United States Patent [19]

Lehmann et al.

[11] **4,037,535**

[45] **July 26, 1977**

[54] HIGH SPEED PRINTING APPARATUS

[75] Inventors: **Jerry Hans Lehmann**, Rochester; **Richard L. Mills**, Pittsford; **William H. Mowry, Jr.**, Ionia; **James D. Peglow**, Canandaigua; **Norman H. Preston**, Rochester; **Aniel G. Sitole**, Pittsford, all of N.Y.

[73] Assignee: **Burroughs Corporation**, Detroit, Mich.

[21] Appl. No.: **640,194**

[22] Filed: **Dec. 12, 1975**

Related U.S. Application Data

[63] Continuation of Ser. No. 499,560, Aug. 22, 1974, abandoned.

[51] **Int. Cl.**[2] **B41F 1/28**; B41F 1/34

[52] **U.S. Cl.** **101/287**; 101/93; 101/233; 197/173; 271/245; 271/253

[58] **Field of Search** 101/287, 45, 57, 90, 101/93, 93.08, 93.12, 93.37, 93.41, 93.42, 232, 233, 239, 242, 273; 271/236, 238, 240, 245, 253, 254; 197/173

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,841,076	7/1958	Johnson et al.	101/233
3,242,859	3/1966	Argerinos et al.	101/407 R
3,254,595	6/1966	Sparrow et al.	101/287
3,489,084	1/1970	Strickland et al.	101/287
3,575,108	4/1971	Scranton	101/269 X
3,877,696	4/1975	Miciukiewicz	271/236 X
3,902,411	9/1975	Gardner et al.	101/273 X
3,948,170	4/1976	Ericsson	101/232 X

Primary Examiner—Edgar S. Burr
Assistant Examiner—R. E. Suter
Attorney, Agent, or Firm—Carl Fissell, Jr.

[57] **ABSTRACT**

The disclosure relates to item or document signing apparatus for imprinting a legally acceptable signature and/or date, etc., upon individual items or documents fed on demand thereto at high speed from an input to an output hopper in a stop-start operation. An adjustably positionable item stop mechanism permits the printing of the data at selectable locations along the longer dimension of the item. Both date and signature imprinting means are simply efficiently and easily demountably removable and replaceable permitting alteration and/or rapid change of the imprinted data. Novel to be automatically maintained regardless of document thickness.

5 Claims, 30 Drawing Figures

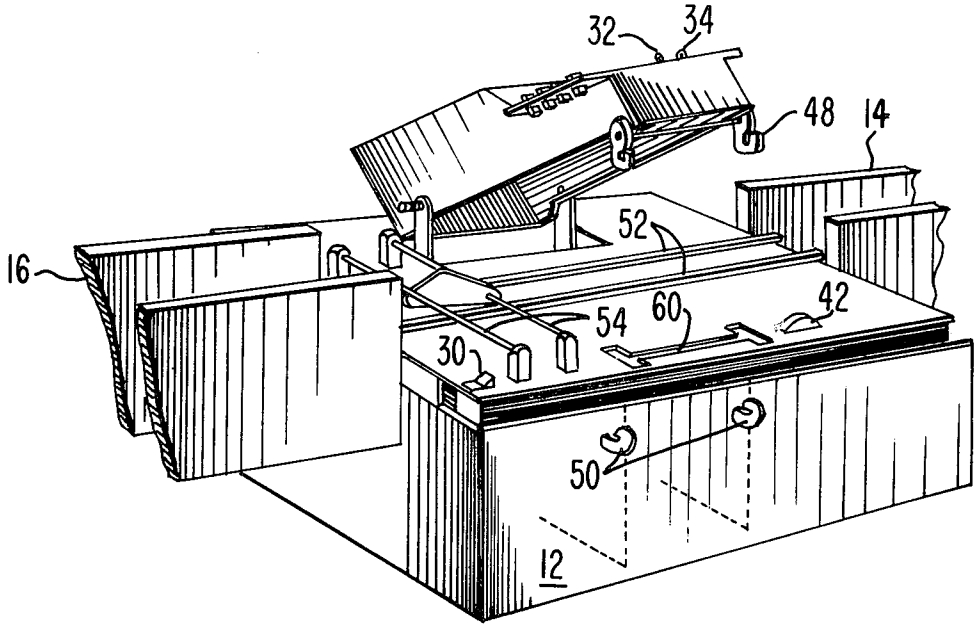


FIG. 1.

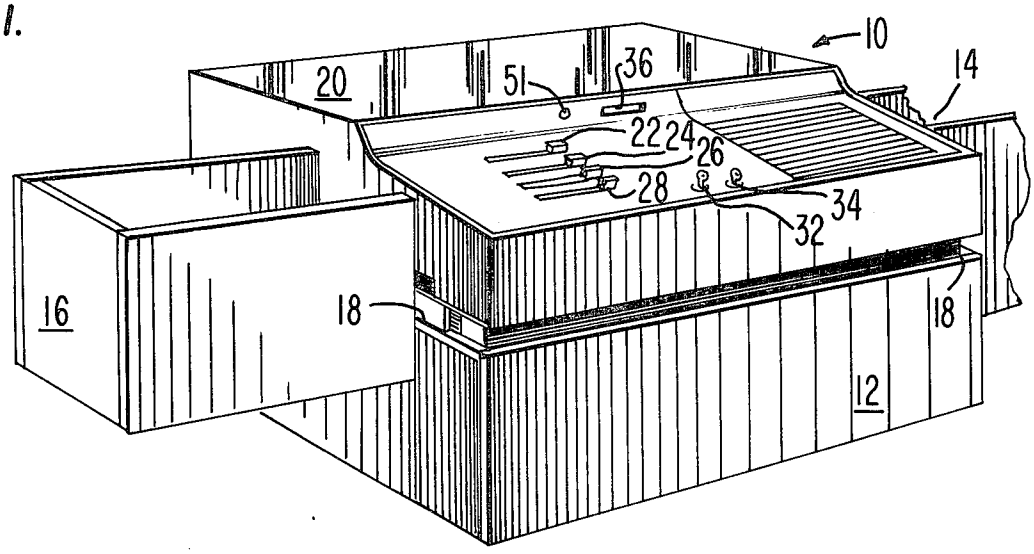


FIG. 2.

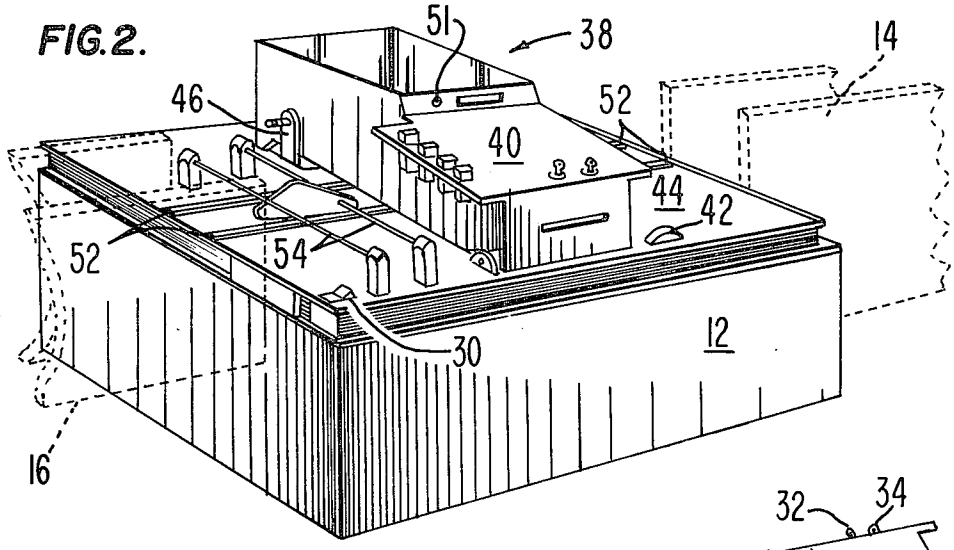
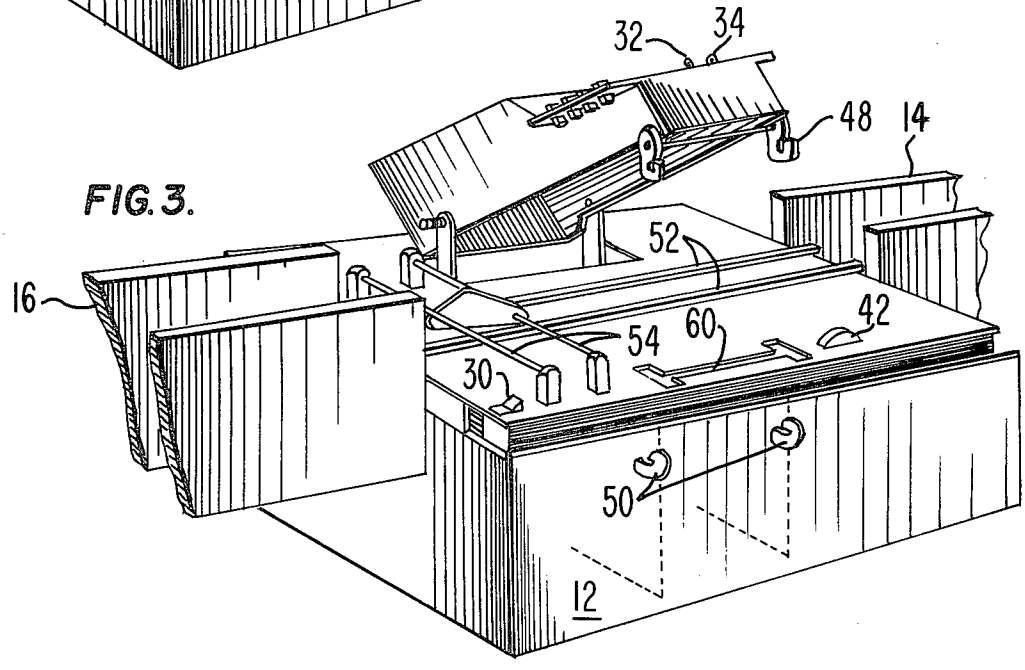


FIG. 3.



