

April 2, 1963

G. W. CHILDS ET AL
PRINTING RECORDERS

3,083,641

Filed Sept. 15, 1960

12 Sheets-Sheet 1

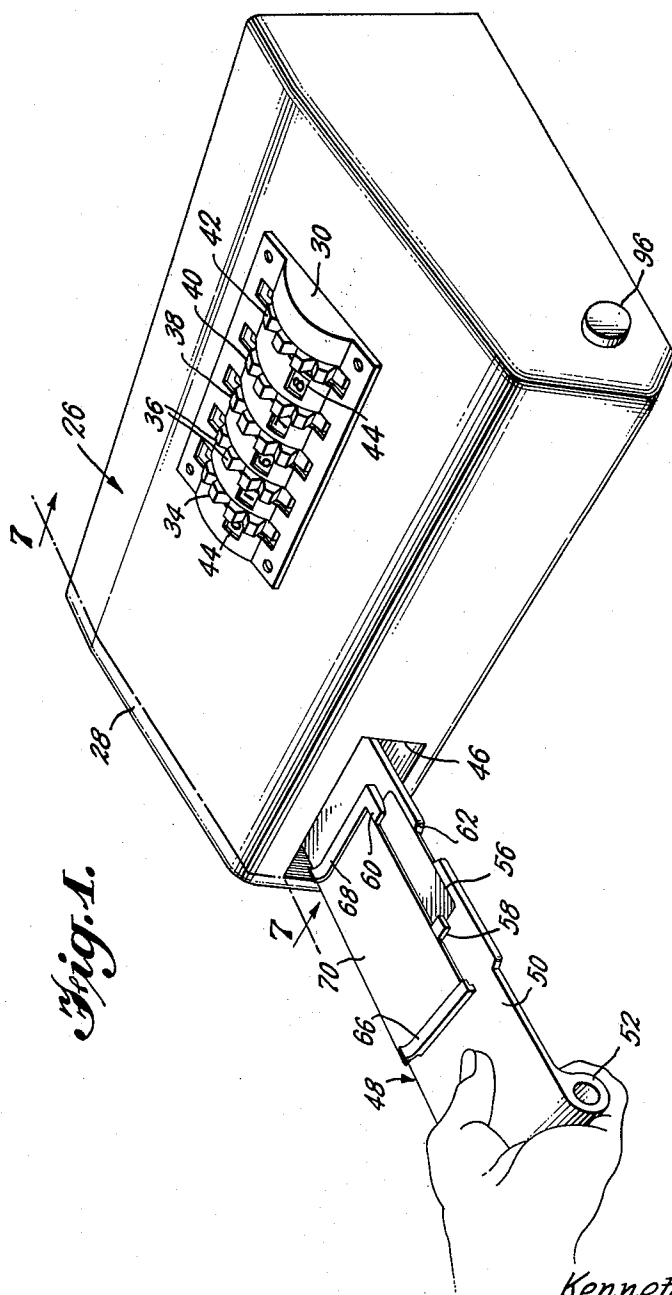


Fig. 1.

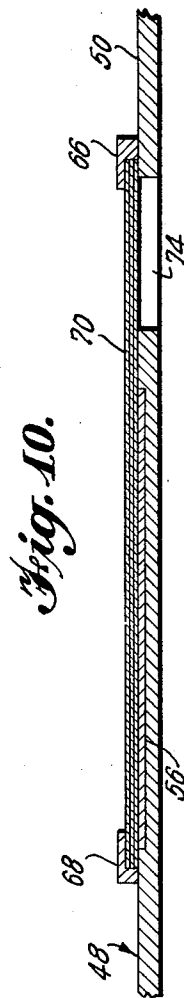


Fig. 10.

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Fig. 2.

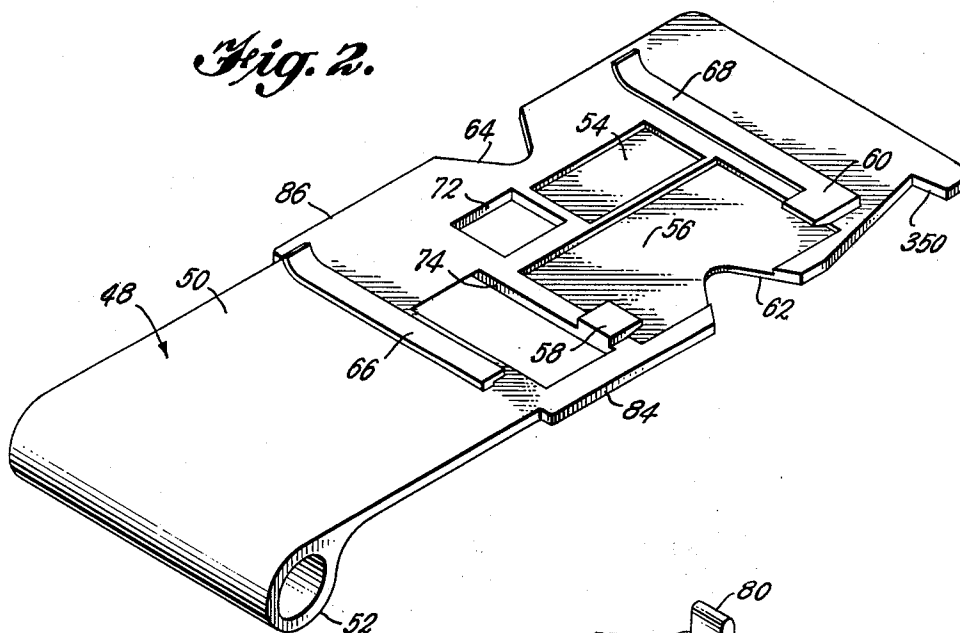
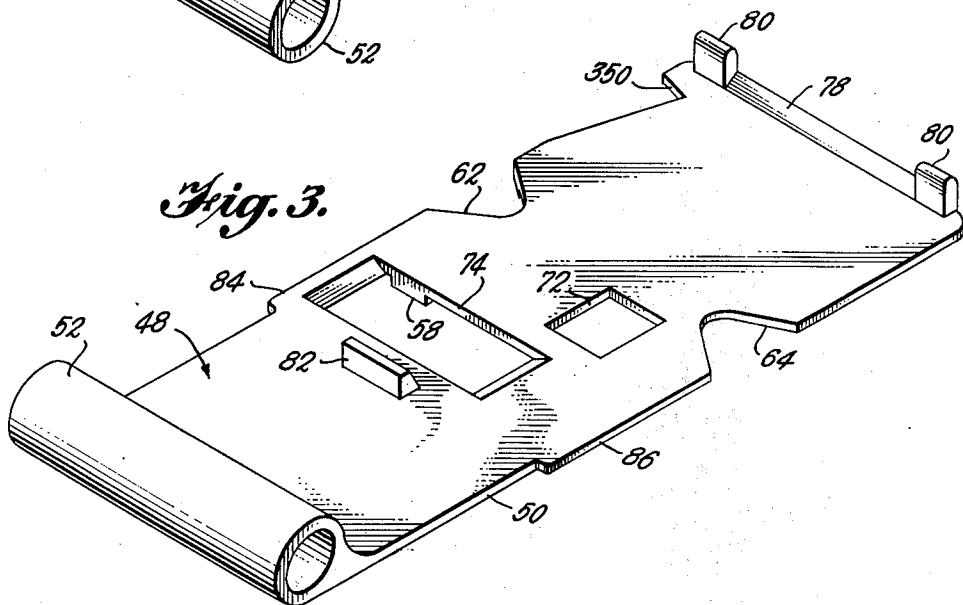


Fig. 3.



