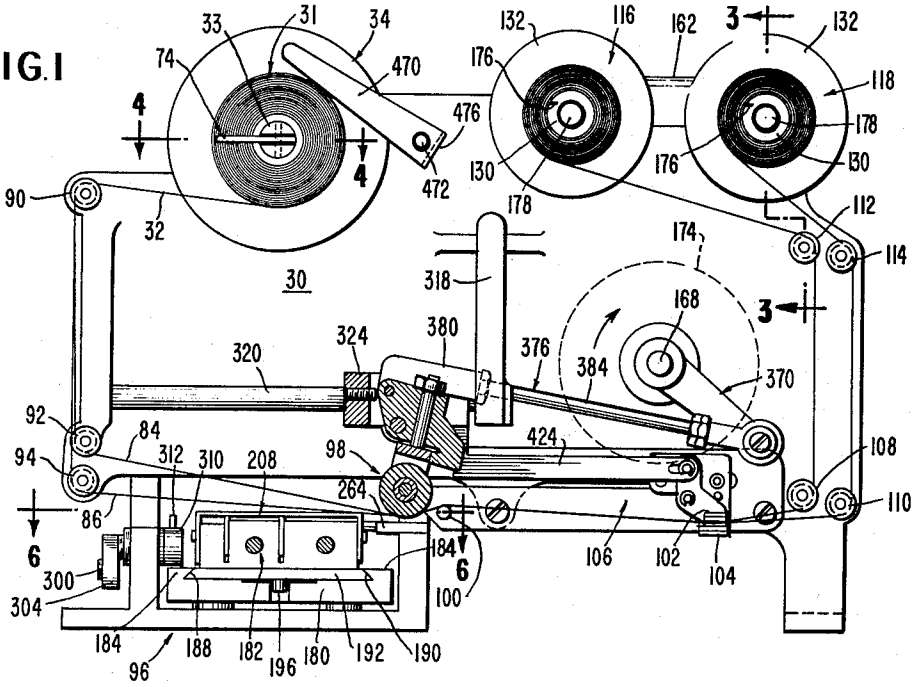
May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 1

FIG.1



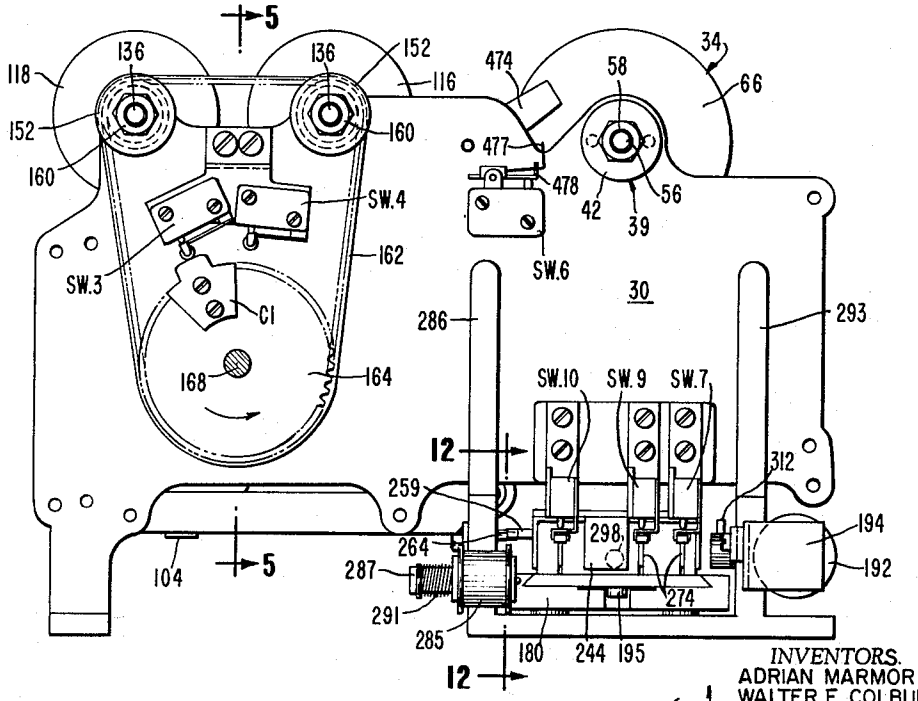


FIG.2

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ADRIAN MARMOR
WALTER E. COLBURN

BY

AGENT

May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 2

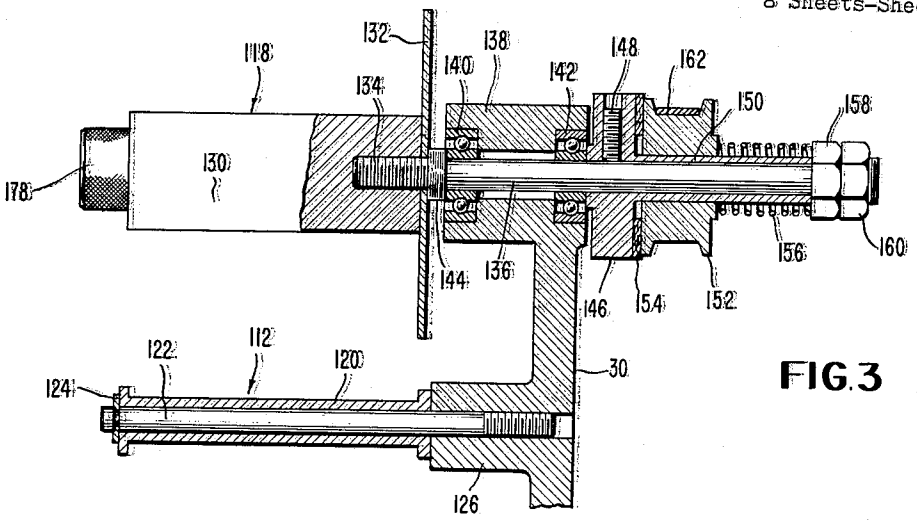


FIG.3

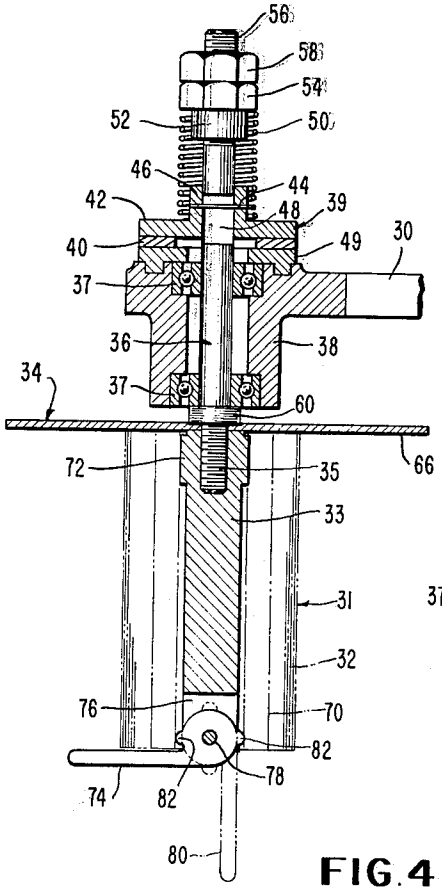
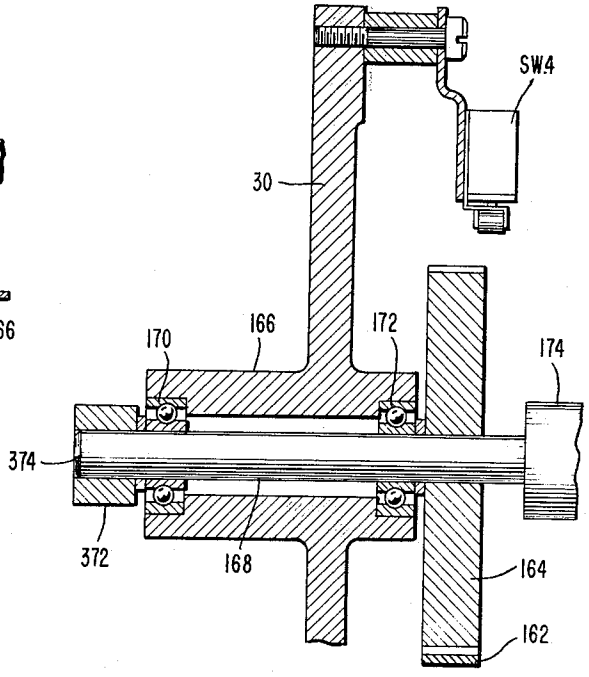