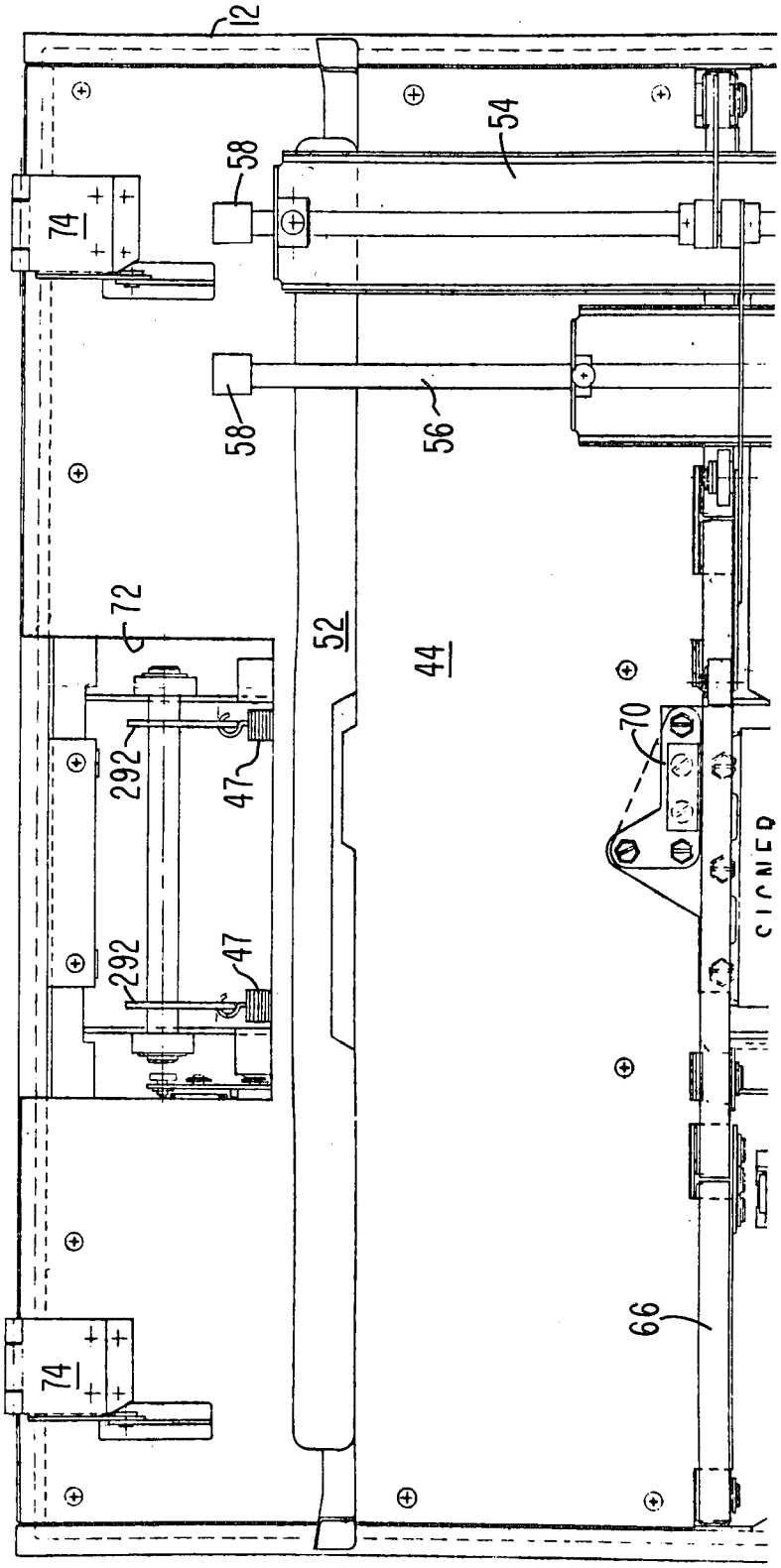


FIG. 4.

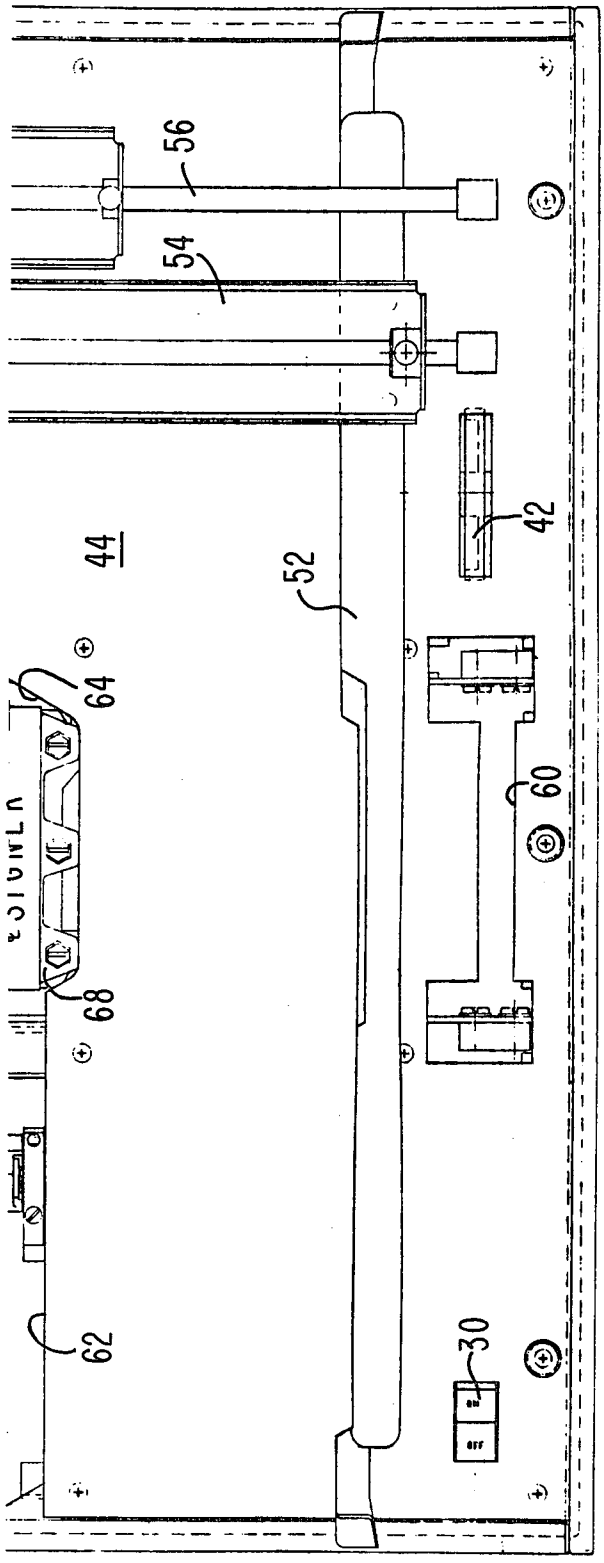


FIG. 5.

FIG. 5A.

FIG. 4.	FIG. 5.

FIG. 6.

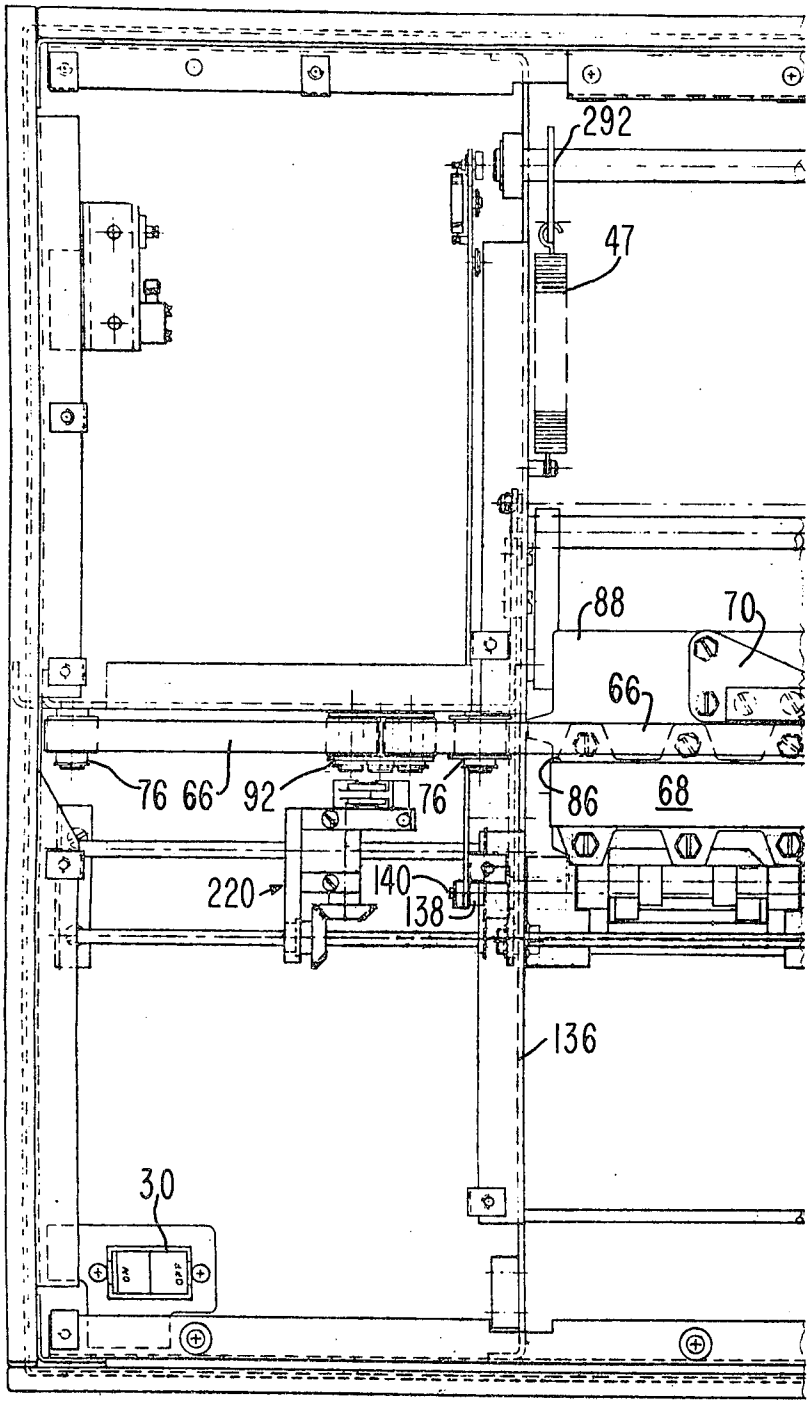


FIG.7.

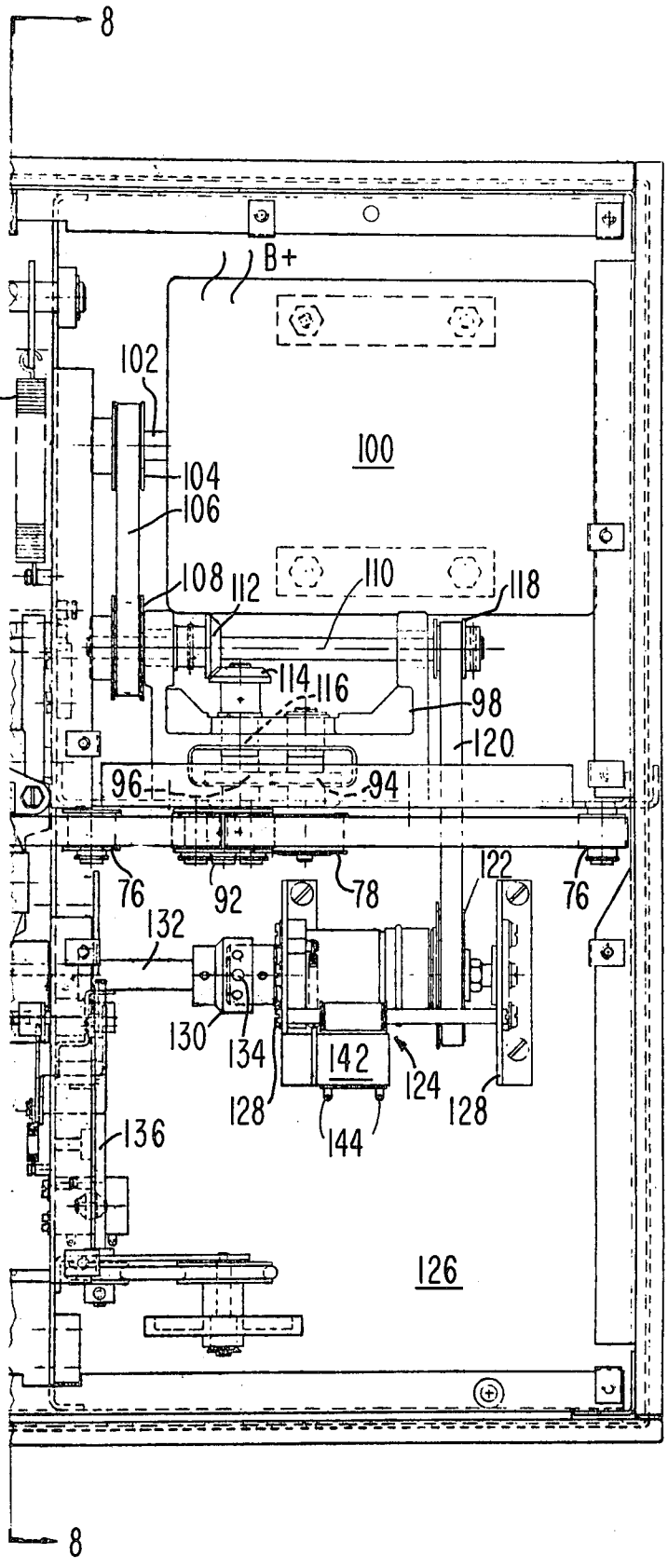


FIG.7A.