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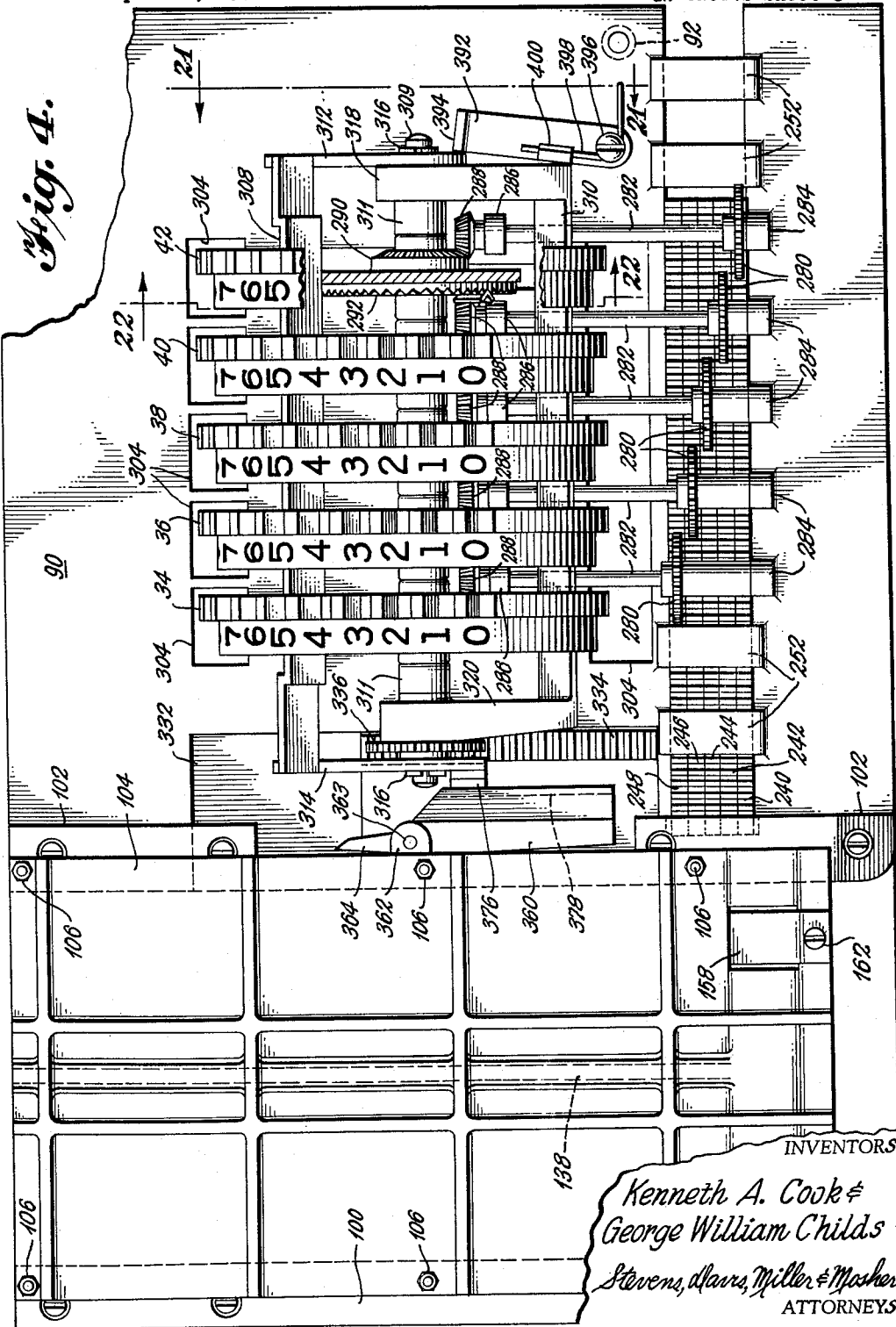
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Fig. 4.



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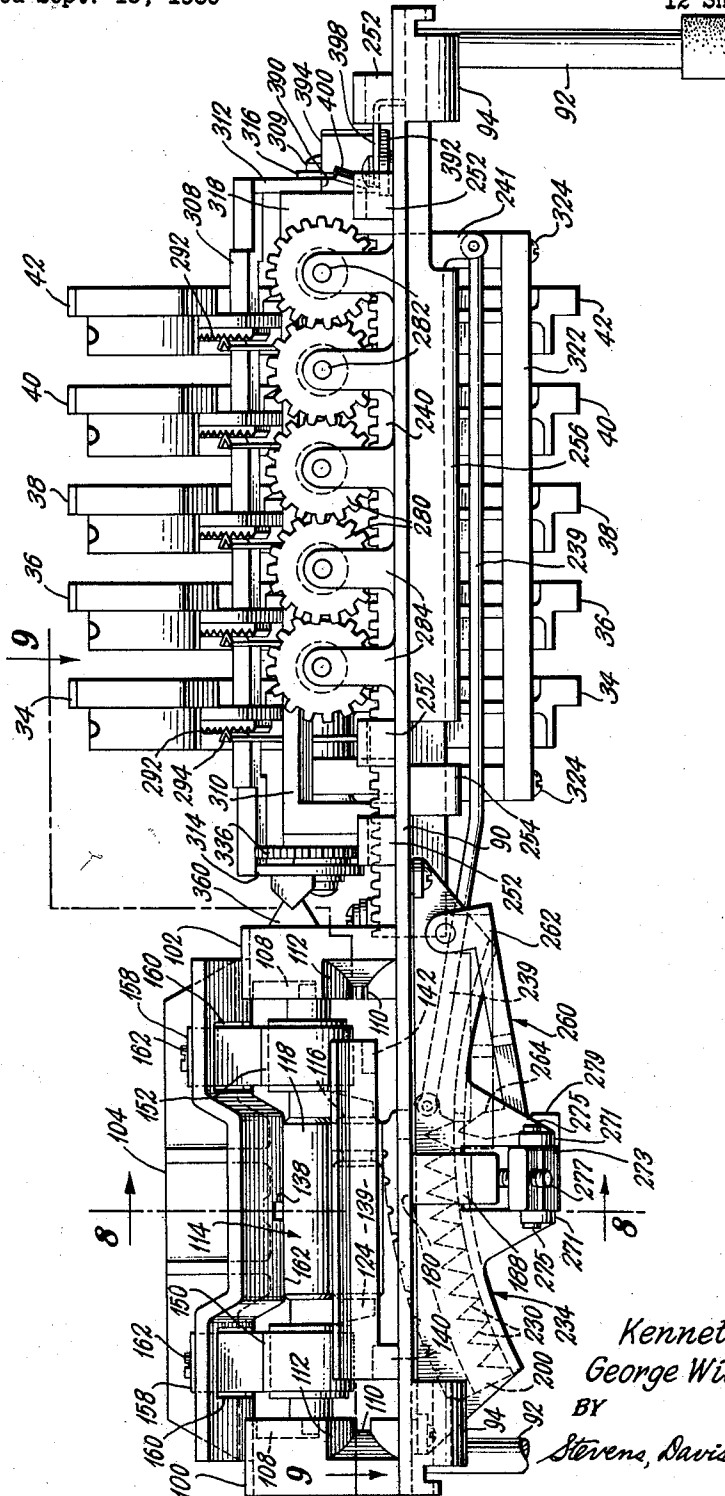


Fig. 5.