FIG.4

FIG.5



May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 3

FIG.6

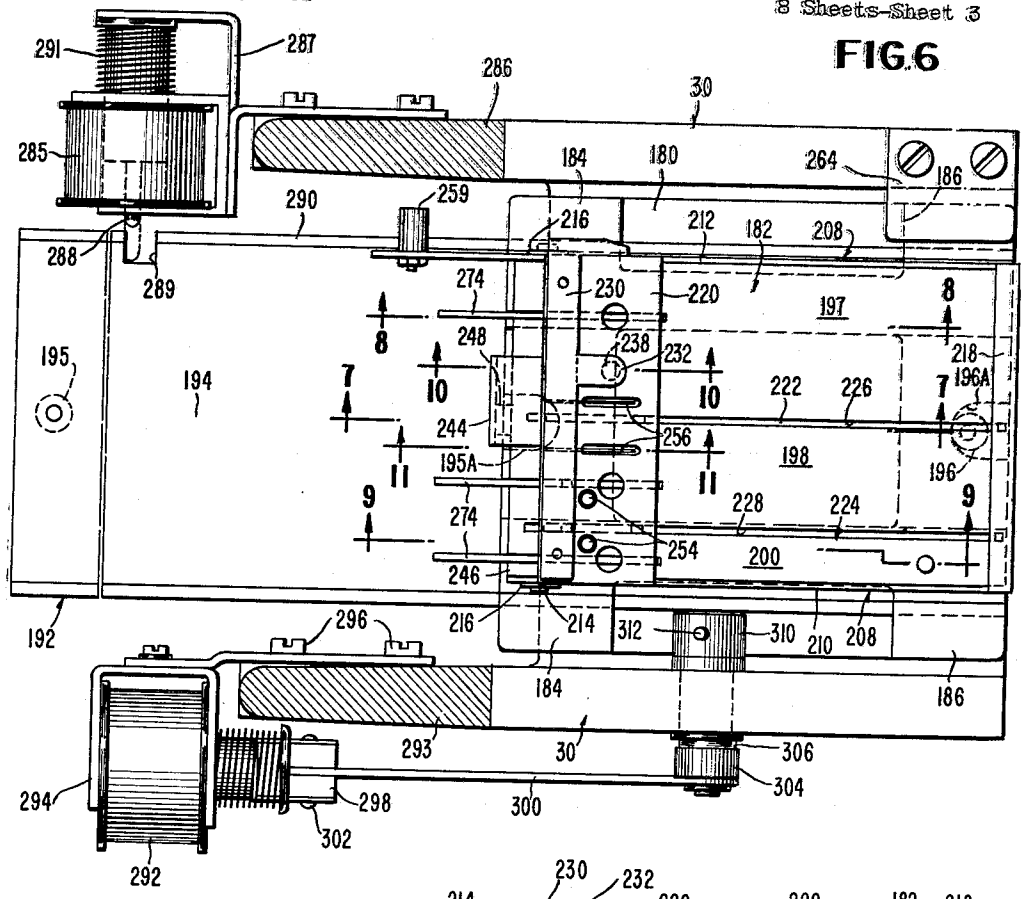
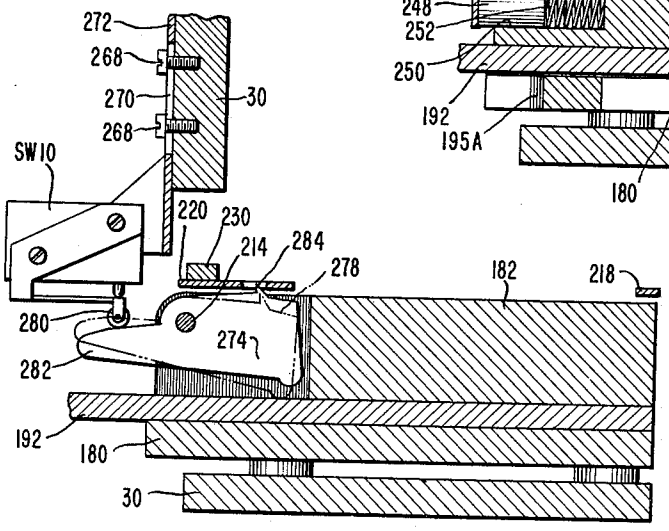