FIG.6.	FIG.7.

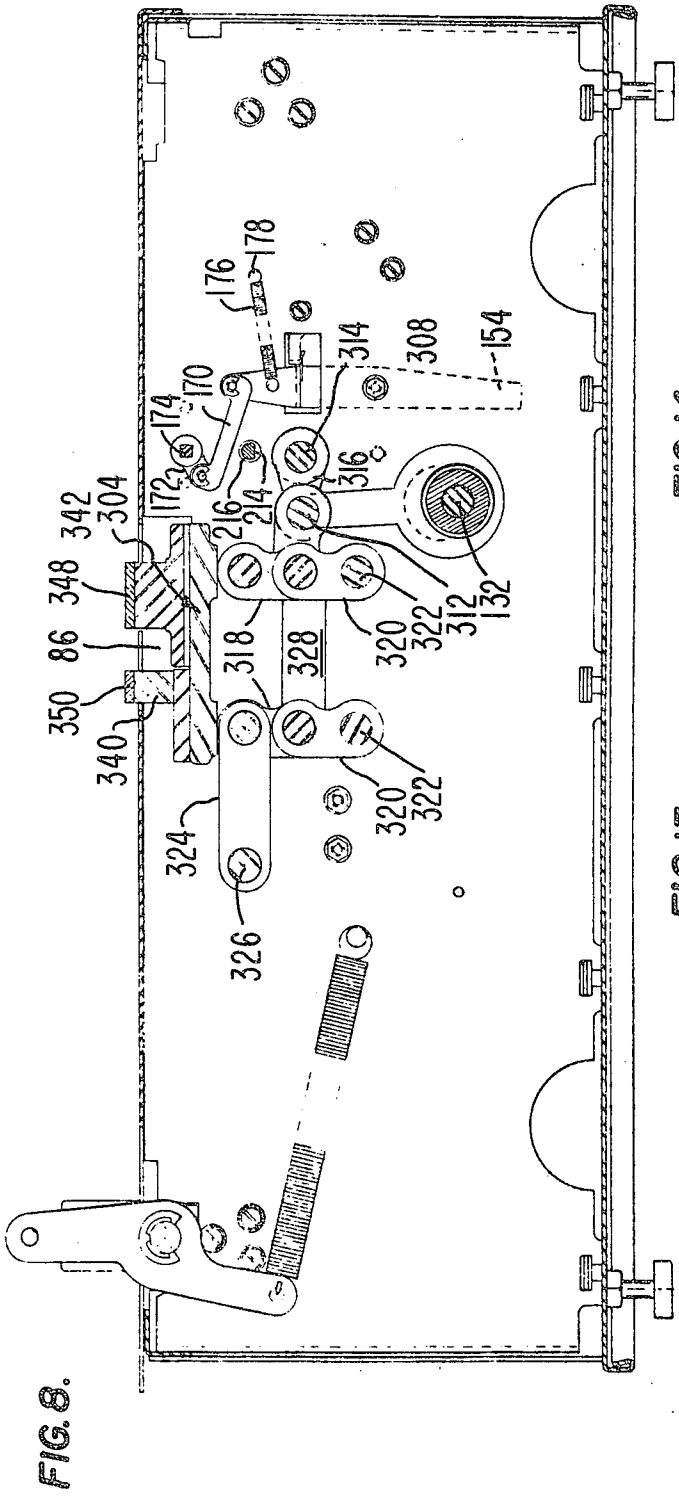


FIG. 8.

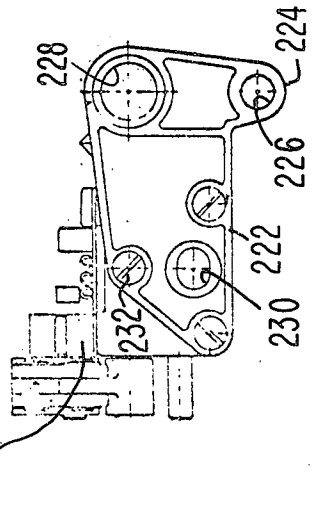


FIG. 14.

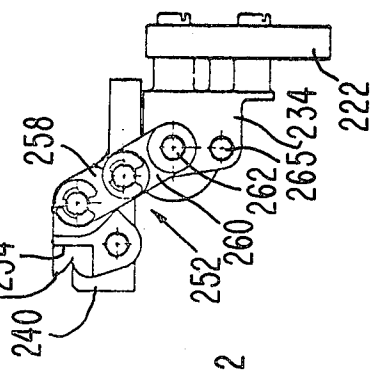


FIG. 13.

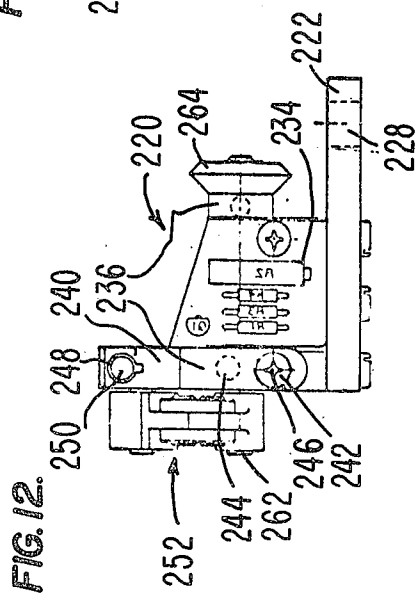


FIG. 12.

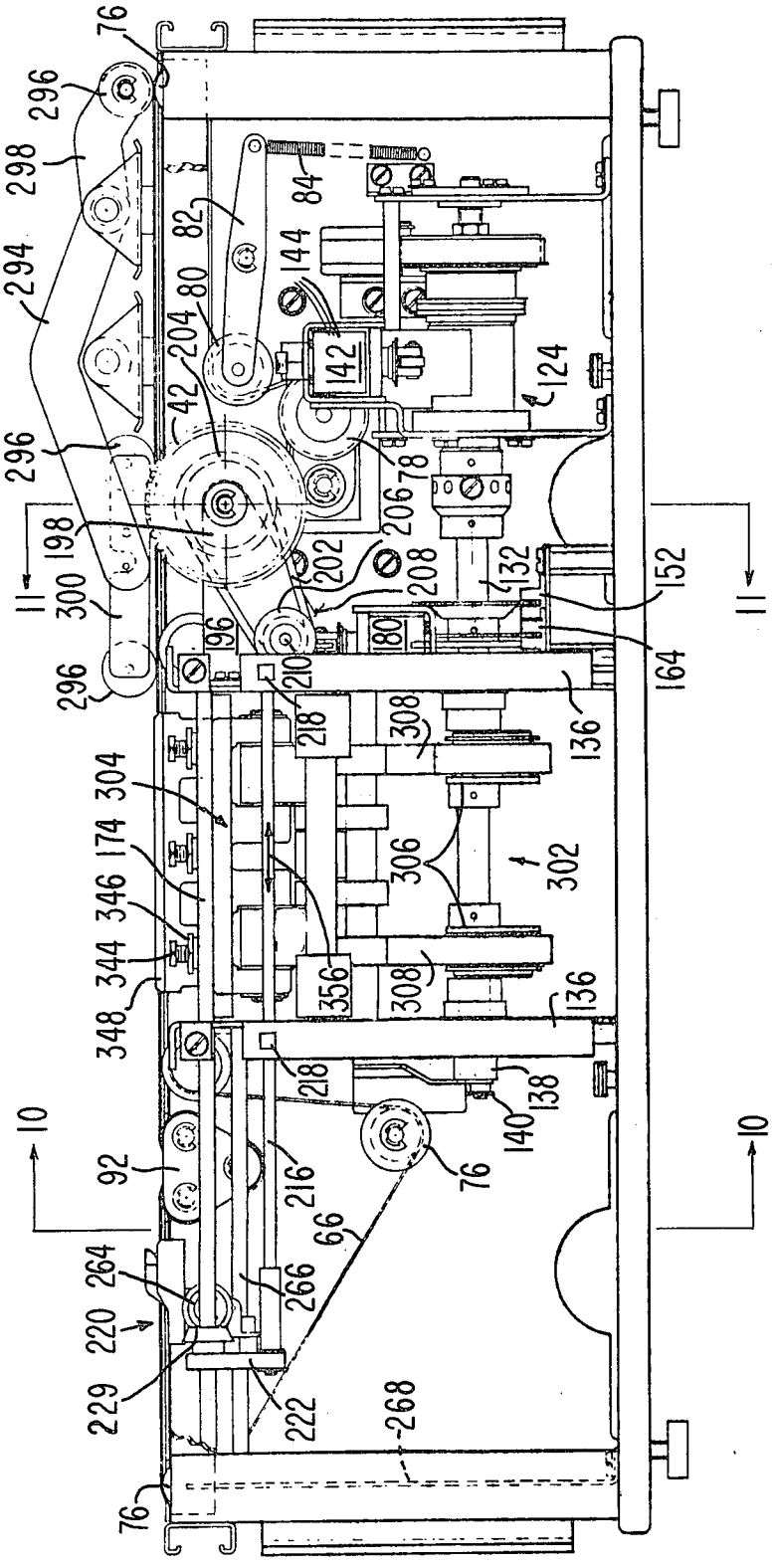

76
296
298
294
296
198
300
296
304
174
346
344
348
92
264
220
229
84
82
144
80
204
142
42
124
78
206
202
208
132
152
96
210
164
218
308
136
306
302
356
138
140
216
66
266
222
268
10
11

FIG. 9.

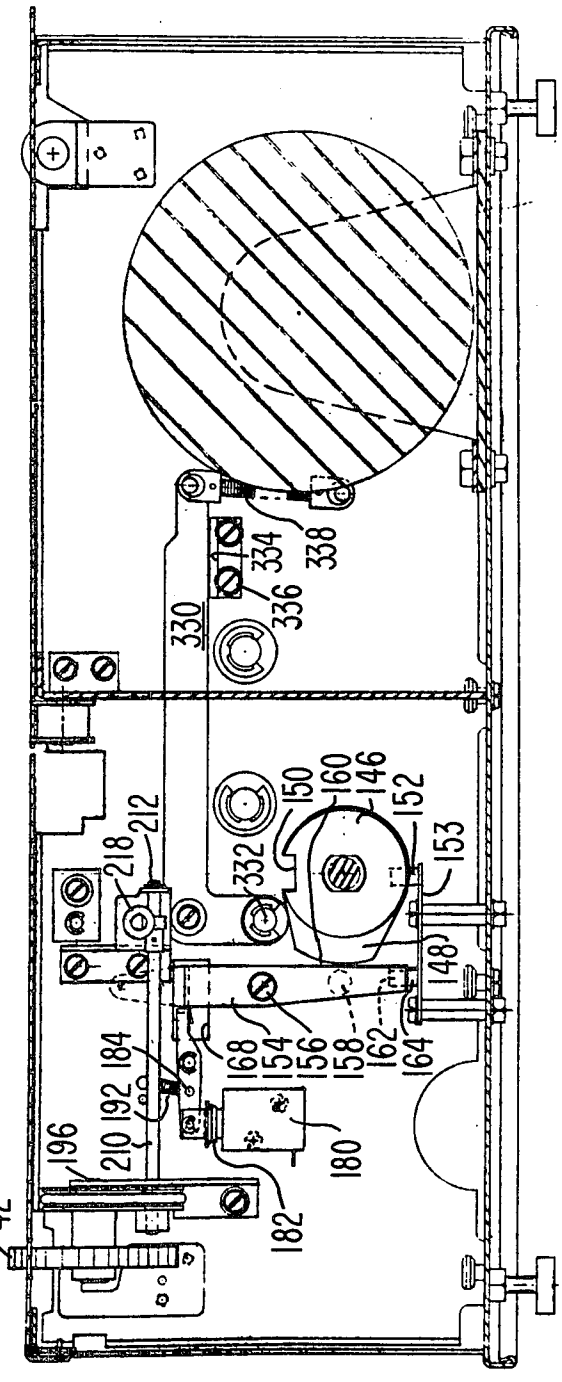

42
196
210
192
184
182
180
168
154
156
158
162
164
148
153
212
218
332
150
160
146
152
330
334
336
338

FIG. 11.