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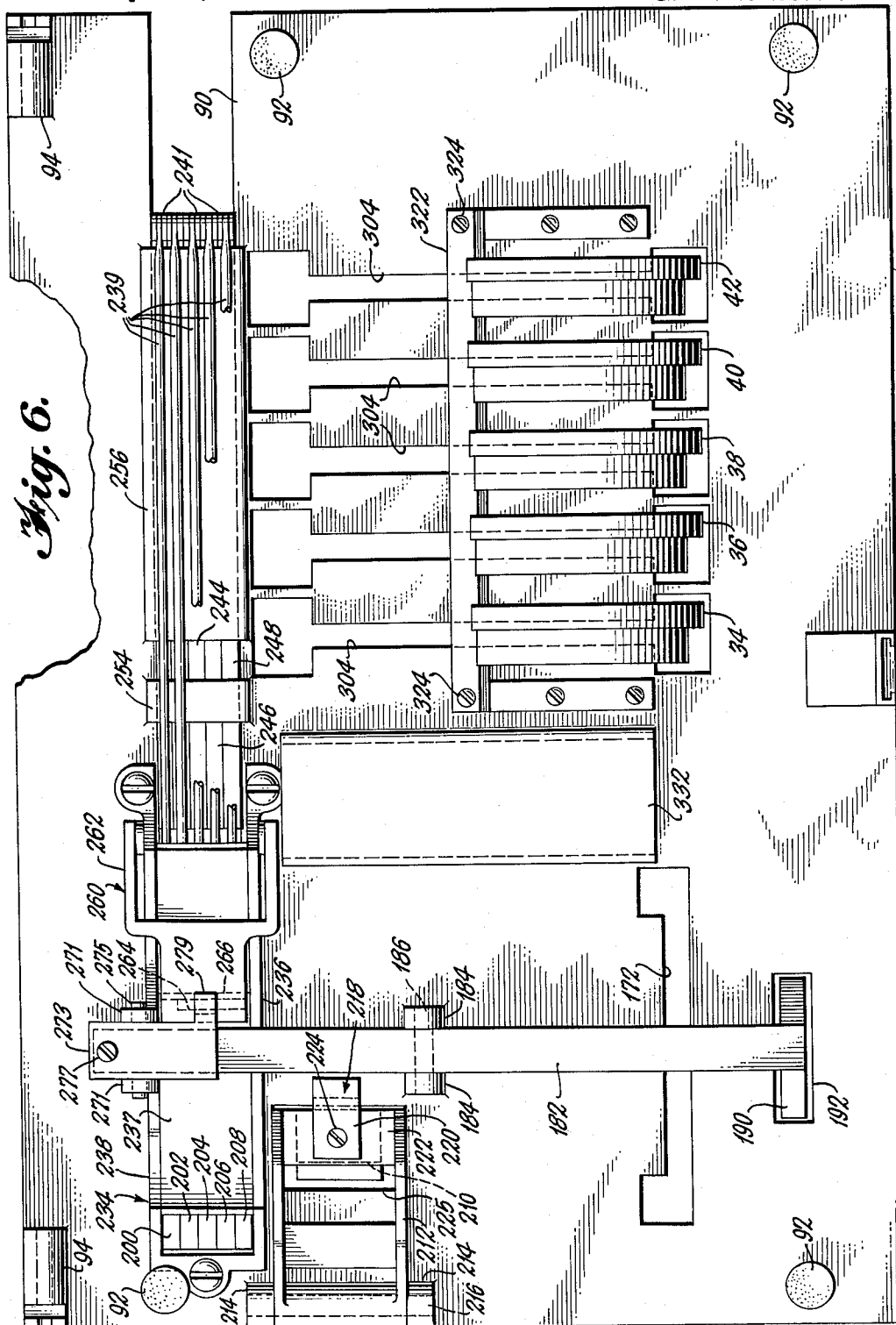
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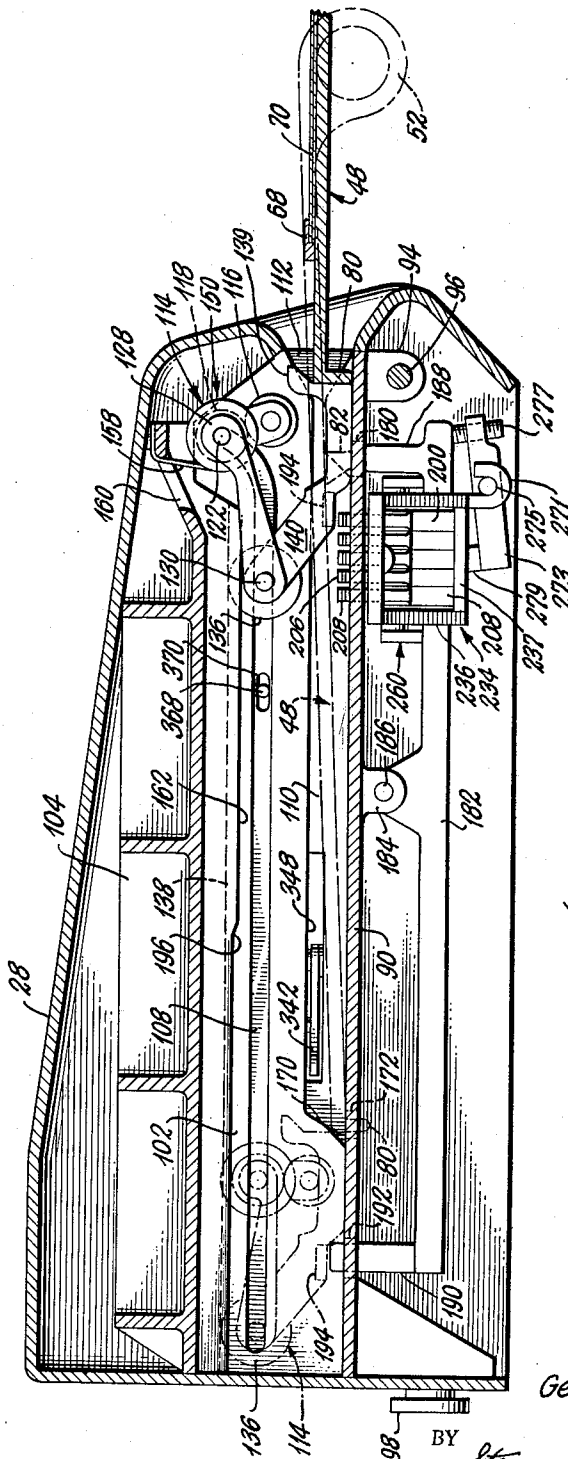


Fig. 7.

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Fig. 8.