FIG.8



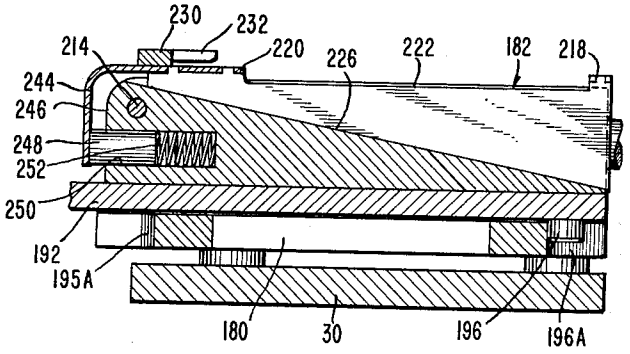


FIG.7

May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 4

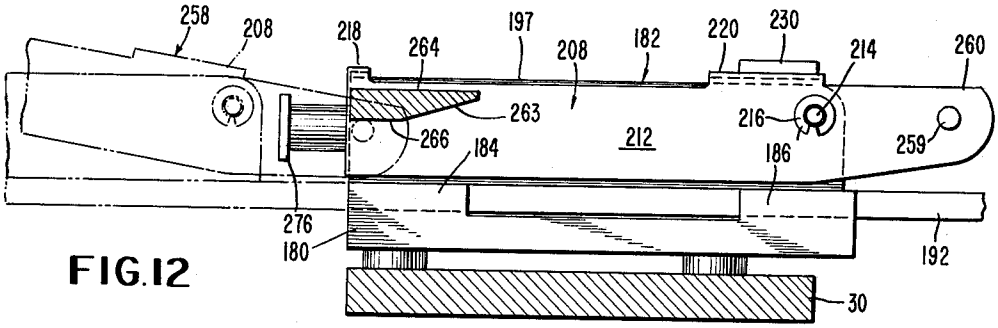


FIG.12

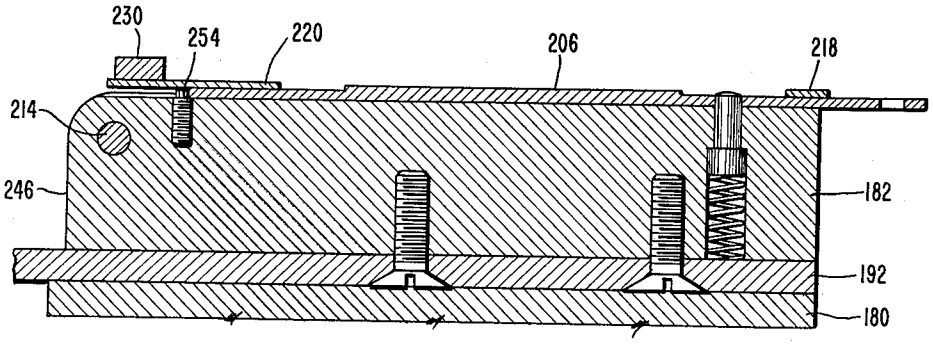


FIG.9

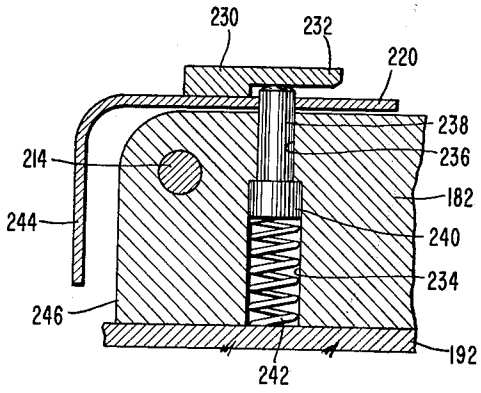


FIG.10

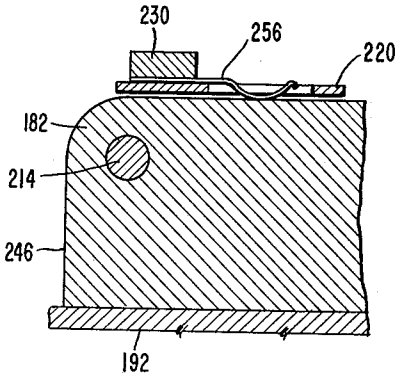


FIG.11

May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 5

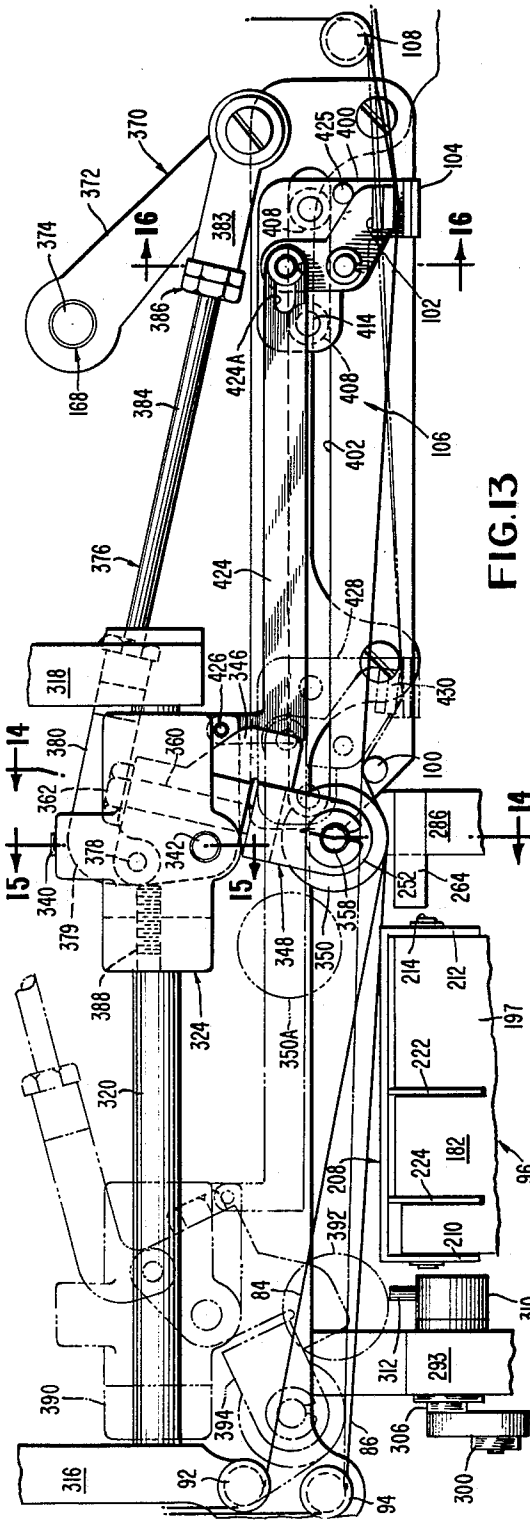


FIG.13

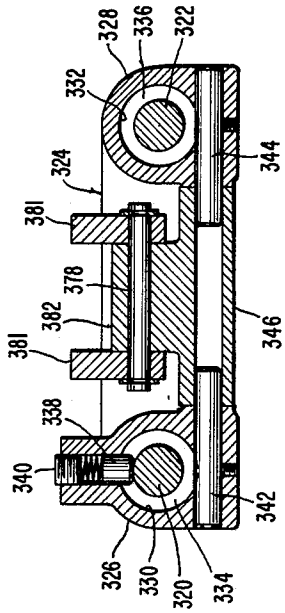


FIG.15

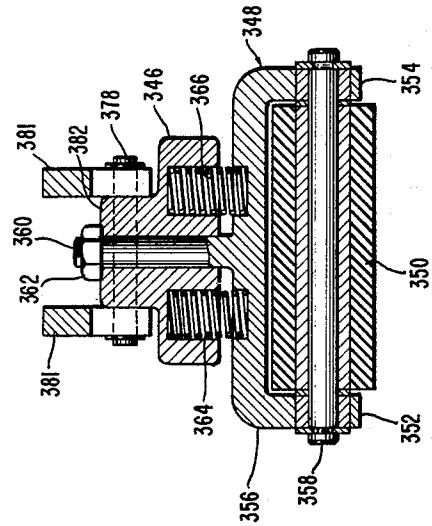


FIG.14

May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 6

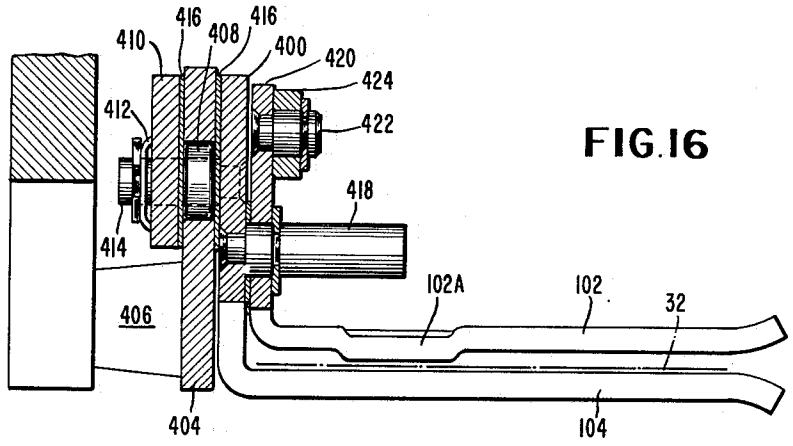


FIG.16

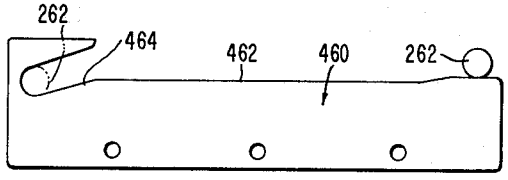


FIG.22

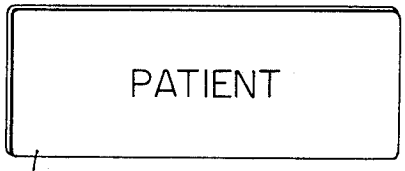


FIG.17

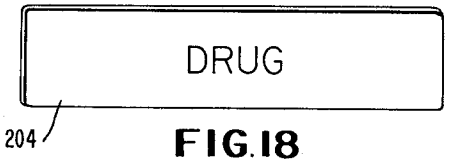


FIG.18

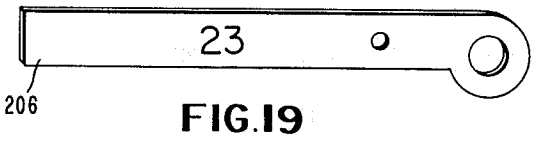


FIG.19

FIG.20

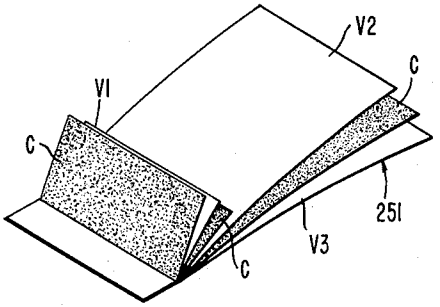
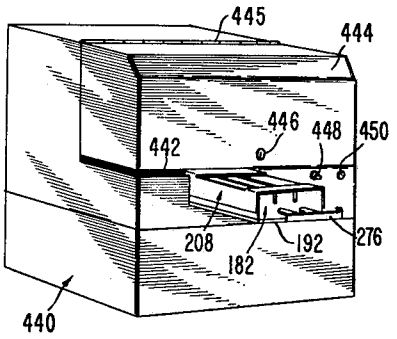


