. It should be understood that other mechanical speed change arrangements may be used in lieu of the removable pulleys illustrated and described.

In some situations it may be desirable to print checks or other commercial documents with personalized indicia requiring only one line of print, such as a customer's name with no identification numbers, or the latter with no alphabetic identification. In this case, it is necessary to utilize only one of the printing devices **42***a* or **42***b*, and in the embodiment of the invention illustrated, the printing device **42***b* would be utilized since only the impression device **86***b* has been provided with the timer actuating switch **340** as illustrated in FIG. 9 to step the time in accordance with the number of items printed. The impression device **86***a* can be rendered inoperative by loosening the collar **390** so that the pulley **72** is inoperative to drive the shaft **76** of the impression device **86***a*. The carbon strip **47***b* will be either of conventional ink or magnetic ink as necessary. The operation of the apparatus in this manner is identical with that described above with the exception that the printing device **42***a* is inoperative, at least during the printing part of the cycle.

It is apparent from the foregoing description and the accompanying drawings that there has been provided a multiple item printing apparatus which achieves the foregoing objects, and attains a degree of versatility not heretofore possible by incorporating through novel structure and arrangement of parts the advantages and desirable features of previously known printing apparatus. The present apparatus is adaptable to print individual indicia on checks and like commercial documents with either one or more lines of alphabetic indicia alone in conventional ink, or one or more lines (generally only one is required) of numeric indicia alone in "magnetic ink recognition character" ink, or both. The length of a line of indicia, that is the number of individual characters in the line, is limited only by the basic size of the chases in the chase carrier, and these may be made longer than illustrated in the drawings should the need for longer lines of print arise. Also, the chases may be enlarged to accommodate four or five slugs at the same time, with appropriate modification of the impression devices, so that more than one name with an address may be printed on separate lines if desired.

It should be understood that the chase carriers may be mounted on their supporting shafts in any desired position laterally of the printing strip in order to dispose the chases out of alignment with each other rather than in alignment as illustrated in FIG. 2. This would facilitate offsetting the lines of indicia printed by one of the printing devices from those of the other printing device more than the amount permitted by merely shifting the location of type slugs within the limits of the chases as is contemplated by the embodiment of the apparatus disclosed.

FIG. 11 illustrates an alternative embodiment of a chase carrier having a mechanical locking feature which prevents rotation of the chase carrier if the toggle clamp for locking the type slugs in the chase is not fully closed. Specifically, a support **400** suitably secured to the block

214 pivotally carries a rocking lever 402 which is pivotally connected at one end 404 to a bar 406 slidably received in a bore 408 and urged outwardly thereof by a compression spring 410. The lever 402 is pivotally connected at its other end 412 to a pin 414 which is slidably carried in another bore 416 and which mates with a bore 418 formed in the shaft 216 when the chase carrier is in its fixed printing position. The outer end of the bar 406 is positioned to be engaged by the bottom of the toggle operating lever 248 to depress the bar 406 and withdraw the pin 414 from the bore 416 when the toggle clamp is fully closed. Unless and until the operator fully closes the toggle clamp, the pin 414, being in the bore 416, prevents rotation of the chase carrier on the shaft 216 even if the solenoids 276*a* and 276*b* are energized. Thus there is no possibility that a chase carrier can rotate to bring improperly locked type slugs to the printing position, an occurrence which could result in serious damage to the apparatus.

It is to be understood that the invention is not limited to the form of apparatus herein described and illustrated, which is deemed to be primarily illustrative of the principles of the invention and which is susceptible to modification of form, size, detail and arrangement of parts, but rather is intended to cover all such modifications and equivalents as may be deemed to be within the scope of the appended claims.

What I claim is:

1. Apparatus for printing a plurality of groups of items, each having indicia common to all the groups, with individual indicia of a different kind for each group and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising means for feeding a strip past a printing station, a chase carrier disposed at said printing station, a plurality of stationary peripherally disposed chases on said chase carrier for removably holding interchangeable printing elements, means for rotatably supporting and holding said chase carrier to transfer said chases alternately between a printing position in which said printing elements are immovably held for printing and a non-printing position in which a chase is accessible to an operator for manual removal of the printing elements therefrom, reciprocable impression means at said printing station for causing momentary printing contact between said strip and said stationary printing elements disposed at said printing position to cause successive printing on a predetermined number of items of one group with indicia individual to said one group, and means for synchronizing the speed of operation of said impression means with said feeding means to cause the printing of said indicia individual to said one group to be in predetermined relation with said common indicia as said items are successively fed past said printing station by said feeding means

2. Apparatus as set forth in claim 1 wherein there are means for rotating said chase carrier to dispose different printing elements at said printing station, said means including means for interrupting the operation of said impression means and said feeding means while said chase is being rotated.