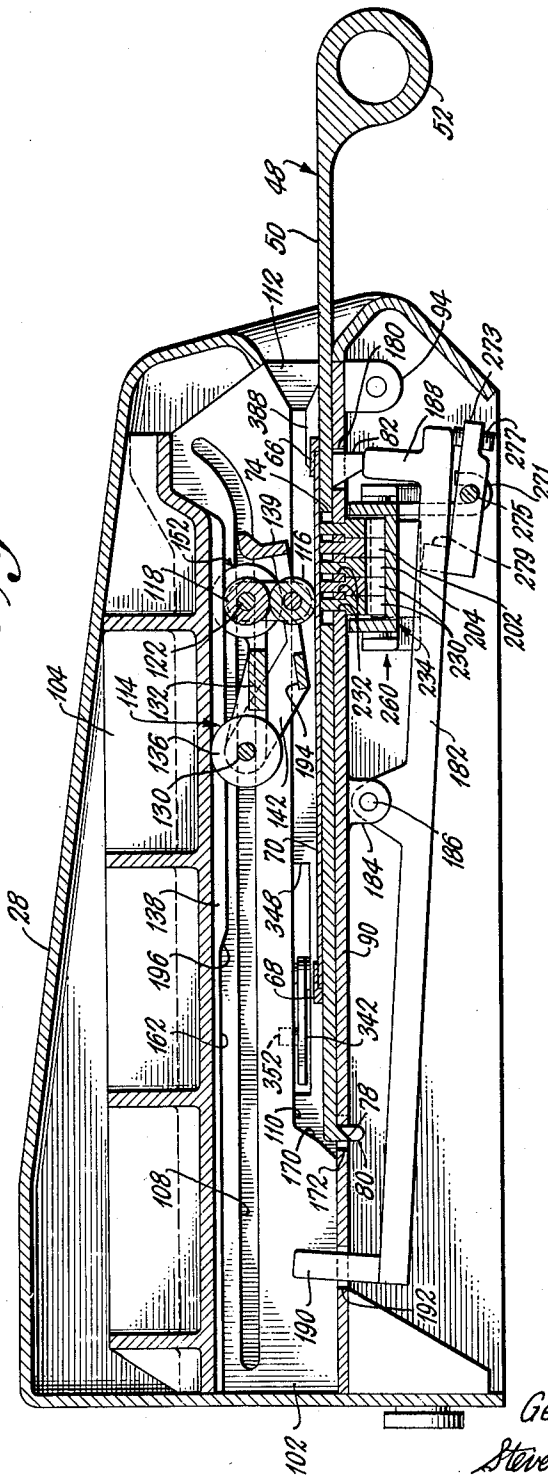
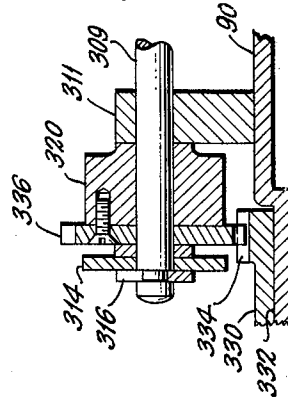


Fig. 24.



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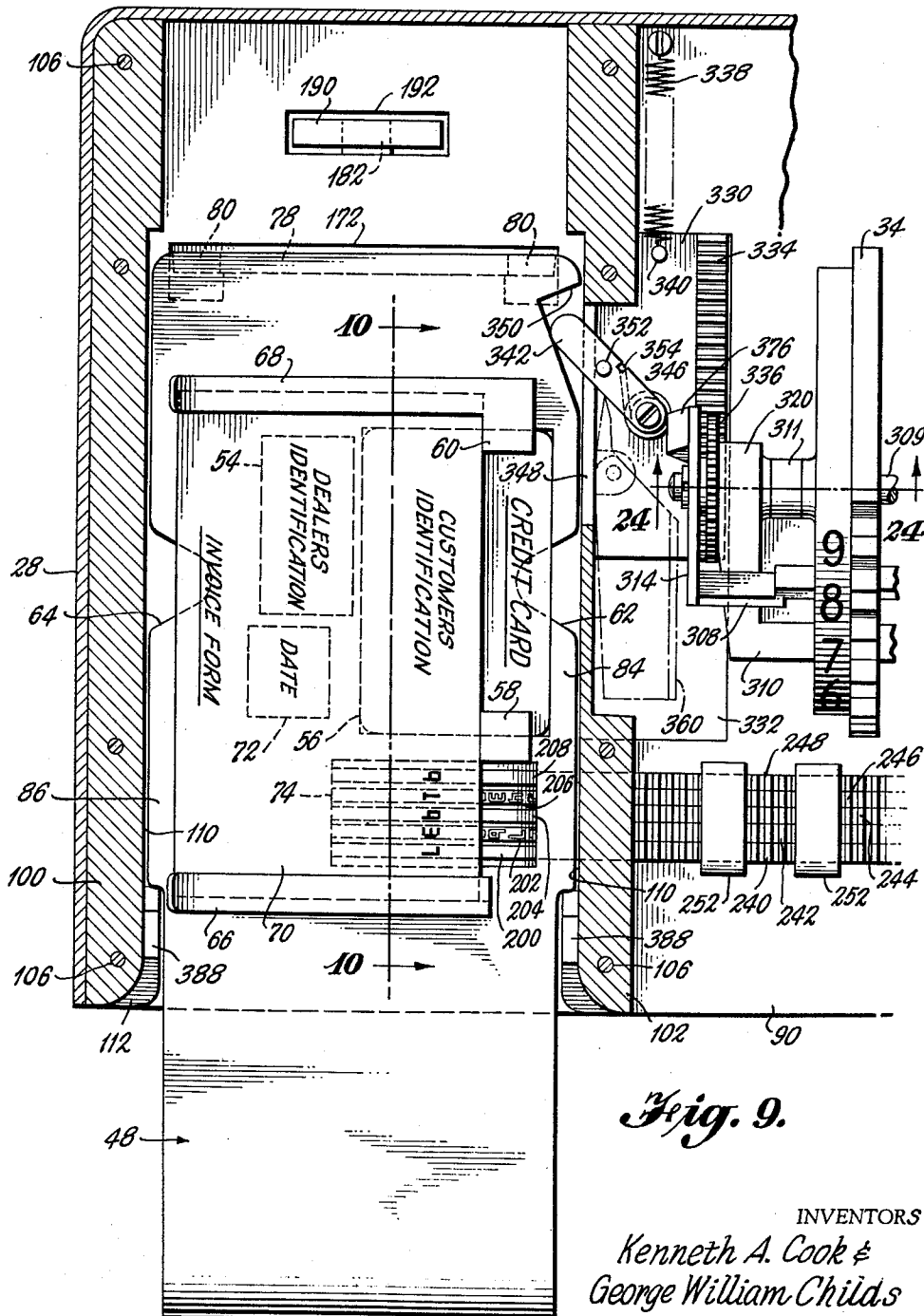


Fig. 9.

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Fig. 12.

Fig. 11.

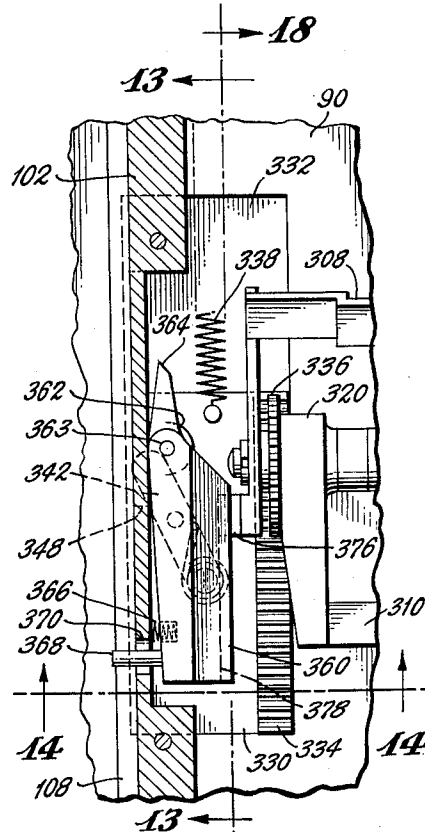
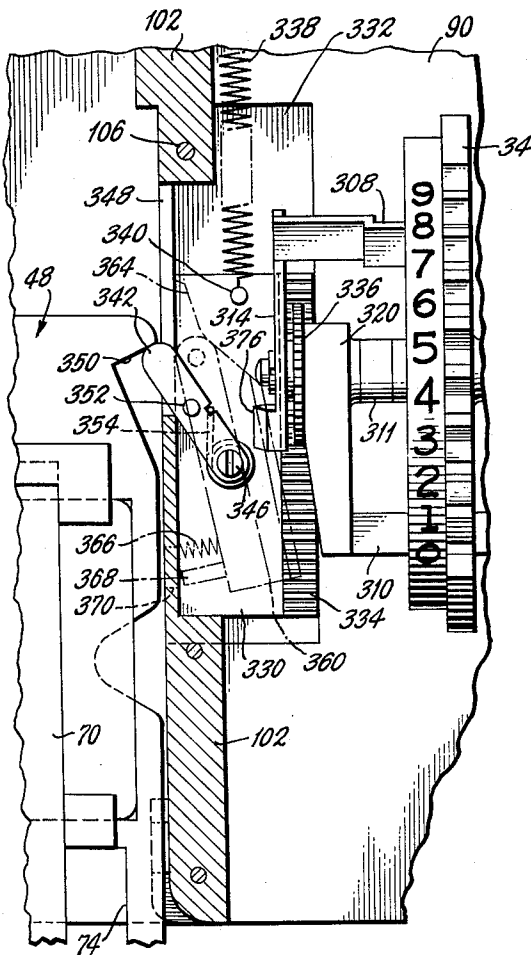