FIG.21



May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 7

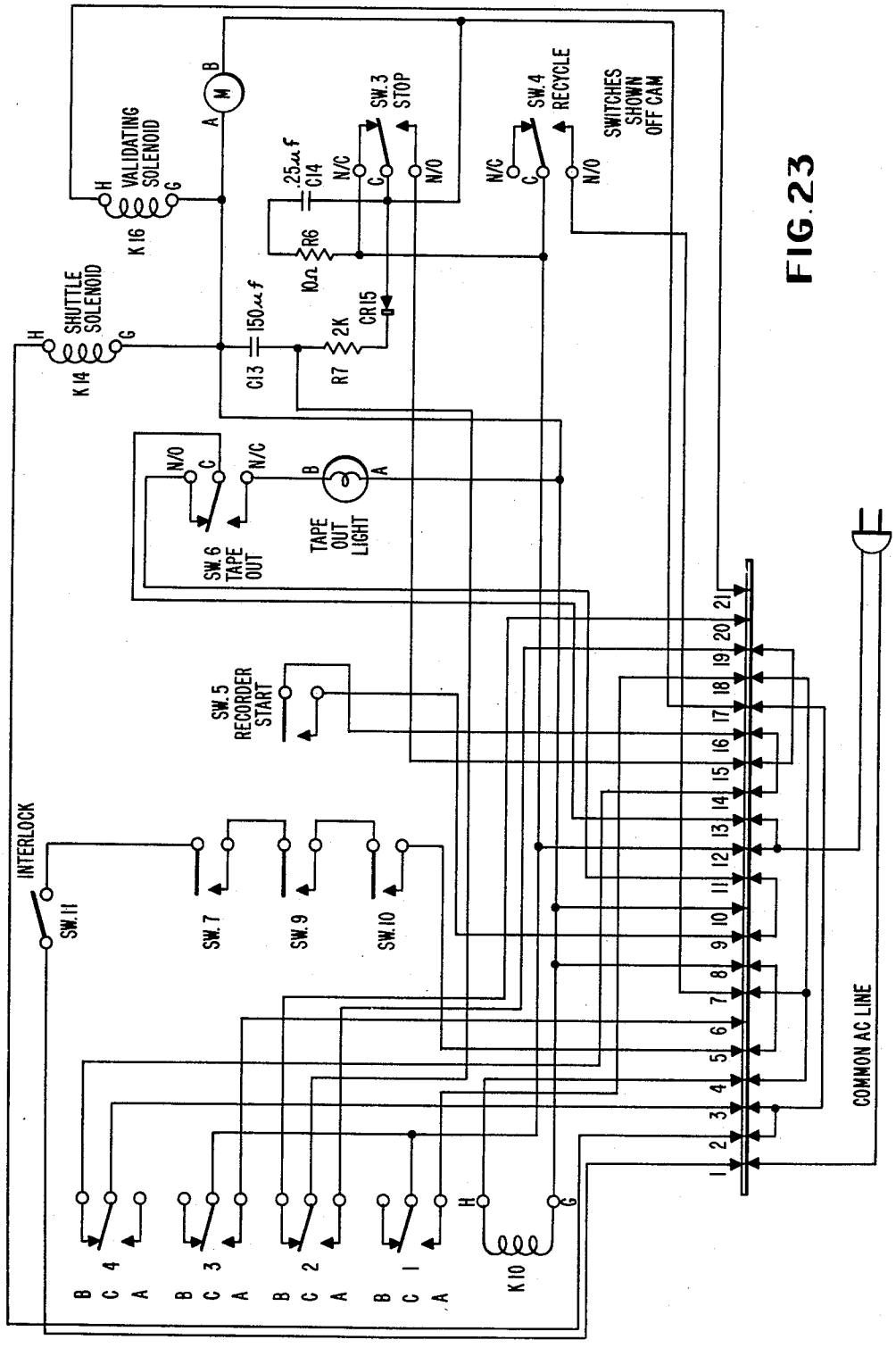


FIG. 23

May 18, 1965 A. MARMOR ETAL 3,183,834

BED AND CYLINDER TAPE PRINTING MACHINE

Filed Jan. 19, 1962 8 Sheets-Sheet 8

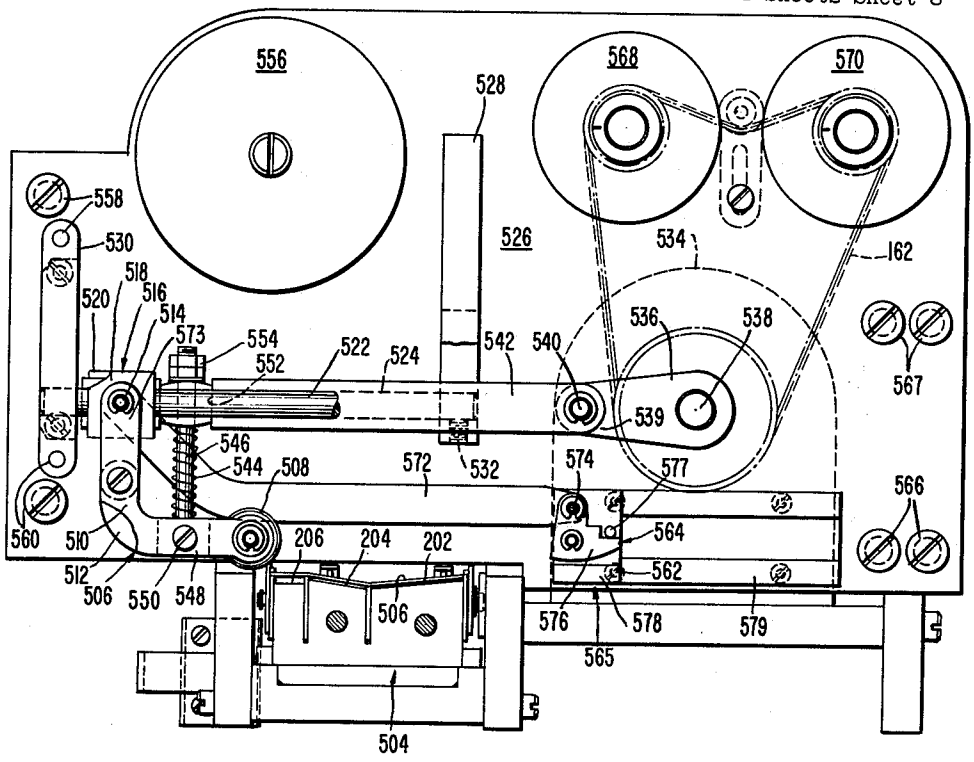
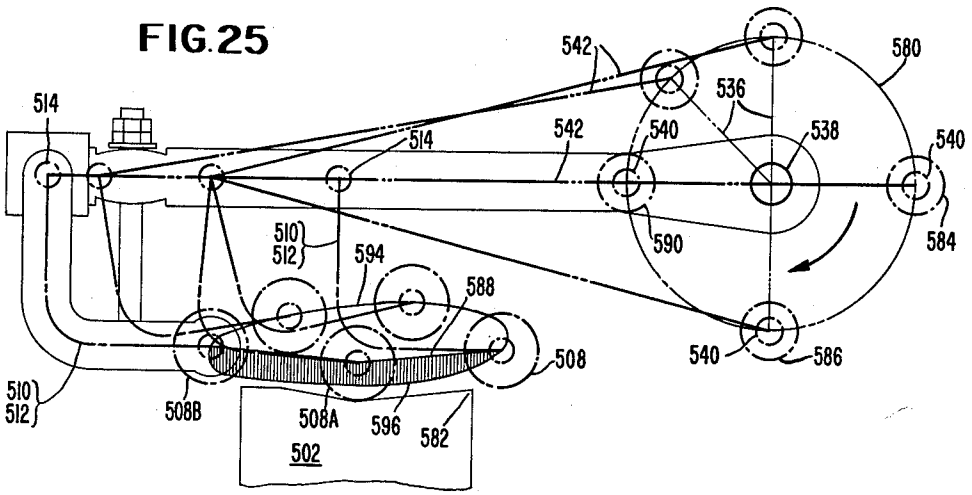


FIG. 24

FIG. 25



United States Patent Office 3,183,834 Patented May 18, 1965

3,183,834
BED AND CYLINDER TAPE PRINTING MACHINE

Adrian Marmor, Bryn Mawr, and Walter E. Colburn, Havertown, Pa., assignors to Brewer Pharmacal Engineering Corporation, Upper Darby, Pa., a corporation of Pennsylvania

Filed Jan. 19, 1962, Ser. No. 167,368
17 Claims. (Cl. 101—260)

The invention hereinafter described and claimed relates to recording machines, but more specifically to that type of recording machine adapted to print or make an impression of type elements, or plates having raised indicia thereon. More particularly, the invention has to do with recorders of the type shown and described in the co-pending application entitled "Inventory Control System and Apparatus," Serial No. 162,630 filed December 12, 1961, in the names of Frederic T. C. Brewer, William A. White, and Walter E. Colburn, and assigned to the same assignee as the present invention.

Recorders of this general type are well known having been in use for a number of years for addressing mailing pieces. In such machines a plurality of addressing plates having raised indicia thereon are fed through the machine in consecutive order and, as each passes through the printing station, its indicia is impressed upon the envelope or an address sticker to be applied to a mailing piece, such as a magazine.

Machines of this general type are also now used for charge-plate transactions in department stores, banks, gas stations, etc. In these machines the plates are placed in the printer, the charge slip placed over it and then some pressure means—usually a roller—is applied, and an impression of the indicia on the plate is transferred to the charge slip.

It is the primary object of the present invention to provide a recording machine of this general type but characterized by its improved construction enabling an improved mode of operation and record making never before attained.

Another object of the invention is to provide a recording machine wherein a plurality of the said printing members or plates may quickly and easily be placed in the machine and the indicia thereon all recorded simultaneously with one cycle of operation of the machine.

A further object of the invention is to provide such a recorder which is cyclically operable only after certain pre-operative conditions have been met.

Still further the invention has as an object to provide a recorder making it possible to utilize pressure sensitive record tape upon which the raised indicia of the printing plates may be recorded in response to pressure thereof against the plates.

With still more specificity, the invention has as an object to provide a recording machine of this type enclosed in a locked housing but with means for conveniently from the outside of the housing moving the printing plates into and out of printing position within the housing.

A more specific object of the invention is to provide in such an enclosed machine, means for making an impression of the plate indicia on a charge-voucher or other record means inserted into printing position from the outside of the housing and available to the operator of the machine after the impression has been made.

In accordance with the above objects and first briefly described the invention comprises in its broad aspects a recorder or printing machine operable only in the presence of removable key plates in the machine to make an impression on a record medium of indicia on the plates. More specifically, but still in its broader aspects, the invention comprises a recorder or printing machine wherein

means is provided for feeding a continuous tape from a supply reel across a printing position to a take-up reel and including reciprocable shuttle means for removably supporting key plates having raised indicia thereon whereby the plates may be moved transversely to the direction of tape movement to and from a printing position wherein a roller platen, cyclically operable only when plates are present on the shuttle, may be moved transversely across the shuttle to urge the tape, and/or other record medium placed on the shuttle, tightly against the raised indicia thus to make an impression thereof upon the record medium, after which the shuttle may be moved from the printing position to a position enabling convenient replacement or removal of the key plates in preparation for a subsequent cycle of operation.

These and other objects of the present invention and the various features and details of the recording machine of the present invention are hereinafter more fully set forth with reference to the accompanying drawings, in which:

FIG. 1 is a front elevational view of the recording machine removed from its housing and with parts broken away more clearly to show details of its construction;

FIG. 2 is a rear elevational view of the apparatus as shown in FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 1 and showing a tape take-up reel and its drive mechanism;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 1 and showing the tape supply reel and its control mechanism;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 2 and showing a portion of the drive means;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 1 and showing the plate holding shuttle in plain view;

FIG. 7 is a fragmentary sectional view taken along the line 7—7 of FIG. 6;

FIG. 8 is a fragmentary section view taken along the line 8—8 of FIG. 6.

FIG. 9 is a fragmentary sectional view taken along the line 9—9 of FIG. 6;

FIG. 10 is a fragmentary sectional view taken along the line 10—10 of FIG. 6;

FIG. 11 is a fragmentary sectional view taken along the line 11—11 of FIG. 6;

FIG. 12 is a sectional view taken along the line 12—12 of FIG. 2;

FIG. 13 is a front elevational view of a fragmentary portion of the apparatus as shown in FIG. 1, but on an enlarged scale and showing in broken lines various operative conditions of the mechanism;

FIG. 14 is a fragmentary sectional view of the roller platen taken along the lines 14—14 of FIG. 13;

FIG. 15 is a fragentary sectional view of the platen support means taken along the line 15—15 of FIG. 13;

FIG. 16 is a fragmentary sectional view taken along the line 16—16 of FIG. 13 and showing a detail of the record tape feeding means;

FIGS. 17, 18 and 19 are top plan views of various printing or key plates adapted for use in the machine;

FIG. 20 is a perspective view of a typical charge-voucher adapted for use in the machine;

FIG. 21 is a general view of the apparatus of the invention as enclosed in a locked housing, and showing the plate holding shuttle in its extended position;

FIG. 22 is an elevational view of a modified form of an element of the machine;

FIG. 23 is a schematic of a suitable control circuit for the machine.

FIG. 24 is a front elevational view of a modified form of the invention; and

FIG. 25 is a motion diagram of the apparatus of FIG. 24.

In accordance with the preferred embodiment of the invention and with reference to the details of the various figures of drawings, and first with reference to FIG. 1, it is seen that the invention comprises a vertically positioned base plate 30 upon which the various components of the operating mechanism are supported. A roll 31 of pressure sensitive tape 32 is mounted on the spindle 33 of a supply reel 34 which, as seen more clearly in FIG. 4, is secured to end 35 of a shaft 36 rotatably mounted, as by roller bearings 37, in a boss 38 formed integrally with base 30. Rotation of shaft 36 and consequently reel 34, as described hereinafter, is controlled by a friction brake 39 including a friction disc 40 carried by a brake disc 42 slidably mounted over shaft 36 and secured thereto as by pin 44 having its ends secured in a sleeve 46 on disc 42, and its intermediate portion passing through a slot 48 in shaft 36. Disc 40 is urged against a brake plate 49 secured to base plate 30 around the shaft, as by a coil spring 50 having one end surrounding the sleeve 46 and urged against the disc 42, and its other end surrounding a sleeve 52 on the underside of a nut 54 threaded on the outer end 56 of the shaft. Adjustment of the spring tension is attained by varying the position of nut 54 on the shaft after which the position is secured by a lock nut 58. The inner end of the shaft—the lower end as seen in FIG. 4—is provided with a flange 60 cooperating with spring 50 to resiliently secure the position of the shaft in its bearings.

The tape reel 34 comprises the spindle or hub 33 and, a wide flange 66 secured between the hub and flange 60. The tape supply 31 is usually on a wooden spool 70 for mounting the tape upon spindle 33. In the present embodiment, the inner end of the spindle is provided with an enlargement 72 of substantially the same diameter as the inner diameter of spool 70, and the outer end of the spindle carries a locking cam mechanism 74 pivotally mounted in a slot 76 in the outer end of the spindle by a pin 78. In mounting the tape on spindle 33 the spool 70 is slipped over the spindle with the locking cam mechanism in the position shown in broken lines 80, after which the cam is rotated to the full line position in which projections 82 on opposite sides thereof move into gripping engagement with the inner surface of the spool thus tightly to secure the tape supply to reel 34.

While other types of record tape might conveniently be used, in the present illustrated form of the invention it is preferred to use a type which will receive an impression of the indicia elements in response to pressure alone. Such a tape is manufactured by National Cash Register Company under the trade name "NCR Tape," and in the type used here includes two separable layers 84 and 86 (see FIG. 1) chemically cooperating under pressure to reproduce printing indicia upon the inner surface of layer 86. It will be understood that the tape can also take other forms, such as a layer of plain paper and a layer of carbon tape.