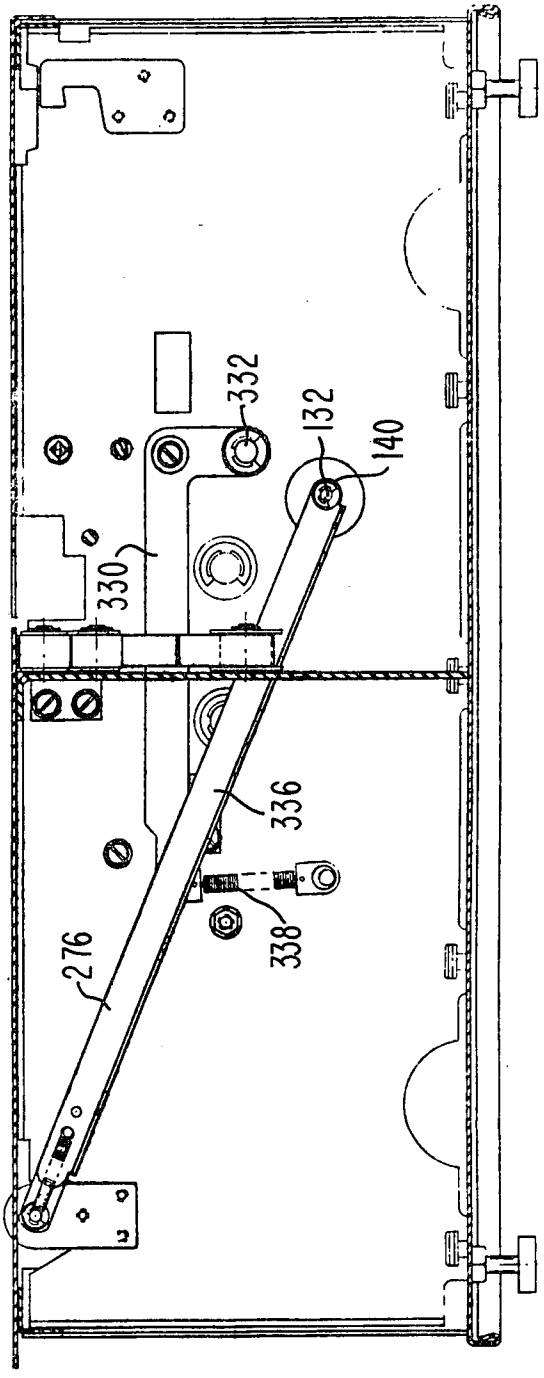

276
338
336
330
332
132
140

FIG. 10.

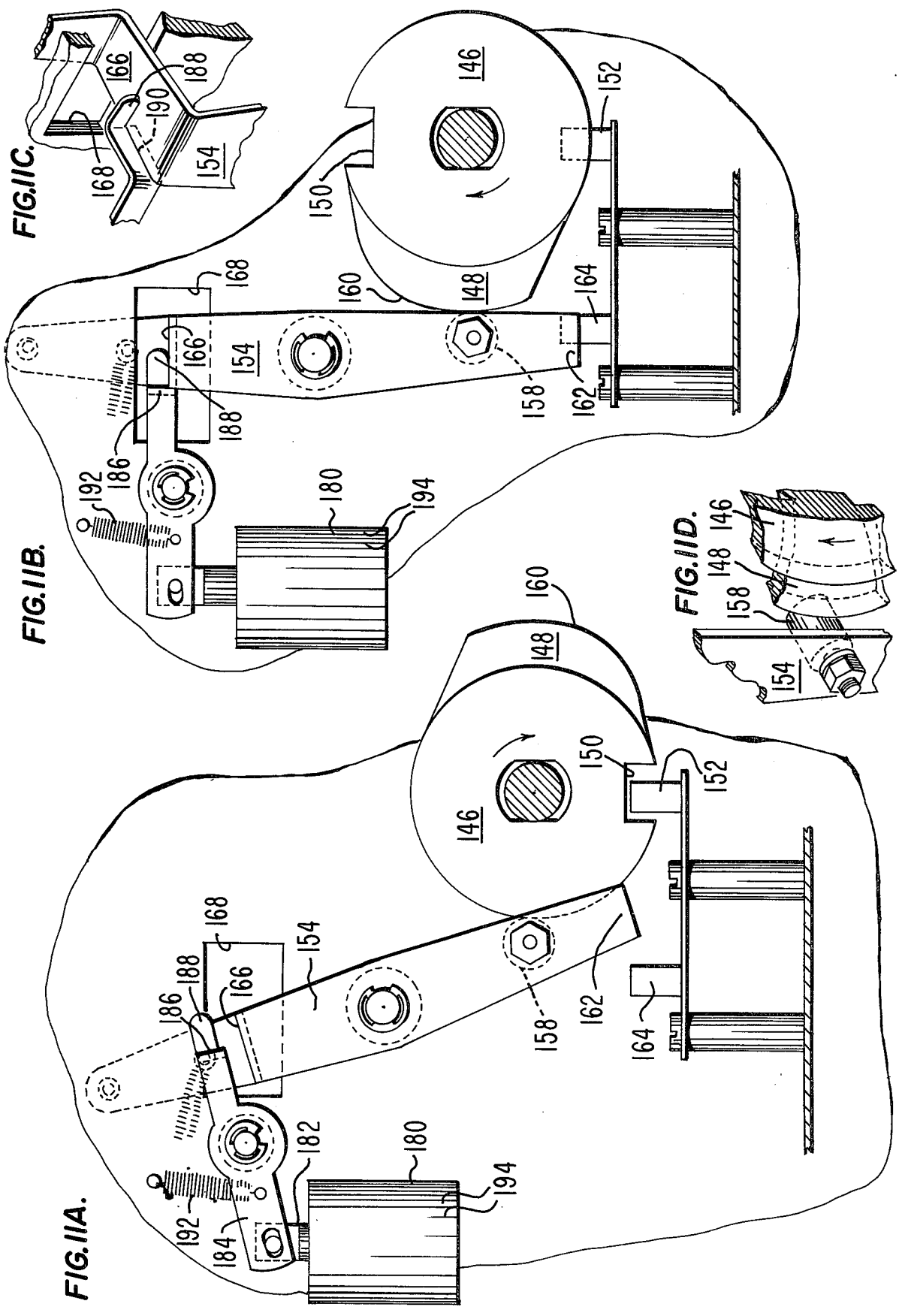


FIG.IIA.
FIG.IIB.
FIG.IIC.
FIG.IID.
146
148
150
152
154
158
160
162
164
166
168
180
182
184
186
188
190
192
194

FIG. 15.

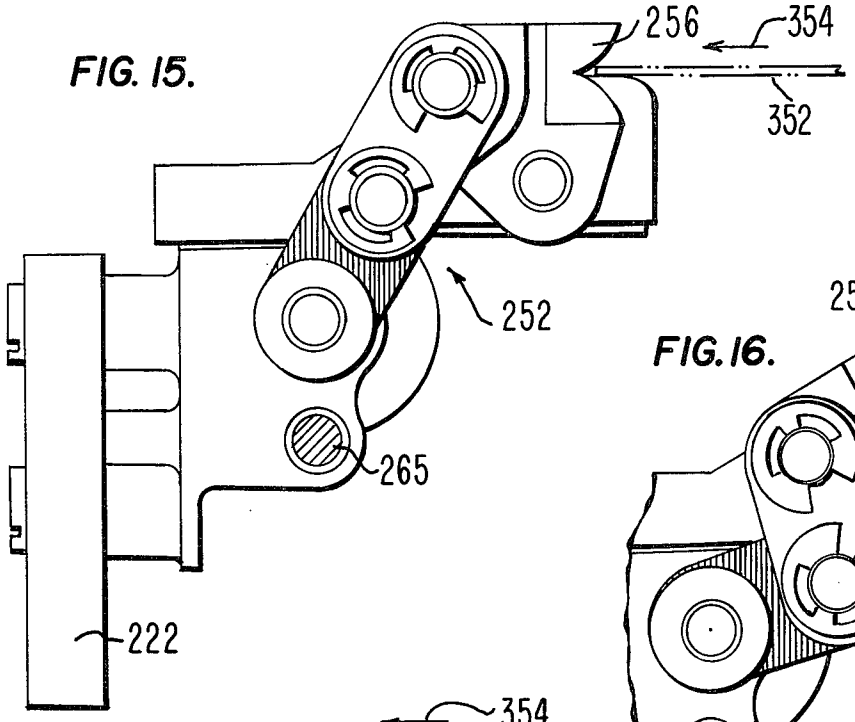


FIG. 16.

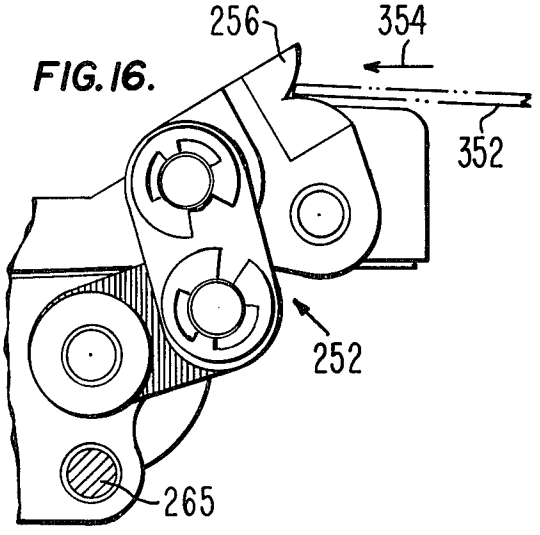


FIG. 17.

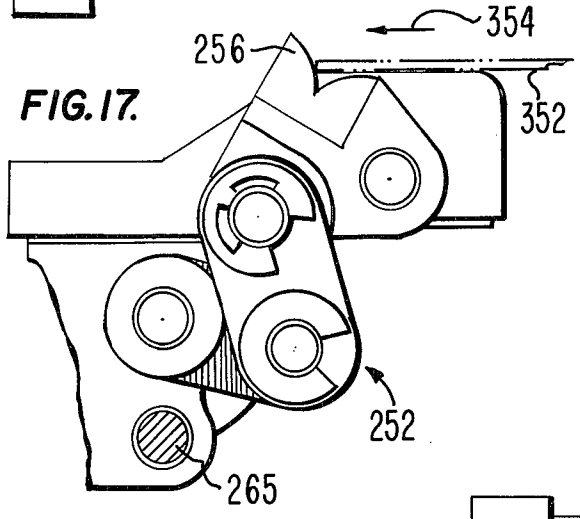


FIG. 18.