Fig. 14.

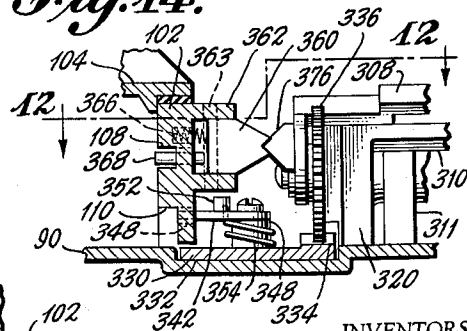
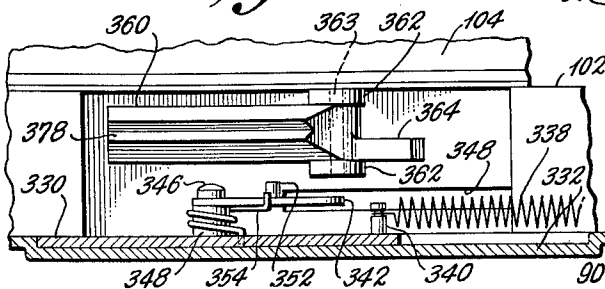


Fig. 13.



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Fig. 16.

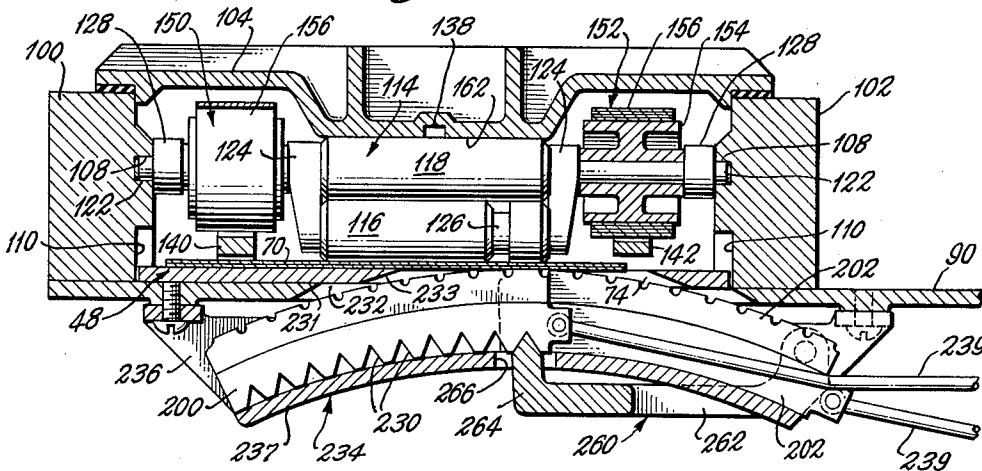


Fig. 15.

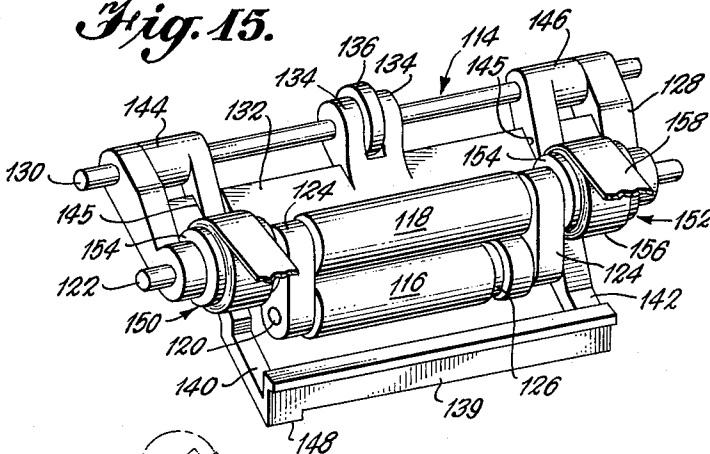
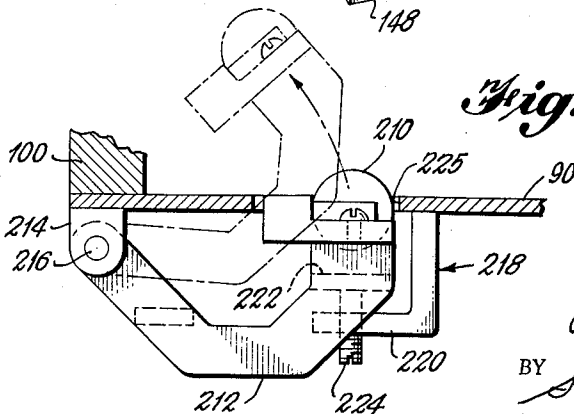


Fig. 17.