3. Apparatus as set forth in claim 1 wherein said means for synchronizing the speed of operation of said impression means includes means for adjusting the speed of operation of said impression means independently of the speed of operation of said feeding means so as to print said individual indicia in predetermined relation with the common indicia on items of different physical size in the direction of feeding of the strip.

4. Apparatus for printing a plurality of groups of items, each having indicia common to all the groups, with individual indicia of a different kind for each group and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising

(A) means for feeding a strip past a printing station,

(B) a printing device disposed at said printing station and having means for holding a plurality of spaced apart printing elements,

(C) means movably supporting said printing device in position to alternately dispose a printing element in a printing position and another printing element in a non-printing position where it is accessible to an operator,

(D) means for causing successive printing contact between said strip and the printing element disposed at said printing position to thereby perform successive printing operations on said strip in synchronism with the arrival at said printing station of successive items on said strip, and

(E) control means operable upon completion of a predetermined number of said successive printing operations for sequentially interrupting operation of said feeding means and said printing contact means, moving said printing device to dispose a different printing element in said printing position, and resuming operation of said feeding means and said printing contact means upon completion of movement of said printing device to cause printing of another predetermined number of items on said strip.

5. Apparatus as set forth in claim 4 wherein said control means comprises settable means for predetermining a variable number of said successive printing operations, and means responsive to movement of said printing device for resetting said settable means to cause the same number of successive printing operations to take place as different printing elements are successively moved to said printing position.

6. Apparatus as set forth in claim 4 wherein said control means comprises settable means for predetermining a variable number of said successive printing operations, first means responsive to operation of said settable means when said predetermined number of said successive printing operations has taken place for interrupting operation of said feeding means and said printing contact means, second means responsive to operation of said settable means when said predetermined number of said successive printing operations has taken place for moving said printing device to move another of said printing elements to said printing station, and means responsive to said movement of said printing device for resetting said settable means whereupon said first means is rendered operable to resume operation of said feeding means and said printing contact means.

7. Apparatus as set forth in claim 6 wherein said control means includes means interconnecting said printing contact means and said settable means for causing the latter to actuate said first means in response to a predetermined number of successive printing operations of said printing contact means.

8. Apparatus for printing a plurality of groups of items, each having indicia common to all the groups, with individual indicia of a different kind for each group and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising

(A) means for feeding a strip past a printing station,

(B) a chase carrier disposed at said printing station,

(C) a plurality of peripherally disposed chases on said chase carrier for removably holding interchangeable printing elements,

(D) means for rotatably supporting and holding said chase carrier to transfer said chases alternately between a printing position and a non-printing position in which a chase is accessible to an operator for manual removal of the printing elements therefrom,

(E) impression means at said printing station for causing momentary printing contact between said strip and the printing elements disposed at said printing position to thereby perform successive printing opera-

tions on said strip in synchronism with the arrival at said printing station of successive items on said strip, and

(F) control means operable upon completion of a predetermined number of said successive printing operations for sequentially interrupting operation of said feeding means and said impression means, rotating said chase carrier to dispose different printing elements in said printing position, and resuming operation of said feeding means and said impression means upon completion of rotation of said chase carrier to cause printing of another predetermined number of items on said strip.

9. Apparatus as set forth in claim 8 wherein said control means comprises means for rotating said chase carrier, power means for causing operation of said feeding means and said impression means to cause printing consecutively, from the printing elements held by one chase in said printing position, of a predetermined number of items of one group with indicia individual to said one group in predetermined relation with said common indicia, means operable upon inactivation of said power means for actuating said chase carrier rotating means, whereby one chase is moved away from the printing position toward the accessible non-printing position, and another chase is moved to the printing position, and settable means for predetermining the number of items of said one group to be printed, said settable means having means responsive to operation of said impression means for inactivating said power means after a predetermined number of items of one group has been printed from the printing elements held by said one chase and for thereafter causing operation of said means for actuating said chase carrier rotating means.