Still with reference to FIG. 1, it is seen that tape 32 preferably is fed from the lower periphery of the tape roll to the left over a guide roller 90, downwardly over a pair of guide rollers 92 and 94 where the tape layers separate, to the right over the shuttle mechanism 96, under roller platen 98, over pin 100 through jaws 102 and 104 of the tape feed mechanism 106, around idler rollers 108 and 110, upwardly and over idler rollers 112 and 114 to take-up spools 116 and 118 respectively. A feature of the tape feed just described lies in the separation of the layers 84 and 86 shortly after the tape leaves the supply reel. Reels of separable layers, such as used here, present a problem in handling the slack due to the increasing length of one of the layers as the tape is fed from the reel. Early separation of the layers overcomes this difficulty by permitting each to be handled individually as described below. Pin 100 cooperates with idler roller 94 to maintain the tape well above the top of the shuttle 96 out of the path of the shuttle when it is moved to and from its printing position as described hereinafter.

All of the above mentioned idler rollers are similar in construction and mounting, therefore only one (112) has been shown in detail in FIG. 3 which also shows details of take-up reel 118, it being understood that take-up reel 116 is similar.

Idler roller 112 comprises a spool 120 rotatably mounted on a spindle 122 between a C-shaped washer 124 on the outer end of the spindle and a boss 126 integral with base plate 30 and in which the inner end of the spindle is suitably secured, such as by a press fit or by threading.

Take-up roller 118 includes a spool 130 having a rear flange 132, both threaded onto the left-hand end 134 of shaft 136 which is rotatably mounted in a boss 138 on base plate 30 as by roller bearings 140 and 142. A shaft flange 144 on the left-hand side of boss 138 and a disc 146 secured on shaft 136 on the right-hand side of the boss, as by set screw 148, positions the shaft on plate 30. Rotatably mounted on a sleeve 150 extending from clutch disc 146 and around the shaft, is a drive pulley or sheave 152 normally urged to the left against friction clutch face 154 of disc 146 by a coil spring 156 surrounding sleeve 150, with one end urged against the right-hand face of sheave 152 thus to bias the sheave in frictional driving engagement with clutch face 154. The outer end of the spring is retained by a nut 158 threaded upon the outer end of sleeve 150. Adjustment of the spring tension may be made by turning nut 158 in one direction or the other and locking it in position by lock nut 160. It is now evident that spool 130 may be rotated by driving sheave 152 in the manner described hereinafter, but it will be understood that if the spool is not free to rotate, the sheave may continue independently to rotate on sleeve 150. As mentioned previously, take-up roller 116 is exactly similar to take-up reel 118, and therefore its description is omitted. A feature of this friction clutch means is its adaptability for sub-assembly construction. Note that sheave 152, spring 156, nuts 158 and 160 may all be pre-assembled on sleeve 150 of clutch disc 146 with pre-adjusted tension against clutch face 154. The sub-assembly is then in condition for being slipped over shaft 136 and secured in driving engagement therewith by set screw 148.

The manner in which the take-up reels are driven will be described hereinafter in connection with the operation of the apparatus. However, by way of brief explanation at this point, and with reference to FIG. 2, it will be seen that sheaves 152 may be rotated by a toothed drive belt 162 threaded over the sheaves and around a drive gear 164 which, as seen in FIG. 5, is rotatably journalled in a boss 166 on base plate 30 by shaft 168 supported on roller bearings 170 and 172. Sheaves 152 are also provided with teeth (not shown) for meshing with the teeth on the drive belt 162 thus to provide positive drive and timing thereof. The shaft 168 comprises an extension of the drive shaft of a motor 174 cyclically operable as explained hereinafter for one complete rotation with each operation of the machine.

In the initial feeding of the tape from the supply reel 34 to take-up reels 116 and 118, the ends of layers 84 and 86 are inserted in slots 176 (FIG. 1) in spools 130, after which the spools are rotated manually as by knurled knobs 178 provided for this purpose, and until a sufficient number of turns of the tape have been applied to lock the tape to the spool.

Turning now to the details of shuttle 96, it is seen in FIG. 1 that it comprises generally two basic elements, a fixed bed plate 180 and a carriage 182, the carriage being mounted on the bed plate for slidable movement transversely of the tape movement between a retracted terminal printing position adjacent the roller platen 98

and beneath the tape, to an extended terminal position projecting forwardly of the platen (FIGS. 12 and 21) and in a position removed from beneath the tape convenient for the placement of the indicia bearing plates on the top of the carriage—or the removal therefrom—as described hereinafter. To provide for the slidable mounting of carriage 182 on the bed plate, the latter is provided with upwardly projecting guide lugs 184 and 186 on its fore and aft edges respectively, as seen in FIG. 12, and, as seen in FIG. 1, on opposite side edges of the bed plate. Each of the lugs is angularly undercut, as indicated at 188 in FIG. 1, thus to receive the mating bevelled edges 190 of the carriage base plate 192. As seen in FIG. 6, the base plate has a trailing portion 194 extending to the rear of carriage 182, thus to provide means for retaining the carriage on the bed plate when the carriage is moved to its extended position.

The above mentioned terminal positions of the carriage are determined by contact of pins 195 and 196 depending from the underside of the rear and front portions of base plate 192, with the rear and front edges of fixed bed plate 180, grooves 195A and 196A being provided at these points of contact thus to increase the movement without decreasing the dimensions of the bed plate.

In this preferred form of the invention, carriage 182 is of substantially solid block construction with its top surface divided into three areas 197, 198 and 200, each adapted to receive a printing or charge-plate, and in this embodiment, each being of a different size. By way of example, and as described in the above identified copending application wherein the machine is used at a drug issuing station of a hospital to record the issuance of drugs, the three plates might comprise: first, a hospital patient plate identifying the patient, his doctor and any other pertinent information required by the particular hospital in which the apparatus is installed, this plate being illustrated in FIG. 17; secondly, a drug plate to identify the particular drug to be issued to the patient, as shown in FIG. 18; and thirdly, a plate comprising the nurse-identification key, which, as shown in FIG. 19 by way of example, identifies nurse No. 23 on the hospital records. For further identification in the various figures of drawings, these plates have been identified by the reference character 202, 204 and 206 respectively.

The carriage is provided with plate retaining means including a frame 208 (FIGS. 6 and 8) having side walls 210 and 212 on its opposite sides which extend downwardly and in engagement with the opposite side walls of the carriage. The frame is pivotally mounted to the carriage at its rear edge, as seen in FIG. 12, by a pin 214 extending through side walls 210 and 212 and the carriage block, being secured thereto by split washers 216 on its ends. The side walls of the frame are joined together at their front edges by a cross rail 218 and at their rear edges by a cross rail 220. Intermediate the side walls 210 and 212, and secured to cross rails 218 and 220 as by rivets, welding or other suitable means, is a pair of downwardly extending walls 222 and 224, the carriage block 182 being provided with slots 226 and 228 at these points to receive the walls, as shown more clearly in FIG. 7. These walls cooperate with the side walls to define the plate receiving areas 197, 198 and 200 of the shuttle.

Secured to cross rail 220 is a bar 230 having a forwardly projecting lug 232 slightly spaced above cross rail 220 thus to provide means for securing a charge-voucher (FIG. 20) over the shuttle to receive an impression of the indicia upon the indicia plates during a cycle of operation of the machine, as explained hereinafter. Referring to FIG. 10, it is seen that means is provided to secure the charge-voucher beneath tab 232. As seen here, carriage 182 is provided with a bore 234 having an extension 236 of smaller diameter to receive pin 238 having an enlarged portion 240 of the same

diameter as bore 234 and cooperating with the shoulder 240 to limit the upward movement of pin 238 to that shown. The pin is biased to its upper extremity by a coil spring 242 positioned in bore 234 between the enlarged shoulder portion 240 of the pin base plate 192 of the carriage.

Cross rail 220 is provided with a downwardly turned tab portion 244 slightly spaced from, but parallel to rear wall 246 of the carriage member. As shown in FIG. 7, a plunger 248 is provided in a bore 250 in rear wall 246 of the carriage and is biased against the downturned tab by a coil spring 252, thus to urge frame 208 in a clock-wise direction about its pivot 214 to hold the frame closely adjacent the top surface of the carriage. When in this position, the frame, as shown in FIG. 9, will be conditioned to clamp key-plates 202, 204 and 206 tightly to the carriage. Pins 254 are provided at the rear of the top surface of the carriage to provide stop means for the key plates as they are slid into position on the shuttle. FIG. 11 shows spring means consisting of a tension spring element 256 as a further means for clamping the key plates to the shuttle.

As indicated in broken lines 258 on FIG. 12, when the carriage is moved to its extended position projecting from bed plate 180, frame 208 is in an angularly raised condition relative to the top surface of carriage 182 thus to condition the carriage for receipt of, or removal of the key plates therefrom. In the presently illustrated embodiment of the invention, means for so raising the frame against the spring pressure of plunger 248 (FIG. 7) is provided by a cam pin 259 in a trailing portion 260 of side wall 212 which, when the shuttle moves forward, engages cam surface 263 of a fixed lug 264, and as the shuttle continues to move forward, cams frame 208 upwardly in a clock-wise direction, at the same time overcoming the spring pressure exerted on rear tab 244 by plunger 248 (FIG. 7). In the fully extended position of the carriage, cam pin 259 is upon the flat surface 266, thus to hold the frame in its raised condition while the carriage is extended. A handle 267 (FIG. 21) is provided for moving the shuttle carriage.

A normally open switch, as shown in FIG. 8, is adjustably attached to base plate 30 as by screws 268 extending through slot 270 in bracket 272 upon which the switches are mounted. A switch is located at the rear of and in line with each of the key plate sections of the carriage for the purpose to be described hereinafter. By way of explanation at this point, however, each key receiving area of the carriage is provided at its trailing edge with a switch actuating arm 274 pivotally mounted to the carriage by pin 214 and normally held—by its own weight—in the broken line position indicated by numeral 278. When the carriage—sans plates—is moved from its extended to its retracted position, the switch actuator arm 280 contacts end portion 282 of arm 274 and pivots it to its full line condition. However, when the key plates are in position upon the carriage, as described above, and the carriage is moved to its retracted position, movement of member 274 to its full line position is prevented by contact of projections 284 against the under side of the plates. When this condition exists, end portion 282 remains in its broken line position and moves switch arm 280 upwardly to close the switch for the purpose to be explained hereinafter.