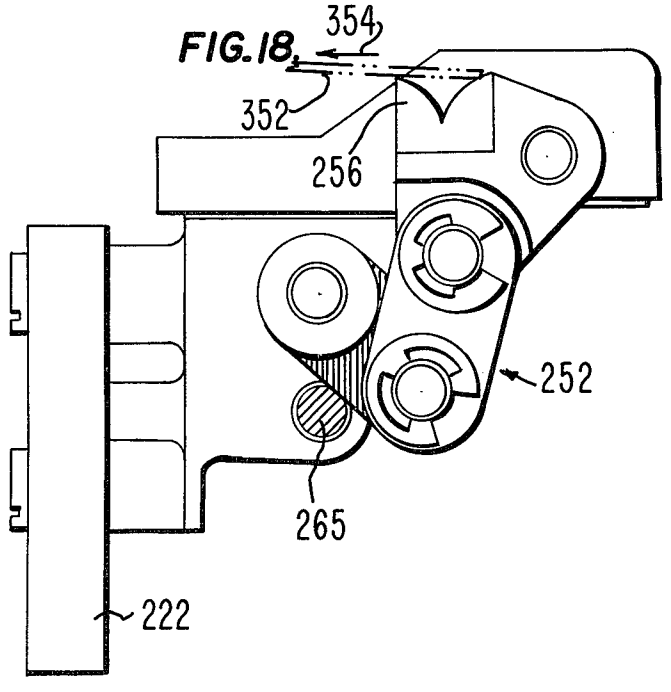


FIG. 19.

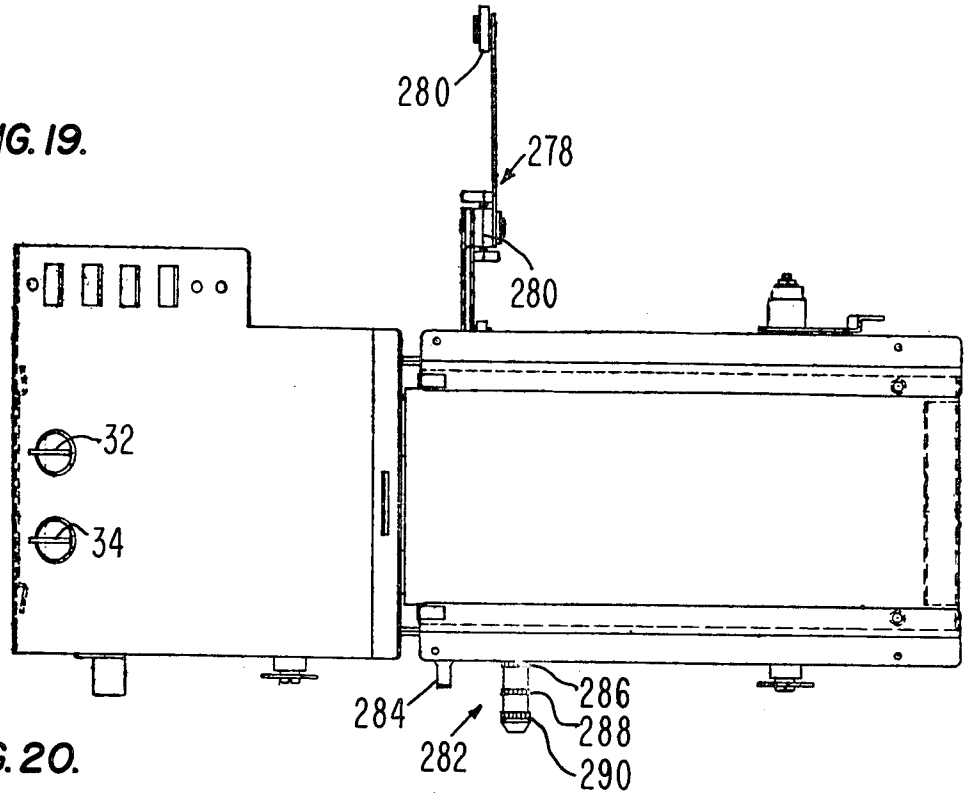


FIG. 20.

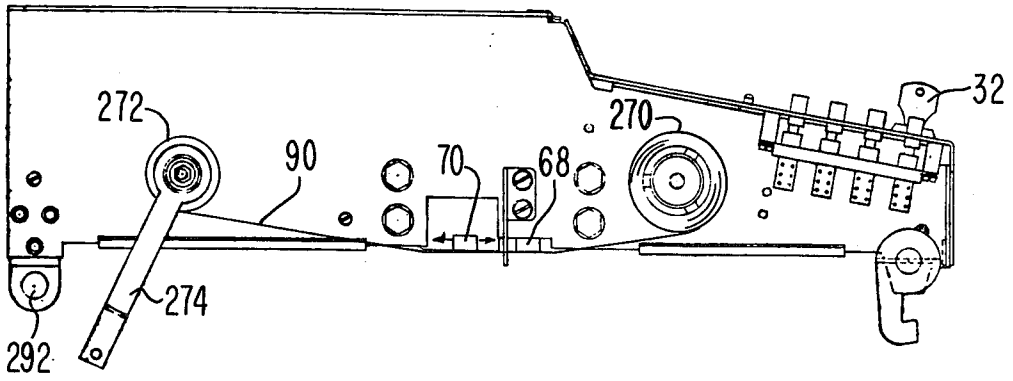


FIG. 21.

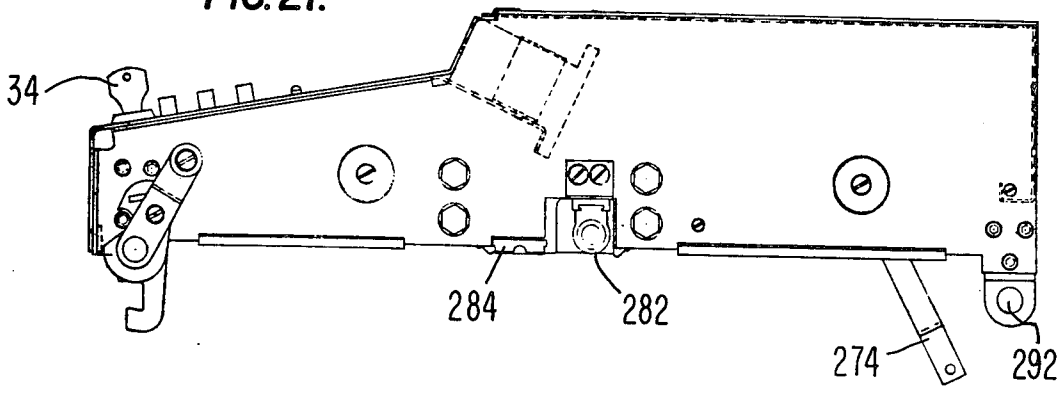


FIG. 22.

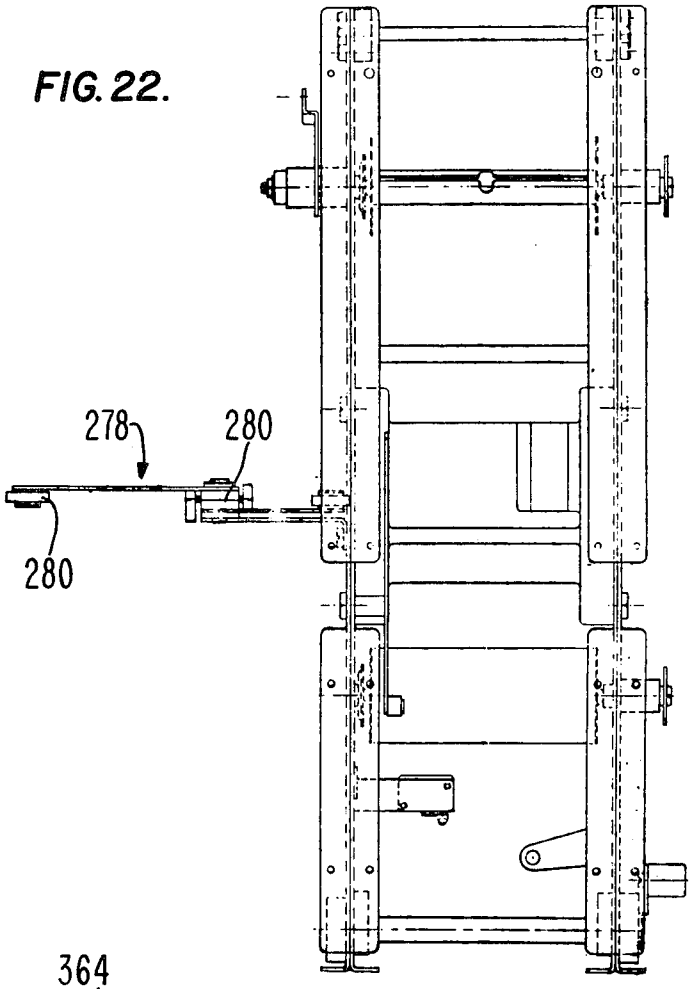


FIG. 23.

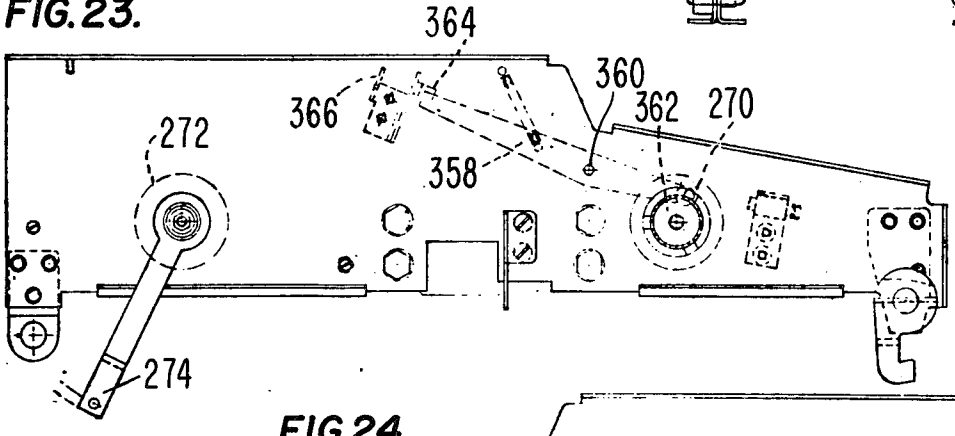
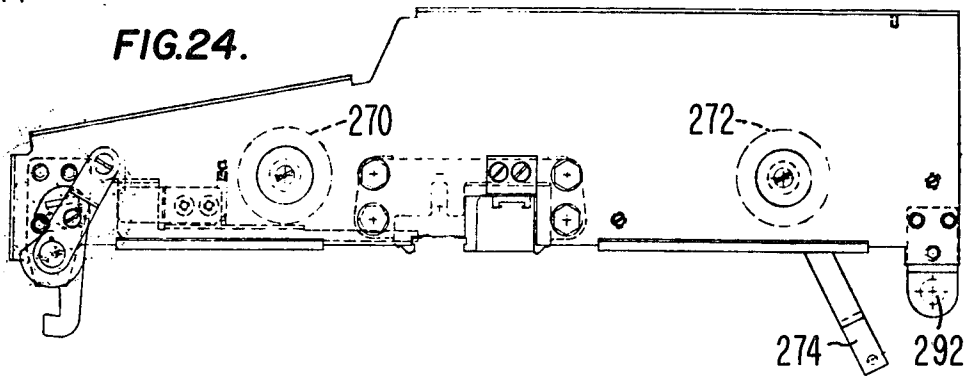


FIG. 24.



HIGH SPEED PRINTING APPARATUS

This is a continuation, of application Ser. No. 499,560, filed 8/22/74 now abandoned.

CROSS REFERENCE TO RELATED APPARATUS

The present apparatus employs a high speed, electromechanically actuatable clutch mechanism similar to the apparatus described and claimed in U.S. Pat. No. 3,802,540, Ser. No. 317,090, filed Dec. 20, 1972, issued Apr. 9, 1974, in the names of Norman H. Preston and Henry M. Korytkowski for "ADJUSTABLE STOP COLLAR FOR SPRING CLUTCH".