10. Apparatus as set forth in claim 9 wherein said settable means further includes means responsive to rotation of said chase carrier for resetting said settable means and for reactivating said power means to cause printing, from the printing elements held by said other chase, of a predetermined number of items of another group with indicia individual to another group.

11. Apparatus as set forth in claim 9 in which the settable means is manually adjustable to determine the number of items to be printed.

12. Apparatus as set forth in claim 9 wherein said means for actuating said chase carrier rotating means includes releasable locking means for preventing rotation of said chase carrier while said power means is activated, means responsive to activation of said power means for preventing release of said locking means while said power means is activated, and means for releasing said locking means only when said power means is inactivated by said settable means whereby said chase carrier is freed for rotation by said rotating means only when said predetermined number of items has been printed.

13. Apparatus as set forth in claim 9 wherein said chase carrier rotating means comprises a continuously energized source of rotative force applied to said chase carrier, and said means for actuating said chase carrier rotating means comprises an element secured to said chase carrier for rotation therewith and having stop means for each chase, a movable locking member connected to said supporting means and normally urged into engagement with one of said stop means to lock said chase carrier to said supporting means, means for momentarily moving said locking member out of engagement with said one stop means to permit said chase carrier to rotate in response to said rotative force to change the positions of said chases, said last named means being effective to permit said locking member to be urged into engagement with said element as the latter rotates with said chase carrier whereby said locking member moves into engagement with another of said stop means after said chase carrier has rotated to move another of said chases to said printing position, and means responsive to activation of said power means for preventing operation of said locking member moving means while said power means is activated whereby said chase carrier is freed for rotation by said force only when said predetermined number of items has been printed.

14. Apparatus as set forth in claim 9 further including selectively manually operable means for disabling said settable means from causing operation of said means for actuating said chase carrier whereby, when said power means is inactivated by said settable means upon completion of printing of said predetermined number of items, said chase carrier may be prevented from rotating in the event that the removal and replacement of printing elements has not been completed when said power means is inactivated by said settable means.

15. Apparatus as set forth in claim 9 further including means interconnected between said chase carrier and said power means for delaying the activation of said power means until said chase carrier has completed a chase transfer movement.

16. Apparatus for printing a plurality of groups of items, each having indicia common to all the groups, with individual indicia of a different kind for each group and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising

(A) means for feeding a strip past a printing station,

(B) a printing device disposed at said printing station and having means for holding a plurality of spaced apart printing elements,

(C) a shaft rotatably uspporting and holding said printing device,

(D) means for rotating said printing device to alternately dispose a printing element in a printing position and another printing element in a non-printing position where it is accessible to an operator,

(E) means for causing successive printing contact between said strip and the printing element disposed at said printing position to thereby perform successive printing operations on said strip in synchronism with the arrival at said printing station of successve items on said strip,

(F) means for releasably locking said printing device to said shaft with one of said printing elements in said printing position, and

(G) means rotatably supporting said shaft, said means including adjustable locking means connected to said shaft for locking the shaft in different angular positions while said printing device is locked to said shaft whereby said printing device may be angularly adjusted to dispose the type face of a printing element held in said printing position in precise parallel planar juxtaposed relationship with said strip.

17. Apparatus for printing a plurality of groups of items, each having indicia common to all the groups, with individual indicia of a different kind for each group and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising

(A) means for feeding a strip past a printing station,

(B) a chase carrier disposed at said printing station,

(C) a plurality of peripherally disposed chases on said chase carrier for holding printing elements,

(D) a shaft rotatably supporting and holding said chase carrier,

(E) means for rotating said chase carrier to alternately dispose a printing element in a printing position and another printing element in a non-printing position where it is accessible to an operator,

(F) means for causing successive printing contact between said strip and the printing element disposed at said printing position to thereby perform successive printing operations on said strip in synchronism with the arrival at said printing station of successive items on said strip, and

(G) means for releasably locking said chase carrier to said shaft with one of said printing elements in said printing position, said locking means comprising an element secured to said chase carrier for rotation therewith and having stop means for each chase, a movable locking member fixedly mounted on said shaft and normally urged into engagement with one of said stop means to lock said chase carrier to said shaft, and means for moving said locking member out of engagement with said one stop means to free said chase carrier for rotation on said shaft to change the position of said chases, said last named means being effective to permit said locking member to be urged into engagement with said element as the latter rotates with said chase carrier whereby said locking member moves into engagement with another of said stop means after said chase carrier has rotated to move another of said chases to said printing position.