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12 Sheets-Sheet 11

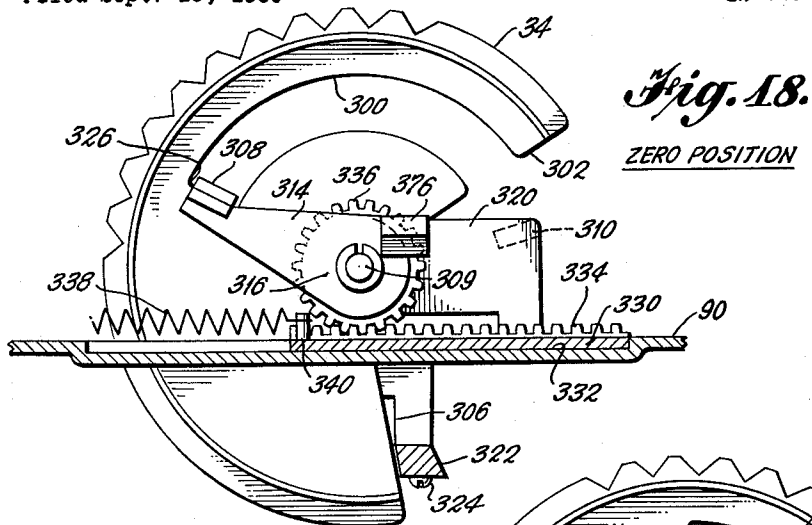


Fig. 19.
NUMBERS SET POSITION

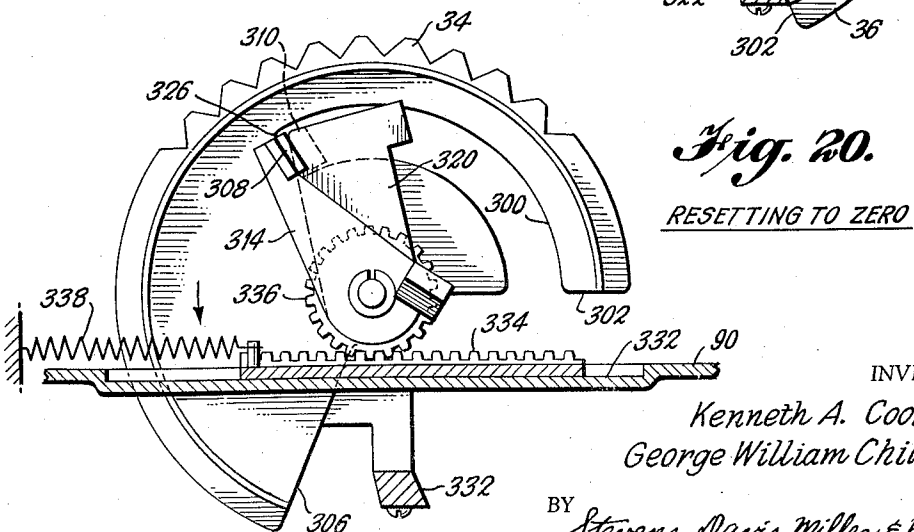
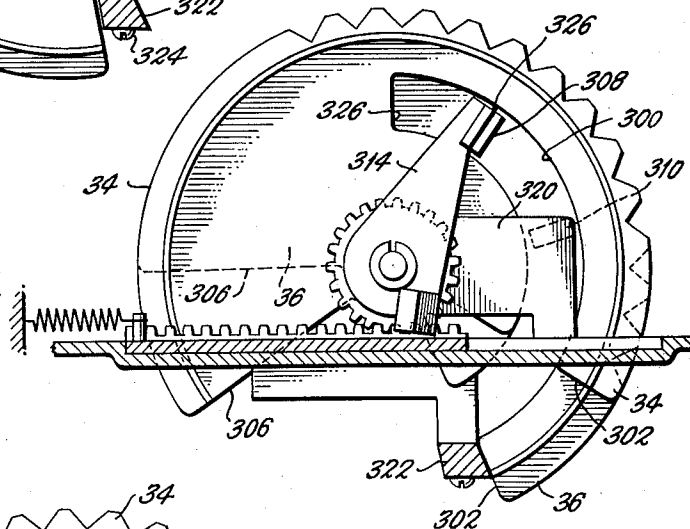


Fig. 20.
RESETTING TO ZERO

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Fig. 21.

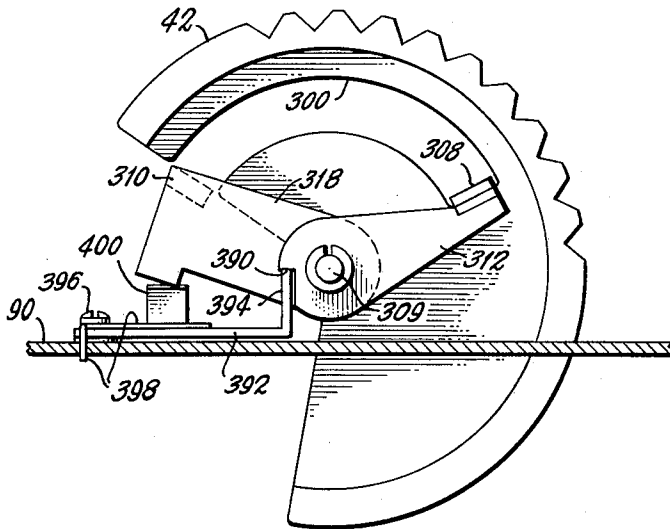


Fig. 22.

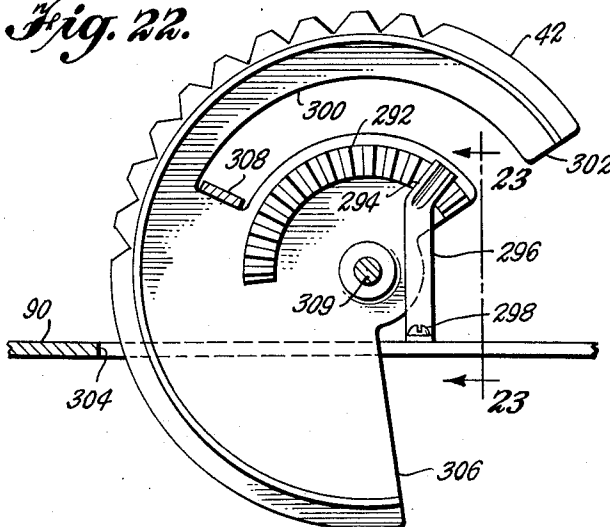
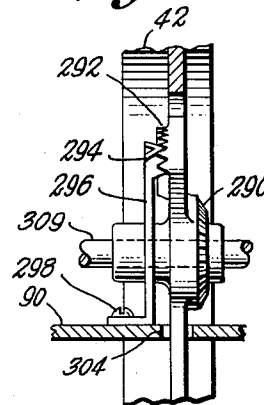


Fig. 23.



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3,083,641

PRINTING RECORDERS

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Filed Sept. 15, 1960, Ser. No. 56,167

19 Claims. (Cl. 101-269)

The present invention relates to printing recorders for printing information on cards or invoices, and more particularly to a printing recorder for recording and invoicing credit sales transactions at gasoline service stations or other sales establishments where a credit card system may be employed using customer credit cards.

It is the usual practice with recording devices now in use for recording sales at gasoline stations, for example, for the operator to first imprint a blank invoice form with the information from the customer's credit card, a manual imprinter of the type used for charge-a-plates in department stores generally being employed. The imprinted form is then secured to a clip board or other device capable of holding the form so that the operator can write in the various items making up the total sale. At this time the operator also fills in the routine information such as the date and the identification of the dealer making the sale.

The present invention significantly reduces handling in such transactions by eliminating the clip board or other invoice holder and substituting therefor a printing field board which is specifically designed to have a dealer's identification card secured thereto and which is provided with a depression for receiving the customer's credit card. The invoice form is then positioned on the printing field board over the dealer's and customer's cards and the operator records the sales items on the invoice form in spaces provided therefor. The printing field board is specifically designed to cooperate with a unique printing recorder which can be positioned near the gas pumps and which briefly comprises a rectangular housing having an opening in the front wall thereof for receiving the printing field board.

After the operator writes each sale on the invoice form, which is interleaved with carbon paper, the printing recorder is set to print the total amount of the sale and the printing field board with the invoice form and dealer's and customer's cards thereon is inserted into the recorder through the opening in the front wall thereof. After the board is fully positioned within the machine, a roller assembly is advanced over the invoice to exert a sufficient rolling pressure thereon to print the various embossed characters on the dealer's identification and the customer's credit card on the invoice form, as well as the total amount of the sale and the date, by the action of carbon paper interleaving the invoice form pages. The printing recorder itself has internal dating rollers and print bars set to indicate the amount of sale which are positioned to lie beneath the printing field board when fully inserted within the machine and project upwardly through suitable openings provided in the printing field board to position the appropriate embossed characters and numerals thereon in contact with predetermined portions of the invoice form, so that when the roller assembly passes thereover it will print this information on the invoice form. After the roller assembly has completely passed over the invoice form, the printing field board is simply withdrawn from the printing recorder with all the information accurately printed thereon in one quick operation.