BACKGROUND OF THE INVENTION

Checkwriters employing multiple platens for printing both individual amounts and the signature of the payee are known. Apparatus of this type generally employ an inking ribbon for inking the printing characters and/or signature plates or platens. Machines are also known for imprinting the MICR (Magnetic Ink Character Recognition)encoding data on individual items or documents such as checks. However, all of the foregoing are limited as to efficiency and/or ease and speed of operation in one regard or another. For example, those checkwriters or signers which are operated electrically or semi-automatically are relatively slow and usually are hand fed. If the MICR encoding data is required to be changed it must be altered by hand. None of the known machines or apparatus operate at relatively high speed and many suffer due to degraded printing which results from the form of print character type used therewith.

Also, in known machines, since the printing area is fixed, variations in document length or size necessitate operator intervention and machine adjustment in order to print the desired signature at the required location on the document, if such location varies from the fixed standard. This usually requires that the printing plate be moved and also the platen which is employed therewith, or that the control stop for the document be positionally altered at the time of manufacture so as to change the location of the signature impression on the document.

Consecutive item MICR number imprinting at the present time can only be performed on a high speed printing press and even then it requires costly and time consuming alteration and adjustment of the apparatus.

The present invention solves the foregoing problems in a unique, novel, unobvious and heretofore unknown manner. The apparatus of the present invention produces high speed signature imprinting and/or dating at any desired location within a wide range of locations by means of an adjustable item stop member which can be adjustably positioned as desired. The stop member is automatically interposed in the pathway of the incoming document to positively stop the document at a precise predetermined location after which a printing impression is automatically accomplished. The document stop is thereafter retracted automatically out of the path of movement of the document permitting the document to be fed into an output or receiving hopper.

Means is provided in the present apparatus for causing the platen or back up anvil against which the signature and/or date plates engage to make a substantially flat or planar contact throughout the entire surface area

thereof effective to produce printing comparable to that attained with a typical high speed printing press.

Pressure overload relief means is provided to accommodate multiple documents or documents of varying thickness and/or weight effectively preventing equipment jamming or motor stall due to excessive loading.

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a perspective view of a preferred embodiment of the present invention;

FIG. **2** is a perspective view of the apparatus of FIG. **1** with the external cover removed illustrating the control panel cover, key locks, and ribbon mechanism;

FIG. **3** is a perspective view of the apparatus of FIG. **2** with the ribbon advance mechanism in the raised position offering access to the item transport pathway;

FIGS. **4** and **5** taken together constitute a top plan view of the present invention with the ribbon advance mechanism and the sheet metal shroud dismounted but with the top dust covers in place;

FIG. **5A** is a diagram showing the manner of assembly of FIG. **4** and FIG. **5** to provide a complete view of the apparatus;

FIGS. **6** and **7** taken together constitute a top plan view of the mechanism of FIGS. **4** and **5** with the top dust covers removed;

FIG. **7A** is a diagram showing the manner of assembly of FIG. **6** and FIG. **7** to provide a complete view of the apparatus;

FIG. **8** is a side elevational view taken along the line **8** — **8** of FIG. **7** illustrating the platens and platen moving mechanism of the apparatus;

FIG. **9** is a front elevational view of the apparatus of FIGS. **4** and **5** with the front cover removed;

FIG. **10** is a view taken along the line **10** — **10** of FIG. **9**;

FIG. **11** is a view taken along the line **11** — **11** of FIG. **9**;

FIGS. **11A** and **11B** are greatly enlarged motion views of the cam-actuated, solenoid latching mechanism for the item stop member;

FIG. **11C** is a greatly enlarged detail view of the latch device;

FIG. **11D** is a greatly enlarged detail view of the cam-and-follower mechanism of FIGS. **11A** and **11B**;

FIG. **12** is a top plan view of the item stop mechanism of the present invention;

FIG. **13** is a front elevational view of the mechanism of FIG. **12**;

FIG. **14** is a side elevational view of the stop mechanism of FIG. **12**;

FIGS. **15** through **18**, inclusive, are motion views of the item stop mechanism of FIGS. **12** through **14**, inclusive, illustrating the movement from the fully advanced to the fully retracted position;

FIG. **19** is a top plan view of the ribbon advancing mechanism of the present invention including one of the outrigger hold down mechanisms;

FIG. 20 is a left side elevational view partly broken away of the ribbon enclosing shroud of FIG. 16;

FIG. 21 is a right side elevational view of the mechanism of FIG. 16;

FIG. 22 is a bottom view of the ribbon advancing mechanism;

FIG. 23 is an interior left side elevational view of the mechanism of FIG. 20; and

FIG. 24 is a right side view of the mechanism of FIG. 20.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Apparatus embodying the present invention is generally of rectangular box-like configuration and functionally is divided into a number of unitary structures interconnected to form a modular assembly. The apparatus is capable of being operated either from the right hand or the left hand side (when viewed from the front) depending upon the desired configuration. If the document, e.g., a check, utilizes a so-called "left hand stub" then such checks would be fed from the left hand side of the machine and the input hopper assembly would be attached to the left hand side of the base machine frame. On the other hand, if the document employs a "right hand stub", then the documents are fed from the right hand side of the machine and the input hopper would necessarily be demountably secured to the right hand side frame of the base structure.

Basically the apparatus is adapted for imprinting a signature and a date on commercial or other similar documents which variously include checks, drafts, money orders and the like. However, it is to be understood that with suitable configuration the machine could be employed to sign a wide variety of different types of items as well as to imprint consecutive MICR encoding on such documents. For the purposes of the present description, however, the document or item to be employed will be considered to be a check, since the check items is the most common of the many items which can be utilized with this apparatus. Generally speaking, such items are of paper and it is to such paper documents that the operation of the machine will be directed. However, assuming that some other form of a document is employed and provided that the surface of such other document is capable of receiving the impression from a printing plate, then obviously the disclosure is not limited to paper documents per se.

FIGS. 1, 2 and 3 illustrate in perspective views the apparatus of the present invention. The High Speed Signer 10 is seen to include a base member 12 supporting at opposite sides thereof an input hopper 14 and an output hopper 16. The members 14 and 16 are demountably attached to the base 12 by means of guide rails or channels 18 extending from front to rear of the base 12 along the upper side portion thereof. A lightweight external cover member 20 of Fiberglas or other similar material is hingedly attached to the rear portion of the base 12 and overlies the base as seen in FIG. 1.

Located along the front forwardly slanting surface of cover 20 are four push button switch actuating members 22, 24, 26 and 28 which are adapted to extend through openings in the cover for access thereto by the operator. Switch functions are identified from top to bottom as follows:

1. Manual (22)
2. Single Feed (24)
3. Continuous Feed (26)
4. Stop (28)

These switches enable the operator to manually feed, single feed, continuous feed or stop the feeding of the items altogether. A main motor control "on-off" switch 30, FIG. 2, is located on the front of the base member 12 and controls the energization of the main driving motor from the electrical power mains (not shown).

The signer is adapted to utilize an engraved or other similar type of signature and dating plate. These plates necessarily must be maintained under rigid security since the signature of the person authorized to sign the item when applied to the item by the machine validates the item and makes it legal tender in the financial community. To offset and guard against inadvertent, accidental, or negligent access to the signature plate when demountably secured in the apparatus the machine is provided with two key locks 32 and 34 controlled respectively by the "operator" and the "supervisor" of the operator.

An elapsed-count item counter 36 is viewable through an aperture in the upper front portion of cover 20. This provides the operator with a means for continuously monitoring the number of items which have been signed and/or dated by the apparatus.

As seen in FIG. 2, removal of cover member 20 exposes the ribbon advance mechanism 38 to view. A rigid shroud or cover 40 encloses mechanism 38 which includes there within the demountable signature plate and the incremental date mechanism to be described later on herein. A control knob or thumb wheel 42 for the item stop adjustment, also to be described later on herein, is arranged for easy access to the operator through aperture in cover 44.

The ribbon advance mechanism 38 is attached, as by hinges 46, to the rear of the base 12 so as to be arcuately, vertically movable to the open position shown in FIG. 3. The mechanism 38 is counterbalanced and spring loaded by springs and is secured and locked to the base 12 when in the lowered operative position by means of oppositely disposed L-shaped members 48 which are adapted to be received over and to hook around oppositely disposed block members 50 located in base 12. An "on" condition and "end of ribbon" indicator light 51 is provided and is positioned on the shroud 40 to be viewable by the operator as will be described subsequently herein.

In order to accommodate items of various widths oppositely disposed slot-like guide rails 52, arranged to extend from one side to the other of the base 12, are adjustably, laterally positionable by means of the carrier members 54, FIGS. 4 and 5, to which they are attached and which slide transversely along guide rail support rods 56. The guide rails supported by the rods are positioned by means of the stand posts 58 attached to dust covers 44 and thus are demountable upon removal of the top cover 20 and dust covers 44.

As seen in FIGS. 4 and 5, which together constitute a top plan view of the embodiment of the present invention, the covers 44 which may be fabricated of sheet metal are generally rectangular in configuration and are attached to the base by means of screws. Irregularly shaped cutout portion 60, FIG. 5, permits the ribbon mechanism locking tabs 48 to be received there through so as to lock the tabs to the rigid members 50. The rear edge 62 of front cover 44, FIG. 5, is irregularly shaped to provide an access opening 64 for both the endless drive belt 66 (the operation of which will be described shortly) and the signature and dating platens 68 and 70.

The rear edge portion of rear cover **44** is provided with a rectangular cutout **72** for the hinge and base spring arrangement employed with the ribbon mechanism **38.** The external "Fiberglas" cover **20** is demountably hingedly attached to the base **12** by means of the hinges **74,** FIG. **4.** The motor main control switch **30** is located at the lower left corner of the base member as seen in FIG. **5.** To the right of the opening **60** is the item stop control thumb wheel or knob **42,** the operation of which will be discussed later on herein.

FIGS. **6** and **7,** together constitute a top plan view of the apparatus of the present invention with the covers **44** removed to expose the item drive and control mechanism located therebeneath. Drive belt **66** which is a continuous loop member is carried by a series of idler rollers **76** and is driven by roller **78,** seen most clearly in FIG. **9.** As shown, the drive belt is maintained under suitable tension by means of tension roller **80** mounted for pivotal movement on arm **82** under tension of spring **84.** The item drive belt is adapted to pass between the signature platen **68** and the date platen **70.** A sufficient clearance is provided by the recessed area **86,** FIGS. **6** and **8,** forming a channel in the platen support member **88** so that when the platen **68** is brought into engagement with an inking ribbon member not shown in a manner to be described later on herein, the belt does not interfere.

In order to prevent the belt from wandering from right to left during during its lengthy passage from one side of the base member to the other the belt is obliged to pass through two sets of three triangularly arranged tension rollers **92** FIGS. **6, 7** and **9** located at opposite sides of the platen support member. These rollers act to keep the belt running in a straight line without deflecting either vertically or horizontally. Drive means for the item drive belt is provided through reduction gears **94** and **96** arranged for rotation in gear block support **98.** Main drive motor **100** FIG. **7** energized through main switch **30** from a suitable source of electrical potential (B+) provides rotative torque through shaft **102,** pulley **104,** drive belt **106,** and pulley **108.** The horizontal drive shaft **110** FIG. **7** driven by pulley **108** is rotatably mounted to gear block support **98.** Bevel gears **112** and **114** transmit rotative drive to main item belt drive pulley **78** through shaft **116.** The outboard end of shaft **110** carries a pulley **118,** coupling drive belt **120** to pulley **122** FIG. **7** on high speed clutch mechanism **124.** Clutch **124** is substantially identical to that described and claimed in U.S. Pat. No. 3,802,540 in the name of Preston et al, assigned to the same assignee as the present invention. Clutch **124** is rigidly attached to and supported on the bottom plate **126** of the base **12** by means of rigid vertical supports **128—128.** The output drive shaft of clutch **124** is connected through clutch coupling **130** to main item signer drive shaft **132** by means of demountable adjustably positionable drive pin **134.** Drive shaft **132,** which is supported throughout its length, extends horizontally through vertical separator and wall support members **136—136,** terminating in a bushing **138** and E ring **140,** FIG. **9,** for purposes to be described later on herein.