Means for preventing the carriage being moved from its retracted to its extended position under certain conditions of operation, is illustrated in FIG. 6, and comprises a solenoid 285 secured to a projection 286 of frame 30 by way of bracket 287 secured to the frame by screws. When the solenoid is energized its armature 288 is moved to its extended position, as shown in broken lines, into a notch 289 formed in the edge 290 of the trailing portion 194 of the shuttle carriage base plate, thus to prevent the shuttle from being moved to its extended position. However, when the solenoid is

de-energized, the armature is moved by spring 291 to its retracted position.

On the opposite side of the shuttle carriage base plate from the solenoid 285 is an imprinter for validating operation of the recorder under certain conditions, as more fully described in the above mentioned co-pending application. More specifically, it comprises a solenoid 292 secured to a projection 293 of frame 30, as by bracket 294 and screws 296. Armature 298 of this solenoid is provided with a link extension 300 secured thereto by pin 302. The other end of the link extension is pivotally secured to the lower end of a crank arm 304, as seen more clearly in FIG. 13. The upper end of the arm is secured to the end of a shaft 306 rotatably mounted in projection 293 of base plate 30. Secured over the right-hand end of shaft 306 on the other side of the frame projection is a sleeve 310 having a pin 312 projecting from its periphery in a position to be moved to and from printing position solenoid 292, as will be explained later.

Having now described the shuttle and its movement transverse to the movement of tape 32 and between extended and retracted positions wherein the indicia bearing key plates may either be inserted or removed, let us now consider the means for imprinting the indicia of the key plates upon the above mentioned record mediums when the shuttle is in its retracted position containing key plates.

As seen in FIG. 13, base plate 30 is provided with a pair of spaced apart forwardly projecting walls 316 and 318. Spaced from each other, but extending across and preferably parallel with the top surface of the shuttle carriage 182, is a pair of guide rods 320 and 322 (FIG. 15). Slidably mounted on these guide rods is a substantially U-shaped slide member 324, the opposite legs 326 and 328 of which are bored, as indicated at 330 and 332, for receiving the guide rods whereby the slide may be moved between the retracted and extended positions shown by the full and broken line in FIG. 13, and by means described below. Bores 330 and 332 are of greater diameter than rods 320 and 322 but the opposite ends of the bores are provided with bearing members 334 and 336 to engage the rails. For reasons to be more fully disclosed hereinafter, means is provided to afford frictional resistance against free sliding movement of slide 324 on the rails. This means comprises a spring pressed plunger 338, the frictional engagement thereof with rod 320 being adjustable by turning screw 340 either inwardly or outwardly, as desired.

Mounted to slide 324 between its legs 326 and 328 for limited pivotal movement relative thereto, as by pins 342 and 344 (FIG. 15), is a platen carrying block 346 to which the roller platen 348 is mounted, as shown in FIG. 14. The platen comprises a roller 350 preferably of slightly resilient material, rotatably mounted between depending legs 352 and 354 of an inverted U-shaped yoke 356 as by axle 358. The yoke is mounted to platen block 346 by an upwardly but angularly extending shaft 360 projecting through block 346 with a nut 362 threaded on its upper end. A pair of coil springs 364 and 366, one on each side of shaft 360, urges the yoke and consequently roller 350 in a resiliently conditioned downward position.

Means for moving the slide to and fro over guide rod 320 and 322 is provided by crank means 370 shown at the right-hand side of FIG. 13. A crank arm 372 is fixed to the outer end 374 of motor shaft 168, see FIG. 5 also. Rotatably secured to the outer end of crank arm 372 is one end of a link 376, the other end of which is pivotally secured to platen block 346 by pin 378 (FIG. 15). The left end 379 of link 376, the present form of the invention, comprises a yoke 380, the ends of which span the upwardly projecting abutment 382 through which pin 378 extends to secure the link to the platen block. The right-hand end of the link is an enlarged arm portion 383 threadedly receiving the right end of an intermediate link portion formed by rod 384. The length of the link may be adjusted by turning the rod either inwardly or outwardly of arm 383 and locking it in position by the lock means 386 comprising a pair of lock nuts.

The full line condition of the mechanism, as shown in FIG. 13, illustrates the condition of the apparatus shortly after being energized, as will be described hereinafter, and after crank 372 has rotated approximately forty-five degrees from its start position. The platen block 346 has been rotated counter-clockwise from a position in which the platen roller 350 was in the broken line position at 350A, to the full line position determined by the position of an adjustable stop pin 388 in block 324, and wherein the roller is slightly to the right of a line drawn perpendicularly through pivot pin 342 (such as line 15—15) whereby the forces against the roller as it moves across shuttle 96 will be in a direction to the right of pivot pin 342 thereby to defeat any tendency of the roller to bounce to its retracted position (broken line 350A) due to the forces exerted during its movement across the shuttle. It will also be seen that movement of the roller platen to its full line position, also moves the record tape downwardly below pin 100 thus taking up any slack in the tape between guide rollers 92 and 94 and pin 100.

Continued rotation of crank means 370 will cause slide 324 to move leftwardly to its fully extended terminal position, indicated by broken lines 390, at the left-hand end of rods 320 and 322. When the slide reaches this position, crank arm 372 will be pointing directly to the left. Continued movement thereof in a clockwise direction will exert a force to the right, first effecting clockwise rotation of platen block 346 and thus the platen roller from its printing condition shown by the broken line circle 392, to the retracted condition shown by broken lines 394. Further movement of the crank in a clockwise direction will then move the slide to the right, returning it to its retracted position while maintaining the platen in its retracted condition during this movement and out of contact with the shuttle.

Simultaneously with the return movement of the platen during a printing cycle, as just described, means is provided to feed the record tape across the shuttle thus to present a clean portion over the shuttle for a subsequent printing cycle. As previously described, threading of the record tape through the apparatus passes it between jaws 102 and 104 of a tape feeding mechanism 106 (FIG. 1).

With reference now to FIGS. 13 and 16, it is seen that jaw 104 extends forwardly—toward the viewer, as seen in FIG. 13, to the right as seen in FIG. 16—as an integral part of an upwardly extending plate 400 slidably mounted on a vertically positioned guide member 404 secured to base plate 30 as by leg portions 406.

A pair of spaced rollers 408 are carried by plate 400 and ride in a groove 402 in guide member 404 which is sandwiched between plate 400 and a back plate 410 resiliently secured to the assembly by spring washers 412 on the ends of pins 414 forming the axles of the rollers 408. Friction elements 416 are provided on both sides of plate 404 and are resiliently urged against the plate by spring washers 412 to provide some frictional resistance to the movement of the feeder 104 during a cycle of operation. The jaw 102 is pivotally mounted on plate 400 of jaw 104 by a pin 418. Pivotally connected to the upper end 420 of movable jaw 102 by pin 422 is one end of an actuating link 424, the other end of which is secured to the slide member 324, as indicated at 426 on FIG. 13.

Now it will be understood that movement of slide 324 by crank 370 will drag link 424 along with it, and by reason of the frictional resistance of elements 416 (see FIG. 16), movement of the link to the left first will cause the pivotally mounted jaw 102 to rotate in a

counter-clockwise direction, as seen in FIG. 13, away from fixed jaw **104** until stopped by pin **425**, disengaging the jaws from the record medium and permitting the record medium to remain stationary during the printing portion of the cycle. After the slide reaches its terminal position and begins its return to its starting position, the frictional resistance of pin **338** on guide rail **320** (see FIG. 15) will tend to hold the slide in its advanced position thus effecting rotation of the platen block **346** in a clockwise direction to the broken line position **394** in FIG. 13. At the same time, the frictional resistance of elements **416** on the plate **404** will tend to hold jaw **104** in the broken line position shown at **428**. Thus, when slide **324** begins its return movement, a stronger force will urge jaw **102** to rotate in a clockwise direction as urged by link **424** causing the jaw to move downwardly to the position shown at **430** in FIG. 13 gripping the record tape at that point. Continued movement of the mechanism to its starting position will now feed the tape to the right and draw an unrecorded portion from the tape supply into printing position over the shuttle. Normally the movement required of slide **324** is more than needed to feed a clean portion of tape over the shuttle, therefore to save tape, a lost motion slot **424A** is provided in the right-hand end of link **424**.

As understood from the description above, motor **174** will rotate gear **164** one complete revolution, thus, in turn, exerting a driving force on the sheaves **152** of the take-up reels **116** and **118**. But as long as jaws **102** and **104** are gripping the paper or the platen roller is in contact with the shuttle it will be impossible for the tape to be fed through the machine, therefore the sheaves rotate independently of the shafts upon which they are mounted, and consequently there is no rotation of the take-up reels. However, on the return movement of the tape feed mechanism the tape will be moved to the right freeing the take-up reels for rotation by means of their friction clutches (FIG. 3) thus to take up the slack in the record tape as it is fed to a new printing position. It should be understood that in this embodiment the driving force of the take-up reels is not sufficient to overcome the braking force of the supply reel, therefore paper advance is only by means of the paper feed mechanism. One complete rotation of gear **164** is sufficient to rotate the take-up reels **116** and **118** more than enough to take up the amount of tape fed by the tape feed means on each cycle of operation, and therefore, during each cycle there may be periods at both the beginning and end of a cycle when the reels will not be rotated even though sheaves **118** are turning. It will also be understood that by reason of the slip clutch means, the amount of rotation of each of take-up reels **116** and **118** may vary thereby to accommodate the difference in the amount of feed of tape layers **84** and **86** by reason of the displacement of the take-up reels from each other and the difference in the length of the respective layers. The gripping portion **102A** of jaw **102**, as seen in FIG. 16, is adjacent the inner edge of the tape, the non-gripping extensions of both jaws **102** and **104** being provided for facilitating the threading of the tape through the machine, as described above.