18. Apparatus as set forth in claim 17 further including means for rotating said chase carrier, said means comprising a continuously energized source of rotative force applied to said chase carrier whereby the latter rotates when freed therefor upon movement of said locking member out of engagement with one of said stop means.

19. Apparatus for printing a plurality of groups of items each having indicia common to all the groups with individual indicia of a different kind for each group in two spaced apart locations on each item and predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising means for continuously feeding said strip past two spaced apart printing stations, two spaced apart chase carriers, a plurality of peripherally disposed chases on each chase carrier for removably holding interchangeable printing elements, means rotatably supporting said chase carriers to transfer the chases of each chase carrier alternately between said printing positions and non-printing positions in which a chase of each chase carrier is accessible to an operator for manual removal of the printing elements therefrom, means for rotating said chase carriers, individual impression means for each chase carrier for causing momentary printing contact between said strip and said printing elements held in said printing positions, means for locking said printing elements in the chases of each chase carrier, said means including means for releasing said printing elements when said chases of each chase carrier are in said accessible position to permit the printing elements to be removed from the accessible chases of each chase carrier and other printing elements to be replaced therein while printing from printing elements held in another chase of each chase carrier which is in said printing position is being performed, power means for causing operation of said feeding means and both said impression means to cause printing consecutively, from the printing elements held by one chase of each chase carrier in said printing positions, of a predetermined number of items of one group with indicia individual to said one group in predetermined relation with said common indicia and in predetermined spaced apart locations on each item, means operable upon inactivation of said power means for actuating said chase carrier rotating means, whereby said one chase of each chase carrier is moved away from the printing position toward the accessible position, and another chase is moved to the printing position, and settable means for predetermining the number of items of said one group to be printed, said settable means having means responsive to operation of said impression means for inactivating said power means after said predetermined number of items of said one group has been printed from the printing elements held by said one chase of each chase carrier, and having means responsive to rotation of one of said chase carriers for resetting said settable means and for reactivating said power means to cause printing, from the printing elements held by said other chase of each chase carrier, of a predetermined number of items of another group with indicia individual to said another group.

20. Apparatus as set forth in claim 19 further including means for varying the speed of operation of said strip feeding means independently of said power means whereby the predetermined spaced relationship of the individual indicia printed by the printing elements of each chase carrier on each item may be varied in proportion to a change in the physical size of the items of said strip.

21. Apparatus as set forth in claim 19 further including means interconnected between both said chase carriers and said power means for delaying the activation of said power means until each of said chase carriers has completed a chase transfer movement whereby the feeding of said strip and operation of said impression means are prevented until said chase carriers are properly positioned and locked with one of the chases of each chase carrier in the respective printing positions.

22. Apparatus as set forth in claim 19 wherein said power means includes individual means for actuating each of said impression means sequentially in timed relationship as said strip is continuously advanced past said printing positions at a constant rate of speed, whereby the individual indicia printed by the printing elements of each chase carrier is printed seriatim on each of the items, and the locations thereof on each item are thereby closer together than the spacing beween the chase carriers.

23. Apparatus as set forth in claim 22 wherein the means of said settable means for inactivating the power means is responsive to operation of the latter of the sequentially operated impression devices, whereby when said power means is inactivated upon completion of printing of said predetermined number of items, a preceding item on said strip is printed with the individual indicia of the printing elements of each chase carrier and the next succeeding item on said strip is unprinted.

24. Apparatus as set forth in claim 22 further including means for varying the timed relationship of the sequential operation of said actuating mans for each impression device independently of said power means whereby the predetermined spaced relationship of the individual indicia printed by the printing elements of each chase carrier on each item may be varied to vary the format of said items.