Clutch actuating solenoid **142,** energized over lines **144,** controlled in a manner to be described presently herein, permits the clutch **124** to be cycled in accordance with the input feed operation of the present signer apparatus.

As seen most clearly in FIGS. **9, 10** and **11** of the drawing the main drive shaft **132** carries a control disk **146** and a cam member **148** FIG. **11** in parallel, spaced arrangement, secured by means of dowel pins so as to be rotatable with shaft **132** as the main drive is rotated by the drive motor **100.** The periphery of control disk **146** is notched as indicated at **150** and is adapted to be rotated between the upstanding elements of photo reflective scanning control member **152** secured to a platform **153** mounted on the base plate **126** of the machine.

Adjacent to the cam and disk apparatus there is located an irregularly shaped elongated lever or link **154** pivotally mounted for rocking movement about a short horizontal stub shaft **156,** FIG. **11,** disposed on the wall member **136** FIG. **9.** A cam follower roller **158,** FIGS. **11, 11A** and **11B** secured to the lower depending portion of link **154** is engageable with the enlarged protuberance **160** of cam member **148** for operational movement thereby. The bottom end **162** of link **154** is adapted for rocking movement to-and-fro between the upstanding portions of photo reflective scanning control member **164** mounted on support **153** for purposes to be explained presently herein.

The upper portion of link **154** FIG. **9** is provided with an L shaped bent portion **166** enabling this end of the link to project through a clearance slot **168** in wall member **136** so that the terminal end thereof is engageable with a cross link **170,** FIG. **8,** attached to the end of pivot member **172** on the end of a square shaft **174,** for purposes still to be described herein. The upper end of link **154** carries a return spring **176** attached to a stud **178** in wall **136** for biasing the link **154** toward the front of the machine or in a counterclockwise direction, as viewed in FIG. **11.**

To the left of link **154** and secured to the wall **136** as by bolts is a plunger type latching solenoid **180** FIGS. **11A** and **11B.** Plunger **182** is pivotally attached to a cross arm **184,** the free end of which projects outwardly from the plunger, and, as seen most clearly in FIG. **11C,** carries an L shaped bent portion **186** terminating in a tab **188.** Bent portion **186** is undercut as shown in the dotted outline **190** so as to seat against the edge of bent portion **166** of the link **154** and lock the link in position as shown in FIGS. **11A, 11B** and **11C.** The cross arm is biased in a vertical direction by means of a spring **192** against the tension of which the solenoid plunger is caused to move when energized over lines **194,** as will be described later on herein.

As earlier mentioned, the present apparatus is designed so as to accommodate varying length documents. Since the position of the printed signature on such documents must be adjustable with respect to the length thereof and also because the document must be accurately positioned and stopped in a prescribed area to receive the printing from the signature and date plates, it is necessary to provide means to adjustably locate the item stop without overburdening the operator of the apparatus with a variety of adjustments To this end the item stop mechanism of the present invention is movable or settable manually, by means now to be described, along the path of movement of the item to be signed.

Referring first to FIG. **9,** a bracket **196** projecting forwardly from wall member **136** on the right side of the apparatus carries at its outboard end **198** a large knurled thumb wheel **42.** A drive belt **202** engaging a large pulley wheel **204** at the rear of the shaft carrying the thumb wheel **42** transmits rotative motion to a small pulley **206** carried at the inboard end **208** of bracket **196.** A short horizontal drive shaft **210,** FIG. **11,** journaled at

one end in small pulley 206 FIG. 9 is provided with a gear 212 at the opposite end thereof engageable with the toothed lower portion 214, FIG. 8, of horizontal, adjustably movable, cross shaft 216, the latter extending from left to right across the interior front of the machine.

Cross shaft 216 is slidable from side to side of the machine in bearing members 218 attached to the wall member 136. The leftwardly extending end of cross shaft 216 is rotatably attached to item stop mechanism 220, FIGS. 6, 9 and 12 through 15 inclusive, and is secured thereto in a fashion permitting the item stop mechanism to be moved in a leftward or rightward direction along the item path of movement by means of the rotative movement of thumb wheel 42, as will be described later on herein.

Item stop mechanism 220, as seen most clearly in FIGS. 9, 12, 13, 14 and the motion views FIGS. 15 through 18 inclusive, comprises an irregularly shaped vertical support member 222, FIG. 12, provided with a depending projecting portion 224 at one end thereof. A pair of shaft receiving apertures 226 and 228 are arranged one above the other on the rightward portion of member 222. A lower aperture 226 extends through the portion 224. A third aperture 230 is located in the leftward portion of member 222 centrally of three attachment holes. Member 222 is secured as by bolts 232, FIG. 14, to a U shaped yoke-like shaft support member 234, FIGS. 12 and 13. An elongated mounting bracket 240 including an aperture 242 at its reduced end portion and a projecting tab or pin 244 formed integrally therewith is secured to the U shaped support as by a bolt 246 and pin 244 so as to extend outwardly away therefrom. The enlarged end of member 240 is provided with a recessed opening 248 for receiving photo reflective scanning device 250. Member 250 is a solid state detector including in one housing a photo transistor and a light emitting diode. The diode and photo transistor are angularly related such that light from the diode may be reflected to the photo transistor when an item-documented is passed over the sensor. The operation of this portion of the apparatus will be described later on herein in conjunction with the overall operation of the signer apparatus.

Secured to the outboard side of the member 240 is a toggle linkage 252, FIG. 13, including an item receiving stop 254 carrying for example a flexible slightly resilient polyurethane, V-shaped element 256 thereon. Element 256 may be secured to the stop 254 as by adhesive. Intermediate toggle link 258 interconnects the stop member 254 with a drive link 260. Drive link 260 is secured to a stub shaft 262 which projects horizontally through and is journaled in the opposite portions 236—236 of the yoke member 234. Over travel limit or stop 265 prevents the linkage 260 from reaching a position from which it cannot recover. A bevel gear 264 is secured to and rotatable with the outboard end of stub shaft 262 for purposes still to be described herein.

In its assembled condition, FIG. 9, the item stop mechanism 220 is mounted on an intermediate shaft 266 extending between the inner wall bracket 136 and a vertically positioned stand-off support member 268 mounted to the base of the machine. Horizontal cross shaft 216 extends through the lower aperture 226 FIG. 14 with an E ring securing the mechanism 220 thereto. Elongated, square, rocking, drive shaft 174 projects through aperture 228 FIG. 12 and is received and secured therein by means of a square apertured bushing rotatable in the end bracket 222. Bevel gear 229 FIG. 9 carried by shaft 174 meshes with bevel gear 264 FIG. 12 and drives the same with a rocking motion for purposes still to be described.

The present apparatus prints from an indexible inking ribbon 90 FIG. 20. The ribbon advance mechanism 38, as seen in FIGS. 20, 21, 23 and 24, inclusive, and which is now to be described, is adapted to cause the ribbon 90 to incrementally move adjacent the surface of the signature and date printing plates 68 and 70 respectively, from a supply reel 270 to a take-up reel 272. The means for incrementally advancing ribbon 90 includes the depending link 274 which is attached at one end to the spool carrying shaft of the take-up spool 272 and at its opposite end to an elongated rigid member 276, FIG. 10. The opposite end of member 276 is secured to the left outboard end of the main signer drive shaft 132 by means of the E ring 140. Rocking motion of shaft 132 causes link 276 to rock link 274 advancing the ribbon take-up spool 272 by one increment presenting fresh inked ribbon to the signing mechanism.

Attached to the side of the frame of ribbon advance mechanism 38 is an outrigger assembly 278 carrying a plurality of hold down rollers 280 which ride against the endless loop belt 66 to maintain constant pressure between the belt and any item disposed therebetween as the belt travels throughout its rather considerable extent from left to right of the machine frame. Interiorly of the member 38 are two rectangular open areas for receiving the rotatably indexible date mechanism 282 and the signature plate 284. Although not shown or otherwise described in detail in FIGS. 19, 20 and 21, both of these members are slidably, demountably attached to the lower interior section of the frame 38. The date mechanism, FIG. 19, includes three rotatable assemblies 286-288-290 coaxially mounted to provide means for changing the day, date and year respectively, while the signature panel assembly itself is adapted to be removably mounted by similar means for replacement whenever the signature is changed. In operation the ribbon 90 is advanced from the supply spool 270 under the signature plate 284 and date assembly 282 to the take-up spool 272 as seen in FIG. 20. The entire assembly for advancing the ribbon 90 is a modular unitary construction which is attached to the base by means of the hinge plate assembly 292.

As previously described, the signing apparatus of the present invention is adapted to operate in a start-stop fashion wherein each item is indexed into position, stopped in such position and thereafter the signature and/or date is impressed on the document after which the document is moved immediately to its position in the outboard receiving hopper. This incremental stop-start actuation is accomplished generally by means of the clutch heretofore described, through the main drive shaft 132. Rotative motion is applied concurrently to the item stop member 220 and the ribbon advance mechanism 38 so that the complete signing and dating is a simultaneous concurrent operation at extremely high speed. The continuously moving flexible endless drive belt 66 for moving the document is maintained in its flat elongate condition by means of additional hold down members as seen more particularly in FIG. 9 wherein the outrigger assembly 294 includes a series of rollers 296 rotatably mounted on interlinked arms 298 and 300 attached to the main link 294.

The signature for the documents hereinabove discussed makes such item a valid and negotiable instru-

ment of exchange. The signature of necessity must therefore be impressed on the document in a manner such that it is completely and clearly legible and readable throughout its extent. To this end a novel platen moving mechanism **302** is provided which causes the platen assembly **304** to be elevated and lowered through a horizontal path of movement effectively providing uniform and substantially equal pressure on the signature panel from one end to the other thereof without the problem of tilt or wobble which is sometimes encountered with known high speed printing mechanisms.

As seen particularly in FIG. **9** of the drawing but with reference also to FIGS. **8, 10** and **11** thereof, main drive shaft **132** is provided with a pair of eccentric members **306—306** which are rotatably mounted within oppositely disposed connecting rods **308** mounted for rotation on shaft **132** between the upstanding separator members **136—136.** The outer ends of connecting rods **308** are linked to cross shaft **312** (shown in FIG. **8** with the eccentric at its high point) so that shaft **312** is nearly in line with shaft **314.** Link **316** interconnects shafts **312** and **314.**

Platen support member **304** is secured to and movable vertically, upwardly and downwardly by means of links **318—318** which are pivoted to and movable with secondary links **320—320.** The upper ends of links **320** are arcuately movable about pivot shafts **322** which are rockably secured to wall support members **136—136.** Oppositely disposed secondary drag links **324** is rockably pivoted at its forward end to the rearward portion of platen support member **304** while at its opposite end the links **324** are pivoted to shaft **326** rockably secured at opposite ends to the opposite separator wall members **136.** A cross link **328** joins the two linkages **318-320** together for conjoint movement.