It is one object of the invention to provide a separate printing recorder and printing field board which cooperate with one another to print desired information on invoice forms.

It is another object of the present invention to provide

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a printing recorder of the type described above which greatly speeds up the recording of sales transactions at sales establishments, such as gasoline stations.

It is a further object of the present invention to provide a recorder for printing desired information on an invoice form with relative freedom from errors or jamming caused by improper insertion of a credit form or invoice form into the recorder.

It is a still further object of the present invention to provide a separate printing recorder and printing field board of the type described above wherein the actual printing operation can be carried out at a relatively high speed once the printing field board has been set up with a credit card and invoice form so that, at sales sites subject to brief periods of intense activity, delay and wasted time resulting from the various sales persons having to wait while a previous sale is recorded can be eliminated. With this arrangement, a plurality of printing field boards can be provided for the various sales persons which cooperate with a single printing recorder where the cost of additional recorders is not justified in view of the periodic demand.

It is a still further object of the present invention to provide a printing recorder of the type described above which can be used with a plurality of printing field boards wherein each of the printing field boards is specifically designed to handle various sizes and thicknesses of customers' credit cards, as is sometimes made necessary by reciprocal agreements between vending companies.

It is a still further object of the present invention to provide a recorder which will print desired information on an invoice form accurately and clearly so that the invoices can thereafter be "read" by machines.

It is a still further object of the present invention to provide a printing recorder of the type described above having a mechanical interlock which makes it impossible to insert a printing field board into the recorder without first setting the recorder to indicate the amount of the sale to be recorded, and which automatically resets the amount printing mechanism of the recorder back to zero each time the printing field board is withdrawn from the recorder.

It is a still further object of the present invention to provide a printing recorder capable of imprinting a card or invoice with the amount of the sale simultaneously with the printing of the other information desired, such as that customarily taken from a customer's credit card.

It is a still further object of the present invention to provide a printing recorder of the type described above which is economical to manufacture, rapid in operation, rugged in construction, and accurate and clear in its printing.

Further objects and advantages of the present invention will become readily apparent as the following detailed description of a specific embodiment of the invention unfolds, and when taken in conjunction with the drawings, wherein:

FIG. 1 is a perspective view of a printing recorder embodying features of the present invention with the printing field board about to be manually inserted therein;

FIG. 2 is an isometric view of a printing field board embodying features of the present invention;

FIG. 3 is an isometric view of the under side of the printing field board illustrated in FIG. 2;

FIG. 4 is an enlarged plan view of the printing recorder illustrated in FIG. 1 with the housing removed;

FIG. 5 is a front elevational view of the structure illustrated in FIG. 4;

FIG. 6 is a view of the under side of the structure illustrated in FIG. 4;

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FIG. 7 is a sectional view of the structure illustrated in FIG. 1 taken along the line 7—7 thereof;

FIG. 8 is a sectional view of the structure illustrated in FIG. 5 taken along the line 8—8 thereof;

FIG. 9 is a sectional view taken generally along the line 9—9 of FIG. 5 with the printing field board illustrated in its fully inserted position;

FIG. 10 is an enlarged sectional view of the structure illustrated in FIG. 9 taken along the line 10—10 thereof;

FIG. 11 is a fragmentary sectional view of a portion of the structure illustrated in FIG. 10 with the printing field board illustrated in a partially withdrawn position;

FIG. 12 is a fragmentary sectional view similar to that of FIG. 11, but taken at a slightly higher elevation, illustrating the position of the zero reset components when the printing field board is completely withdrawn from the printing recorder;

FIG. 13 is a sectional view of the structure illustrated in FIG. 12 taken along the line 13—13 thereof;

FIG. 14 is a sectional view of the structure illustrated in FIG. 12 taken along the line 14—14 thereof;

FIG. 15 is an isometric view of the roller assembly of the printing recorder;

FIG. 16 is a sectional view through the lower left corner of the structure illustrated in FIG. 4 illustrating the roller assembly and arcuate printing bars in detail;

FIG. 17 is a fragmentary sectional view illustrating the dating roller assembly on the under side of the printing recorder for printing the date on an invoice;

FIG. 18 is a sectional view of the structure illustrated in FIG. 12 taken along the line 18—18 thereof;

FIG. 19 is a sectional view similar to FIG. 18 illustrating the position of the zero reset elements when an amount of a sale has been set on the numbering wheels;

FIG. 20 is a sectional view similar to that of FIG. 19 illustrating the position of the zero reset elements after they have automatically rotated all numbering wheels back to their zero position;

FIG. 21 is a sectional view of the structure illustrated in FIG. 4 taken along the line 21—21 thereof;

FIG. 22 is a sectional view of the structure illustrated in FIG. 4 taken along the line 22—22 thereof;

FIG. 23 is a sectional view of the structure illustrated in FIG. 22 taken along the line 23—23 thereof; and

FIG. 24 is a sectional view of the structure illustrated in FIG. 9 taken along the line 24—24 thereof.

Referring to FIG. 1, a printing recorder 26 embodying features of the present invention is illustrated which comprises a housing 28 having a slotted cover 30 suitably secured on the upper surface thereof with the serrated edges of a plurality of numbering wheels 34—42 projecting through the slots in the cover. The cover 30 is also provided with a plurality of rectangular windows 44 immediately beside each of the slots therein to provide a visual indication of the position at which each of the wheels is set. As will hereinafter appear, an arcuate plate with the numbers 0—9 thereon is attached to each of the wheels and positioned beneath the windows so that the number at which the wheel is set can be seen through the window 44 associated therewith.

A rectangular opening 46 is also provided in the left front of the housing 28 to enable a printing field board 48 to be manually inserted into the housing 28 to print desired information on an invoice 70 attached to the field board. Referring specifically to FIGS. 2 and 3, a preferred form of the printing field board 48 is illustrated which comprises a substantially flat rectangular plate 50 which is preferably die cast from a light-weight alloy as a single piece. One end of the plate 50 is formed to provide a handle 52 to enable an operator to conveniently grip the plate for carrying out the printing operations, as will be described. The upper flat surface of the plate 50 constitutes the printing field and the various letters, numbers or other characters which project above the upper surface, as will be described, will be considered as being

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in the printing field. The upper surface is provided with a suitable rectangular depression 54 for receiving a dealer's identification plate which may indicate, in the form of raised letters and numerals projecting into the printing field, the name and address of the dealer, vendor, or other user of a particular printing recorder 26. Since the dealer's identification plate forms a semi-permanent part of the printing recorder, it may be suitably secured in the depression 54 by adhesive material or screws, or the like.

Another rectangular depression 56 is provided for receiving the customer's credit card, and suitable retaining ears 58 and 60 are provided which overlap the depression 56 to hold the credit card in position. The depressions 54 and 56 have a depth approximately equal to the thickness of the dealer identification plate and customer credit card, respectively, so that the raised characters thereon project above the upper surface of the plate 50 into the printing field. A suitable notch 62 may be provided in the edge of the plate 50 adjacent to the depression 56 to facilitate insertion and removal of the customer's credit card, and a similar notch 64 may be provided in the opposite edge of the plate 50 to facilitate the removal of the invoice form 70 to be positioned over the recesses 54 and 56. Flanges 66 and 68 are secured to the plate 50 with the inner edges thereof spaced slightly above the plate to enable the invoice form 70 to be positioned beneath the flanges as illustrated in FIGS. 1 and 9. The flanges 66 and 68 prevent the invoice 70 from lifting and moving longitudinally off the plate 50 and the ears 58 and 60 engage one edge of the invoice to position it transversely of the plate.