25. A printing device for use with a printing apparatus for printing a plurality of groups of items with individual indicia of a different kind for each group, said device comprising a body member, means for rotatably mounting said body member on a portion of the printing apparatus, said body member having a plurality of peripherally disposed outwardly facing recesses formed therein for receiving printing elements, a plurality of clamping bars movably received in each recess for releasably clamping printing elements therein, stop means fixedly secured to said body member adjacent each recess for movably supporting said clamping bars and for limiting the movement thereof toward a releasing position, and individually releasable locking means mounted on said body member adjacent each recess and cooperable with the adjacent clamping means for moving said clamping means to a clamping position and for releasably locking said clamping means in said clamping position to permit printing elements held in one of said recesses to be removed and others substituted therefor independently of, and without any effect upon, printing elements held in another of said recesses, said locking means comprising a plurality of snap acting toggle clamps, one for each clamping bar, each toggle clamp having a locking lever, the locking lever of each toggle clamp being operable on an individual clamping bar, and all of the toggle clamps for each recess being connected together by a common operating handle whereby all of the clamping bars for each recess are movable simultaneously by a single manipulation of said handle.

26. Apparatus for printing a plurality of groups of items each having indicia common to all the groups with individual indicia of a different kind for each group in two spaced apart locations on each item and in predetermined quantities for each group, said items being joined to form a continuous strip, said apparatus comprising

(A) means for continuously feeding a strip past two spaced apart printing stations,

(B) a printing device disposed at each of said printing stations, each printing device having means for holding a plurality of spaced apart printing elements,

(C) individual means movably supporting each printing device in position to alternately dispose a printing element held by each printing device in a printing position and another printing element in a non-printing position where it is accessible to an operator,

(D) means for causing successive printing contact between said strip and the printing elements disposed at the printing position of each of said printing stations to thereby perform successive plural printing operations on said strip in synchronism with the arrival at said printing stations of successive items on said strip, and

(E) control means operable upon completion of a predetermined number of said successive plural printing operations for sequentially interrupting operation of said feeding means and said printing contact means, simultaneously moving said printing devices to dispose different printing elements in each of said printing positions, and resuming operation of said feeding means and said printing contact means upon completion of movement of both said printing devices to cause printing of another predetermined number of items on said strip.

27. Apparatus as set forth in claim 26 wherein said printing contact means includes individual impression means for each printing device for causing momentary printing contact between said strip and the printing elements held in said printing positions, and means for actuating sach of said impression means sequentially in timed relationship as said strip is advanced past said printing position at a constant rate of speed, whereby the individual indicia printed by the printing elements of each printing device is printed seriatim on each of the items, and the locations thereof on each item are closer together than the spacing between the printing elements in said printing positions.

28. Apparaus as set forth in claim 27 wherein said control means includes means responsive to a predetermined number of actuations of the latter of said impression means in the direction of feed of said strip whereby when said control means is rendered operable to interrupt operation of said feeding means and said impression means, a preceding item on said strip is printed with indicia of the printing elements at both printing positions and the next succeeding item on said strip is unprinted.

29. Apparatus as set forth in claim 27 wherein said feeding means includes means for varying the speed of operation of said feeding means independently of the timed relationship of the actuation of said individual impression means by said actuating means whereby the spaced apart locations of the indicia printed by the printing elements held in said printing positions may be varied in proportion to a change in the physical size of the items on said strip.

30. Apparatus as set forth in claim 27 wherein said means for actuating each of said impression means sequentially in timed relationship includes means for varying the timed relationship of said sequential actuation independently of the speed of operation of said feeding means whereby the spaced apart location of the indicia printed by the printing elements held in said printing positions may be varied to vary the format of said items.

31. A printing device for use with a printing apparatus for printing a plurality of groups of items with individual indicia of a different kind for each group, said device comprising a body member, means for rotatably mounting said body member on a portion of the printing apparatus, said body member having a plurality of peripherally disposed outwardly facing recesses formed therein for receiving printing elements, clamping means movably received in each recess for releasably clamping printing elements therein, stop means fixedly secured to said body member adjacent each recess for movably supporting said clamping means and for limiting the movement thereof toward a releasing position, individual releasable locking means mounted on said body member adjacent each recess and cooperable with the adjacent clamping means for moving said clamping means to a clamping position and for releasably locking said clamping means in said clamping position to permit printing elements held in one of said recesses to be removed and others substituted therefor independently of, and without any effect upon, printing elements held in another of said recesses, and additional releasable locking means mounted on said body member and engageable with a portion of said means for rotatably supporting the body member, said additional locking means including an element normally biased into locking engagement with said portion of said supporting means, and means disposed in the path of movement of the locking means for the printing element clamping means for engagement with the latter during the final movement of the latter for withdrawing said element from engagement with said portion of said supporting means whereby said body member is locked against rotation on said supporting means unless the locking means for the printing element clamping means is in locked position.

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