As seen most clearly in FIGS. **10** and **11** horizontal L-shaped members **330** only of which is shown in FIG. **10** disposed front to back in the machine are pivoted to cross shaft **332** and rockable thereabout. Cross shaft **332** is secured in enlarged apertures in the wall members **136** so as to have approximately $\frac{1}{8}$ inch play thereinproviding for automatic pressure control and relief due to change in document thickness as will be described shortly herein. The opposite end of each member **330** rests on an individual stop blocks **336** secured in the opposite side frames **136.** Each member **330** is biased in a downward direction, i.e. toward the bottom plate of the apparatus by means of tension springs **338.**

Platen support member **304,** FIGS. **8** and **9,** is provided with adjustable platen carrier members **340** and **342** FIG. **8,** each of which is horizontally and vertically, adjustably, positionable by means of bolts and sleeves **344** and **346,** respectively, as seen particularly in FIG. **9** with respect to the signature plate platen assembly. A polyurethane platen **348** and **350** is disposed on respective platen carriers for the signature platen and the date assembly. These platen members are employed as the back-up member for the signature plate and date plate mechanism carried by the ribbon actuating and advancing mechanism.

DESCRIPTION OF OPERATION

As earlier described herein the apparatus embodying the present invention is capable of operating with the item feed input from the left hand or the right hand side of the machine depending upon the desired configuration and the type of document which is being employed therewith. For the present discussion it is assumed that the document utilizes a right hand stub and therefore the input to the machine is from the right hand side. In this instance then the stack of items would be placed in the input hopper **14** on the right side of the machine with the output hopper **16** attached as shown in FIG. **1** to the left side of the machine.

With the machine in condition shown in FIG. **1** with the covers in place and with the main motor switch **30** in the on position and the switch **26** on motor **100** is energized and the drive belt is continuously moving. As noted in connection with the description of the clutch **124** in the Preston U.S. Pat. No. 3,802,540, until clutch solenoid **142** is energized clutch pulley **122** simply cycles without operation of the clutch and therefore drive shaft **132** is immobilized.

Assuming that the continuous item feed switch has been depressed and that the feed operation is initiated, an item **352** will be forwarded from the input feed hopper by the continuously moving drive belt **66** within the guides **52** (which have been adjusted to the correct width for the particular document) along the path of travel of the belt in the direction of arrow **354,** FIGS. **15** through **18,** inclusive, until the leading edge of the document abuts and is entrapped by the V-shaped notch of the member **256** which is disposed in the position shown in FIGS. **4, 5, 6, 7** and **13** respectively. As the document abuts member **256** it covers phototransistor **250.** As earlier described the photo sensor is adapted to operate in a reflected light mode in which light from the diode is reflected by the surface of the document back to the photo transistor causing photo detector **250** to send a pulse over lines (not shown) to the clutch solenoid **142** causing the clutch to release the stop collar rotating main drive shaft **132.**

As the main shaft **132,** FIG. **9,** rotates it also rotates the two eccentrics **306.** This action moves connecting rods **308** vertically, upwardly. The vertical motion of the connecting rods **308** causes the platen actuating mechanism to move the platen support **304** carrying the two polyurethane platen members **348** and **350** upwardly into contact with the etched signature plate **284** and the dater plate **282.** With the item **352** disposed between the ribbon **90** and the members **282** and **284,** printing of the signature and the date on the item is automatically accomplished.

Continued rotation of the main drive shaft **132** carrying control disk **146** and latching control cam **148** rotates these members from the position shown in FIG. **11A** (with the notch **150** positioned to unblock photo transistor **152** and with latch control link **154** to the right and unblocking photo transistor **164)** to the position shown in FIG. **11B** where the disk lobe blocks photo transistor **152** disabling the machine printing and preventing any spurious or accidental tripping of the drive clutch **124** until the present printing operation is completed. The document counter **36** is energized to add one count to the total in the counter.

After approximately **100** degrees of rotation cam **148** brings cam lobe **160** riding on follower **158** into position to move link **154** leftwardly as seen in FIGS. **11A** and **11B.** Link **154** through links **170** and **172** shown most clearly in FIG. **8,** rotates square shaft **174** causing the two intermeshed bevel gears **212** and **264** of the item stop mechanism **220** to rotate. Rotation of shaft **262** causes item stop linkage **252** to snap the end stop **254** arcuately, leftwardly as seen in FIGS. **15** through **18,** inclusive, into the position shown in FIG. **18** against the

stop pin **265** and downwardly out of the path of movement of the item **352.**

In the position shown in FIG. **11B** the link **154** has been moved by the cam lobe **160** into a position so that the bent portion **166** is engaged by the latching end **186** of the latching link of solenoid **180.** It is noted that link **154** is biased in a rightward position by spring **176** so that in its latched condition it is maintained by the latch under tension of spring **176.** Sensor **164** is now de-energized.

As the document **352** FIGS. **15–18** inclusive passes leftwardly to the receiving hopper **16** of the machine the trailing edge of the document uncovers the photo transistor **250** of the item stop mechanism. Energization of the photo transistor **250** causes a pulse to be sent to solenoid **180** retracting the plunger to the position shown in FIG. **11A** which rocks the arm **184** about its pivot support causing the mechanism to release the link **154.** Link **154** now swings rightwardly to the position of FIG. **11A** so that the follower roller **158** is again in contact with the cam lobe of cam **148** resetting the latch **184.** The mechanism is now in condition for the next incoming item depending upon whether the apparatus has been cycled in a single cycle operation or a continuous mode of operation.

As has been described hereinbefore, the apparatus embodying the present invention is provided with means enabling the apparatus to accommodate items of varying widths and lengths. The width adjustment is accomplished by means of the laterally movable guides **52** while the length adjustment is provided by means of the thumb wheel control **42** operating together with the **0-ring** or pulley **202** and the pulley wheels **206** shaft **216** and fixed shaft **266.** As seen most clearly in FIG. **9** of the drawing, rotation of the thumb wheel **42** causes the pulley wheel **206** to rotate rotating shaft **210** causing the gear **212** to rotate driving shaft **210** which is in engagement with the toothed portion of the bottom of shaft **216,** rightwardly or leftwardly depending on the length of the item, in the direction of the arrow **356.** In this manner the item end stop apparatus is caused to move rightwardly or leftwardly along the path of the item travel and thus accommodates the placement of the signature at various positions, as desired, on documents of different lengths. The square shaft **174** permits the item stop mechanism **220** to be rockably movable about the shaft while also providing a supporting means along which the item stop may be moved as the thumb wheel **42** is adjustably positioned.

Should the document thickness be inadvertently increased beyond that of a single thickness, the document pressure overload release mechanism prevents the platen drive apparatus from stalling the drive motor. Shaft **341** is rockable within the limits previously described herein through link **330** and stud **332.** If, when the platen is raised, too much pressure is exerted thereon, shaft **314** is free to move about pivot shaft **332** restrained by spring **333.** Any undue pressure will cause shaft **314** to rotate clockwise about pivot shaft **332** which is fixed in the side frames. The opposite ends of the link **330** float under the influence of spring **333** and are restrained in a downward direction by stop member **336.** The restoring force caused by the spring is taken up by the urethane bumpers **334** on the stop member **336.**

As seen most clearly in FIG. **23** the ribbon advance mechanism includes supply reel **270** and take up reel or spool **272** together with a rockable elongated link **358** pivoted on a stud **360** secured to the side frame of the ribbon cover. Link **358** carries a roller **362** at the supply spool end thereof which rides on the periphery of the ribbon supply. The opposite end of link **358** is adapted to swing between the confronting surfaces of a photosensing device **364** similar to photosensors **152** and **154** shown in FIG. **11.** Photosensor **364** is mounted on bracket **366** attached to the cover of the ribbon advance mechanism.

As the ribbon **90** is depleted in use, link **358** is caused to move arcuately by pivot **360** interrupting the light beam of the sensor causing the indicator light **51** on the cover to flash intermittently signaling to the operator a low ribbon condition.

What is claimed is:

1. Printing apparatus for printing signatures and dates on items effective to commercially validate such items comprising:

a printing station having a printing platen and including demountable printing members capable upon introduction of an item in juxtaposition to said platen of producing an impression of a signature and a date thereon from said printing members,

input feed means for feeding items such as checks to said printing station,

output collecting means for collecting items after printing,

an item feed pathway including continuously movable means for moving items from said input feed means to said printing station and thence to said output collecting means,

means in said printing station for causing an impression to be produced on one of said items from said signature and date impression producing members,

linking means for inking said printing members including means for incrementally presenting a fresh inked area of said inking means to said signature and date impression producing members,

clutch means for advancing the item moving means to present one of said items to said printing station,

first photo optical sensing means producing an electrical signal for initiating and controlling the actuation of said clutch means,

item stop means in said item feed pathway for stopping the item adjacent to said printing members, and

second photo optical sensing means removably mounted on said item stop means,

including means demountably supporting the second photo optical sensing means permitting the latter to be removed or replaced as required.

2. The invention in accordance with claim **1** wherein said means for causing an impression to be produced on an item further includes a parallelogram linkage coupled to oppositely disposed elongated link members and a pair of spring biasing members providing a resilient coupling between said platen and the impression producing means thereby maintaining both constant printing pressure at said printing station between said anvil and said printing members and providing pressure overload relief to prevent jamming and stalling due to excessive loading as a result of increases in thickness of items being printed.

3. Printing apparatus for printing signatures and dates on items effective to commercially validate such items comprising:

a printing station including demountable members capable upon introduction of an item in juxtaposit-

ion thereto of producing an impression of a signature and a date thereon,

input feed means for feeding items such as checks to said printing station,

output collecting means for collecting items after printing,

an item feed pathway including continuously movable means for moving items from said input feed means to said printing station and thence to said output collecting means,

means in said printing station for causing an impression to be produced on said items from said signature and date impression producing members,

inking means for inking said printing members including means for incrementally presenting a fresh inked area of said inking means to said signature and date impression producing members,

said inking means includes a ribbon supply and a photo sensing element with an indicating light actuatable in response to the depletion of the inking means for visually alerting the operator to the amount of ribbon remaining available,

clutch means for advancing the item moving means to present one of said items to said printing station,

photo optical sensing means producing an electrical signal for controlling the actuation of said clutch means,

item stop means in said item feed pathway for stopping the item adjacent to said printing members, and

photo optical sensing means removably mounted on said item stop means for initiating the feeding and printing of each of said items.

4. Printing apparatus for printing signatures and dates on items effective to commercially validate such items comprising:

a printing station including demountable members capable upon introduction of an item in juxtaposition thereto of producing an impression of a signature and a date on said items and adjustable lateral guide means for straight line guiding each item into and through said printing station,

input feed means for advancing items such as checks to said printing station,

output collecting means for retrieving said item from said printing station for further handling,

continuously movable means for moving items along an item feed pathway from said input feed means to said printing station and thence to said collecting means,

means in said printing station for causing said signature and date members to print said validating signature and date on each item,

inking means for inking said printing members including means for incrementally presenting a fresh inked area of said inking means to said printing means,

adjustable one way incrementally rotatable clutch means for advancing the item moving means for each cycle of operation of said apparatus,

photo optical sensing means including a rotatable cam and disk controlling said clutch means,

item stop means movable into and out of the item feed pathway for stopping the item adjacent to said printing means, and

photo reflective photo optical sensing means removably mounted on said item stop means for initiating the feeding and printing of said signature and said date on said items.

5. The invention in accordance with claim **4** wherein said item stop means further includes means coupled thereto enabling adjustable positioning of said stop means along the path of movement of said items, means operably coupling said adjustable positioning means to said one way incrementally rotatable clutch means controlled by said photo optical sensing means effective to activate said item stop means for varying length items regardless of the item position along said item pathway.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 4,037,535 Dated July 26, 1977

Inventor(s) Jerry Hans Lehmann et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Abstract, line 11, after "Novel" insert --pressure relief apparatus permits signature imprinting pressure--.

Col. 9, line 41, should read --therein providing--.

Col. 9, line 45, after "individual" insert --polyurethane bumper 334 attached to individual--.

Signed and Sealed this

Eighteenth Day of *October 1977*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

LUTRELLE F. PARKER
Acting Commissioner of Patents and Trademarks