In the use of the apparatus in the environment set forth in the above mentioned co-pending application, it is desired to have the mechanism in a completely enclosed locked housing whereby the tape record is sealed against mutilation or tampering during operation of the mechanism. This housing is shown in FIG. 21 and consists of a box-like casing **440** completely enclosing the mechanism except for the narrow slot **442** which is formed in the front wall of the housing between the lower edge of an access door **444** and the housing, just above the shuttle mechanism. The door **444** is hinged to the housing across the top thereof as indicated at **445**, and is locked to the housing by means of a latch **446** just above a starter button **448** and a tape out light **450** described hereinafter. In this figure the shuttle is shown near its extended position wherein it receives the charge or key plates **202**, **204** and **206**.

With the shuttle in its completely extended position, the frame **208** is in its raised condition (broken line **258** in FIG. 12) and the tab **232** (FIG. 10) on its rear cross-rail **220** will be out of contact with plunger **238** thus permitting an edge **251** of a charge-voucher V (FIG. 20) to be inserted between the tab and the plunger. Movement of the shuttle to its retracted position causes the voucher to be gripped and held by the tab and plunger, and moved into the housing through slot **442** and beneath tape layer **86** (FIG. 1). The vouchers may take other forms than that shown, but this one is exemplary. Those portions of the voucher identified with the letter "c" are carbon paper thus to imprint the plate indicia on the portions marked **V1**, **V2** and **V3**, during a printing cycle.

In a modification of the invention, the spring pressed plunger **248** (FIG. 7) and the rear tab **244** of cross-rail **220** may be eliminated along with the cam **263** (FIG. 12), all being replaced by a cam track **460**, as shown in FIG. 22. In this modification the cam pin **262** is guided throughout its travel by the cam surface **462**, being urged thereagainst by the light spring **256**, one of which is shown in FIG. 11.

During movement to its extended position, the shuttle frame **208** is opened by contact of pin **262** with cam track portion **464**, similar in shape to tab **264** (FIG. 12). At its right-hand end, as seen in this figure, the cam surface **462** is provided with a slightly raised portion thus to effect additional plate clamping force on the frame at the end of the shuttle movement to its fully retracted position.

As described, it is important in this embodiment that the recorder not be operated without tape as no permanent record would be made. Therefore, means has been provided to indicate when the tape is about exhausted. In FIG. 1 a tape feeler arm **470** is shown pivotally mounted to base plate **30** by pin **472** and resting against the tape roll. A similar arm **474** connected at its base **476** to feeler arm **470** is arranged at the rear of flange **66**. As the tape diminishes the arms will follow and the path of movement will be such that arm **474** will effect actuation of the tape-out switch **SW6** secured to the rear face of base plate **30**, breaking the operating circuit and lighting signal lamp **450**, as described below. Actuation is effected by means of the wire **477** carried by switch actuating arm **478** pivotally mounted on the switch. The wire extends from the arm into the path of movement of arm **474**.

Control circuit

While the recorder is operable in response to sensing of an issued package as described in the above mentioned co-pending application—and reference may be had thereto, for the description of such operation—the schematic of FIG. 23 is primarily for independent operation in response to closing of a start switch **SW5**. However, before describing the operation in response to closing switch **SW5**, a description of the functions of the various switches and relays will be helpful.

SW3 is the stop switch seen in FIG. 2 on the back of base plate **30**. Its function is twofold; first it permits the motor to complete its cycle once it has started; and secondly when the cam **C1** transfers the common contact from the N/C side of the switch to the N/O side, it will break the motor circuit and discharge capacitor **C13** through its points thus to brake the motor to a stop.

SW4 is the recycle switch also seen in FIG. 2 next to switch **SW3**. When the cam hits this switch, its N/O contact picks relay **K10**.

SW5, as mentioned above, is the start switch which is operated by a push button **443** located on the front panel of the recorder housing **440**.

SW6 is the tape-out switch mentioned above, and seen in FIG. 2. With tape in the recorder the N/O contacts of the switch cooperate with other switches to complete

the circuit to energize the recorder. When the tape is depleted, the common of the switch is transferred to its N/C contact, breaking the operating circuit, and simultaneously energizing the tape-out light 450.

SW7, SW9 and SW10 are the key plate switches also seen in FIG. 2. These are normally open switches operated by plates on the shuttle, and all three must be closed before the recorder can be operated.

SW11 comprises an interlock switch which is associated with latch 446 (FIG. 21). The key that is used to open the door 444 operates this switch to prevent operation of the recorder when the door is unlocked.

K10 is an interlock relay not shown in the other figures of the drawings, but used to prevent double cycling of the recorder by an operator.

K14 is the shuttle solenoid 285 (FIG. 6). When this is energized, a mechanical interlock, as described heretofore, will prevent the shuttle from being pulled out while the recorder is operating.

K16 is the validating solenoid 292 (FIG. 6).

The operation of the equipment is as follows: the operator places the three plates on the shuttle, pushes the shuttle into place, and depresses the start button 448 causing the recorder to operate for one cycle only. It will not operate again until the shuttle is withdrawn from the unit thus to release the interlock relay K10. When this is done the recorder is ready for another cycle of operation.

In the operating circuit (FIG. 23), the common A.C. line is the return line of all the circuits and may be followed from one side of the line to pin 1, then successively through interlock switch SW11, shuttle switches SW7, SW9, SW10, pins 5 and 8, to the left to G of interlock relay K10, and to the right to the tape-out light 450 and G of shuttle solenoid K14, then to the negative side of capacitor C13, to G of validating solenoid K16, and A of the motor.

When the door 444 (FIG. 21) is closed, interlock switch SW11 is closed, and with all three key plates 202, 204 and 206 in place on the shuttle in its retracted position, switches SW7, SW9, and SW10 are closed, completing the common A.C. line circuit.

When the start button switch SW5 is depressed, the circuit to start the motor is completed from the other side of the A.C. line successively through pin 13, tape-out switch SW6 N/O (now closed because of sufficient tape on reel 34), pins 11 and 9, start switch SW5 (now closed), pins 16 and 14, and K10–4 N/C to pin 3. From pin 3. the circuit branches out to pin 2 thus to energize the shuttle lock solenoid K14, and to pin 17 to complete the circuit to B, starting the motor.

After the motor has started, the cam C1 (FIG. 2) will move off stop switch SW3 which transfers to its N/C side and the motor will operate continuously until the cam again transfers the contact of this switch. With the motor circuit completed through the N/C contact of SW3, the motor operates independently of the start switch as follows: from one side of the line (pin 12) to the common of stop switch SW3 through SW3 N/C to the motor. Components R6 and C14 are arc suppressor components. While the motor is running through the contacts of SW3, capacitor C13 is being charged through CR15 and R7.

As the recorder nears completion of the cycle, the cam will close recycle switch SW4 momentarily, to energize or pick interlock relay K10 as follows: from one side of the line through pin 12 to the common of SW4 N/O, to pin 7 which branches out to pins 4 and 18. The line to pin 4 will pick relay K10, while the line from pin 18 will hold relay K10 through pin 12, K10–1 now closed (as a result of picking K10 through SW4) through pins 18 and 4, to the coil of relay K10.

When the cam rotates around to switch SW3, it will transfer the contact from the N/C to the N/O side, opening the motor circuit to stop the motor. At the same time shuttle lock K14 circuit is opened unlocking the shuttle,

and the contact on the N/O side will discharge capacitor C13 through the motor winding stopping the motor from drifting or over-running. Discharge of the capacitor is as follows: the negative side of the capacitor to side A of the motor, and the positive side to side B of the motor through the common contact of K10–2, K10–2A, pins 19 and 15, and the N/O side and common of SW3.

After the recorder has completed its cycle, it will be impossible for it to restart without resetting. If the start button is depressed after completion of a cycle the circuit will not be completed to start the motor because of K10–4 switch being open.

If the tape in the equipment should run out, the common of tape-out switch SW6 is transferred to the N/C side which will light the tape-out light, and at the same time open the start circuit of the recorder preventing its operation. Should the tape run out in the middle of a cycle, the unit will not stop until completion of the cycle. This is possible because the circuit for the recorder is completed directly from one side of the line at pin 12 and through stop switch SW3 to the motor.

The validating solenoid is not used in the independent operation of the recorder, as described above, but is provided for use in the system described and claimed in the above identified co-pending application to show that an article was dispensed, contact 21 being provided for this purpose.

The modified form of the invention shown in FIGS. 24 and 25 differs from the preferred form primarily in the construction of the roller platen mechanism and its operative relationship with the movable shuttle.

The top surface of the shuttle 504 is concave in the areas upon which the patient and drug plates are supported. The roller platen mechanism 506 comprises roller 508 having its ends journalled in a pair of spaced L-shaped arm members 510 and 512 each pivotally mounted at 514 on opposite sides of a slide member 516 comprising a pair of blocks 518 and 520 mounted on horizontally positioned guide rods 522 and 524 respectively. The rods are supported on base plate 526 between walls 528 and 530 projecting forwardly from the base plate and fixed thereto, as by set screws 532.

Means for sliding the member 516 across guide rods 522 and 524, thus to move the roller 508 over and in contact with the shuttle whereby the indicia on key plates 202, 204, and 206 mounted on the shuttle may be printed on the record medium, as described above, is provided by a motor 534 and a crank 536 attached to the outer end of motor shaft 538. The outer end 539 of crank 536 is pivotally connected by pin 540 to a connecting rod 542, the other end of which is pivotally connected to a pin extending between and interconnecting slide blocks 518 and 520.

The roller 508 is biased downwardly to its terminal printing position by a coil spring 544 surrounding a shaft 546 having its lower end connected to the horizontal arms 548 of the L-shaped links 510 and 512, as indicated at 550. The upper end of shaft 546 extends through a slot 552 in the connecting rod 542 adjacent slide number 516 and has a pair of lock nuts 554 threaded on its upper end whereby the terminal position of the roller 508 may be adjusted in accordance with the printing pressure desired.

While the paper tape has not been shown in this figure, it will be understood that it will be fed from the supply reel 556 to the left and separated over guide rollers 558, course downwardly over guide rollers 560, to the right over shuttle 504 under the roller platen 508, through the jaws 562 and 564 of the feeding mechanism 565, around the guide rollers 566, and upwardly over guide rollers 567 to terminate on the take-up reels 568 and 570.

As already described above, paper feed is effected by the movement of a drag link, 572 in this embodiment, during movement of the slide member 516 over guide rods 522 and 524. In this regard, the left-hand end 573 of

drag link 572 is connected to the pin 514 on the inner side of block 520 adjacent base plate 526, while its other end is connected to the upper end of the pivotally mounted jaw 564 of the feeding mechanism 565 by pin 574. It will be understood that movement of link 572 during movement of the platen mechanism 506 to the right, as described hereinafter, causes the jaw 564 to be pivoted in a clockwise direction to move its rightward projecting finger portion 576 against the fixed jaw 562, first to grip the record tape and then move an unprinted portion of the tape over the shuttle for a subsequent printing operation. Counter-clockwise rotation of the jaw 564 is terminated by the stop pin 577. The jaws 562 and 564 are both carried by a block 578 slidably mounted on a track 579 on base plate 526.

The particular advantage afforded by this modified form of the invention will be more clearly understood with reference of FIG. 25. In this figure the large circle 580 on the right illustrates the path of movement of pin 540 interconnecting rod 542 with crank arm 536. A cycle of operation normally begins with the crank arm extending to the right from motor shaft 538 with pin 540 at the extreme right-hand side of the circle 580, and the connecting rod 542 extending directly to the left to the pin 514 from which depend the angle members 510 and 512 of the platen mechanism 506 placing the roller 508 in its start position adjacent the upper right-hand corner 582 of the shuttle 502.

Now, when the start button is actuated—as described heretofore—the crank 536 moves downwardly from its position indicated by the small circle 584 at the extreme right of the large circle 580, with the connecting rod 542 assuming an increasing angular relationship relative to and below guide rods 522 and 524 and simultaneously therewith, by reason of its movement to the left, moving the slide member 516 to the left across the rods 522 and 524. Almost immediately upon the start of this movement, platen roller 508 is brought into contact with the patient key plate on the top of the shuttle. When the crank pin 540 reaches the position of small circle 586 at the bottom of large circle 580, roller 508 has moved across the patient plate and is at the lowermost portion of the top surface of the shuttle (508A) following the path of movement indicated by line 588.

Continued rotation of the crank arm 536 to the position extending directly to the left as indicated in FIG. 25 by the small circle 590, moves roller 508 successively over the drug plate and the nurse's plate on the remaining top portions of the shuttle to terminate at 508*b*, corresponding to the position shown in FIG. 24. Continued rotation of crank 536 now raises the connecting rod 542 in an increasing angular relationship above rods 522 and 524 thus to raise the platen roller 508 above the shuttle 502 during its return to the start position and during which it will follow the path indicated by the line 594.

By reason of the above-described construction a substantially uniform pressure is applied against the record medium or tape as the roller moves over the plates on the top surface of the shuttle. The normal path of the roller in the absence of the shuttle would be that indicated by the line 596, its displacement from this line being indicated by the shaded area between the lines 596 and 588 thus to represent the amount of pressure exerted by the spring 544 during printing of the indicia on the record medium. In the preferred form of the invention the movement of the platen is in a straight line during its movement both to and from extended and retracting positions, whereby substantially uniform pressure is applied. From the above it is understood that in both forms of the invention a substantially uniform printing pressure is applied during a recording cycle.

We claim:

1. A cyclically operable recorder comprising:
(*a*) support means for removably supporting indicia bearing key plate means;
(*b*) a roller;
(*c*) guide means for said roller fixed above and spaced from said support means;
(*d*) means mounting said roller on said guide means for movement across said key plate support means through a cycle of operation to and from retracted and extended terminal positions on transversely opposite sides of said support means, said mounting means permitting limited relative movement of said roller toward and away from said support means;
(*e*) means for carrying a supply of record tape;
(*f*) take-up means for receiving said tape from said supply;
(*g*) means for guiding said tape from said supply over said key plate support means under said roller and to said take-up means;
(*h*) actuating means for moving said roller to and from its extended and retracted positions and simultaneously therewith urging said roller and therefore said tape tightly against said key plate when in said support means during such movement of the roller from its retracted to its extended terminal position, and away from such contact on return of the roller to its retracted terminal position, thus to make an impression of said key plate indicia on said tape only on its movement to the extended position.
(*i*) means responsive to the movement of said roller moving means on its return movement to said retracted terminal position to grip and advance said tape incrementally to said take-up means during the said return movement thus to move a different portion of said tape over said key plate supporting means for subsequent impression of key plate indicia thereon;
(*j*) motor means for effecting a cycle of operation of said actuating means to move said roller from its retracted position to its extended position and return it to its retracted position; and
(*k*) control means for the starting and stopping of said motor to complete each cycle of operation; wherein
(A) said tape supply means comprises,
(1) a reel of tape, and
(2) friction brake means for said reel; and
(B) said take-up means comprises,
(1) a reel upon which said tape is received,
(2) friction drive means for said reel, said drive means being of less force than said brake means whereby tape feed is only by said tape advance means; and
(3) means for driving said friction drive means by said motor means.

2. A recorder according to claim 1 wherein:
(*a*) said tape comprises two layers;
(*b*) said guide means includes spindle means for separating said layers; and
(*c*) said tape take-up means includes a reel for each tape layer.

3. A recorder according to claim 1 and further including:
(*a*) electro-mechanically operated means for validating the operation of said recorder by recording a validating mark on said tape during imprinting of said plate indicia.

4. A recorder according to claim 1 wherein:
(*a*) said key plate support means comprises a movable shuttle member; and further includes;
(*b*) means supporting said shuttle for movement transverse to the movement of said tape between a first position wherein said key plate is under said tape, and a second position wherein said plate is not under the tape and in a position convenient for placement of a key plate on, or removal thereof from said shuttle.

5. A recorder in accordance with claim 1 wherein;
(*a*) said guide means extends transversely across and spaced above said key plate supporting means;

and wherein said roller mounting means comprises,

(*b*) a first member movably mounted upon said guide means;

(*c*) a second member mounted upon said first member for limited pivotal movement relative thereto between first and second positions with one end thereof adjacent said key plate supporting means with said roller being carried by the said one end of the second member; and wherein

(*d*) said actuating means during initial movement from said retracted to said extended position first pivots said roller carrying second member from its first to its second position conditioned for effecting an impression of said indicia upon said record tape as said roller moves over said key plates, and upon return movement of said first member to its retracted position, to move said second member to its first position with said roller out of contact with said key plates, said first and second positions of said second member being on opposite sides of a vertical line drawn through its pivotal mounting whereby printing forces are in a direction to prevent rebound of said second member to its first position during a printing operation.

6. A recorder in accordance with claim 1 wherein said roller guide means and said roller mounting means comprises;

(*a*) fixed guide rail means extending transversely across and spaced above said key plate supporting means;

(*b*) a first member movably mounted upon said guide rail means;

(*c*) a second member mounted upon said first member for limited pivotal movement relative thereto between first and second positions with one end thereof adjacent said key plate supporting means with said roller being carried by the said one end; and wherein

(*d*) said actuating means during initial movement from said retracted to said extended position first pivots said roller carrying second member into position for effecting an impression of said indicia upon said record tape then moves said first member over said roller guide means and said roller over said key plates, and upon initiation of return movement to retracted position moves said roller carrying member to a position wherein said roller is out of contact with said key plates, and finally moves said roller carrying member and said movable member to the retracted position.

7. A recorder in accordance with claim 6 wherein:

(*a*) said second member comprises an arm pivotally depending from said first member; and wherein said actuating means comprises,

(*b*) a crank for rotation by said motor means; and

(*c*) a connecting rod interconnecting said crank and said second member at the end opposite to the end carrying the roller thus to affect the pivotal movement of said second member on said first member to move the roller toward and away from the key plates support means.

8. A recorder in accordance with claim 4 wherein:

(*a*) said shuttle includes means for clamping said key plate tightly thereon.

9. A construction according to claim 8 wherein said clamping means comprises:

(*a*) a frame pivotally mounted on said shuttle, and

(*b*) cam means for moving said frame tightly against said key plate upon movement of said shuttle to its said first position and away from said shuttle upon movement of said shuttle to its said second position, whereby said plate may be placed upon or removed from said shuttle.

10. A recorder according to claim 9 and further including:

(*a*) electro-mechanical means for positively locking said shuttle in its retracted position during recording.

11. A recorder in accordance with claim 4 and further including:

(*a*) circuit means rendered operable by said shuttle when in its first position and only in the presence of key plates on said shuttle to condition said recorder for a recording cycle of operation.

12. A recorder according to claim 9 wherein:

(*a*) said shuttle includes means for supporting and holding a plurality of key plates side by side; and

(*b*) circuit means rendered operable by said shuttle when in its first position and only in the presence of said plurality of key plates on said shuttle to condition said recorder for a cycle of operation.

13. A recorder according to claim 9 and further including:

(*a*) means on said cage cooperating with said shuttle for clamping an additional record medium on said shuttle during recording.

14. A recorer according to claim 12 wherein said circuit means further includes:

(*a*) a tape-out switch for inactivating said circuit; and

(*b*) feeler means urged against said tape supply in a manner so to actuate said switch when said tape supply runs out.

15. A recorder according to claim 14 wherein said circuit means further includes:

(*a*) reset means to prevent reactuation of said motor without first moving said shuttle toward its terminal extended position.

16. A recorder according to claim 15 wherein said reset means comprises:

(*a*) a relay;

(*b*) a reset switch;

(*c*) means for actuating said reset switch for energizing said relay; and

(*d*) means operable by said shuttle movement to de-energize said relay.

17. A recorder according to claim 16 wherein said circuit further includes:

(*a*) a stop switch; and

(*b*) cam means operable by said motor for operating said reset switch and said stop switch in sequence, first to actuate said reset relay, then to shut off the motor.

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