A rectangular opening 72 is provided in the plate 50 to permit raised characters on dating rollers carried within the printing recorder 26 to project upwardly therethrough to print the date on the invoice, as will be described in greater detail hereinafter. Another rectangular opening 74 is provided in the plate 50 to permit raised numerals on printing bars within the printing recorder to project upwardly therethrough for printing the amount of a sale on the invoice, as will also be described in greater detail hereinafter. The plate 50 is also provided with a horizontal bar 78 with extended lugs 80 at each end thereof, and a lug 82 in the central portion thereof, each of which project downwardly from the under side of the plate 50. It will also be observed that the forward half of the plate 50 is wider to provide laterally projecting supporting flanges 84 and 86 along each side of the plate.

Referring to FIGS. 4—7, the operating elements of the printing recorder are mounted within the housing 28 on a base plate 90, which is supported in elevated position by a plurality of legs 92 secured to and extending downwardly therefrom. The front corners of the base plate have bushings 94 depending therefrom in position to receive stub shafts 96 (FIG. 1) for pivotally supporting the cover 28 on the base plate 90. With this construction the housing 28 can be pivoted upwardly and forwardly to expose all of the operating elements enclosed thereby. A suitable latching knob 98 or the like (FIG. 7) can be provided to releasably latch the housing 28 in its closed position. Referring to FIGS. 4, 5, 7 and 9, a pair of spaced guide plates 100 and 102 are mounted on the base plate 90 on the left side thereof, as viewed in FIG. 5, and extend from front to rear of the base plate. A roller assembly pressure plate 104, preferably made as a light-weight, ribbed, die cast piece, is supported on and secured to the upper edges of the guide plates 100 and 102 by a plurality of bolts 106 or the like. The guide plates 100 and 102 are each provided with a longitudinal groove 108 on the inner face thereof extending parallel to the base plate 90 and curved upwardly at the right end thereof, as viewed in FIG. 7. The guide plates are also each provided with grooves 110 on the inner faces thereof below the grooves 108 for receiving the supporting flanges 84 and 86 of the printing field board as it is inserted into the housing to accurately guide the board. The right end

of the grooves 110, as viewed in FIG. 7, open on the front of the printing recorder and suitable flared portions 112 are provided on the ends of the guide plates 100 and 102 in extension of the three walls of each of the slots 110 to facilitate feeding the supporting flanges 84 and 86 of the printing field board into the slots 110.

A roller assembly 114 is slidably supported between the guide plates 100 and 102. As most clearly illustrated in FIG. 15, wherein the roller assembly 114 is shown alone, the roller assembly comprises two steel cylindrical rollers 116 and 118 rotatably mounted on axles 120 and 122 respectively. The axle 120 is supported at each end by a yoke 124 supported on and depending from the axle 122. It will be observed that the lower roller 116 is also provided with an annular groove 126 near the right end thereof for a purpose which will be described in greater detail hereinafter.

Each end of the axle 122 is supported in a yoke 128 having the other end thereof secured to an axle 130. An integral web portion 132 extends between the yokes 128 and has a pair of spaced yokes 134 extending from the central portion thereof and secured to the middle of the axle 130. A suitable roller 136 is rotatably mounted on the axle 130 between the yokes 134 and is adapted to roll within a slot 138 on the under side of the pressure plate 104, as most clearly illustrated in FIG. 16. With this construction, as the roller assembly 114 retracts and advances between the guides 100 and 102, as will be described, the roller 136 prevents the roller assembly from pivoting about a vertical axis with a minimum amount of friction.

A push bar 139 is pivotally connected to the axle 130 by a pair of rearwardly extending legs 140 and 142 having bushing portions 144 and 146 formed on the free ends thereof which are pivotally connected to the axle 130. The legs extend through slots 145 in the web portion 132 to eliminate interference between the web portion and the legs. The leg 140 is deformed downwardly a greater amount than the leg 142 to form a shoe 148 projecting downwardly from the left end of the push bar 139 to support the push bar in an elevated position relative to the printing field, as will be described. A pair of spring spools 150 and 152 are rotatably mounted on the axle 122 between the yokes 128 and 124. Referring to FIG. 16 as well as FIG. 15, each of the spring spools comprises a bushing 154 rotatably mounted on the axle 122 with a flat, tightly-coiled spring 156 disposed thereabout. The inner end of the spring is fastened to the bushing 154 and the outer end 158 extends tangentially therefrom through an aperture 160 in the pressure plate 104, as most clearly seen in FIGS. 5 and 7, and is suitably secured to the upper surface of the pressure plate, such as by a screw 162.

Referring specifically to FIGS. 15, 16 and 17, it will be observed that each of the axles 122 and 130 project beyond the outer surfaces of the yokes 128 to provide stub shafts which slide in the grooves 108 on the inner surface of the guide plates 100 and 102. Thus the roller assembly is slidably supported between the guide plates for movement from the position illustrated in solid lines at the right of FIG. 7 to the position illustrated in phantom at the left of FIG. 7. Of course, the roller 136 rolls in the slot 138 during this movement to accurately guide the roller assembly. The central portion 162 of the under side of the pressure plate 104 projects downwardly between the spring spools 150 and 152 along the entire length of the pressure plate except for the right end thereof as viewed in FIG. 7, which flares upwardly. With this construction, the axle 122 is free to ride upwardly with the right end of the groove 108 without interference from the central portion 162, but as the roller assembly moves to the left beneath the flat horizontal portion of the central portion 162, the roller 118 will frictionally engage the under side of the central portion and roll thereon in a manner to drive the roller 116 which frictionally engages the roller 118. The position which the rollers 118 and 116 assume when beneath the flat horizontal portion of

the central portion 162 is most clearly illustrated in FIG. 8.

Normally the roller assembly will be retained in the position illustrated in solid lines in FIG. 7. When the printing field board 48 is inserted in the grooves 110 on the inner face of the guide plates 100 and 102, the flared portions 112 guiding the supporting flanges 84 and 86 into the grooves 110, the bar 78 and the lugs 80 on the end of the board engage the pusher bar 139 of the roller assembly, as illustrated in FIG. 7, so that the roller assembly will be pushed to the left as the printing field board 48 is forcibly inserted into the printing recorder. Of course, the spring spools 150 and 152 will unwind to yieldably resist this movement in a manner to provide a restoring force for returning the roller assembly to its starting position, as will be described.

When the leading edges of the supporting flanges 84 and 86 engage the sloping surfaces 170 at the ends of the slots 110, the front edge of the board will be cammed downwardly to the position illustrated in phantom with the lugs 80 and bar 78 projecting downwardly through a slot 172 in the base plate 90. Once the front of the printing field board drops into the slot 172, the handle 52 can be depressed by the operator to project the lug 82 on the under side of the printing field board downwardly through a slot 180 in the base plate to actuate a lever 182 to the position illustrated in FIG. 8. The trailing ends of the supporting flanges clear a raised flat 388 at the front end of each of the slots 110 to enable the handle 52 to be depressed in this manner.

The lever 182 is pivotally mounted beneath the plate 90 on a pair of depending lugs 184 by a pin 186, the lugs 184 being suitably secured to the under side of the plate 90. A finger 188 projects upwardly from the right end of the lever 182 in position to abut against the plate 90 and partially overlies the slot 180 when the lever 182 is in the position illustrated in FIG. 7, and a second finger 190 projects upwardly from the left end of the lever 182 through a suitable slot 192 in the rear of the base plate. When the roller assembly 114 is slidably cocked to its rearmost position, as illustrated in phantom in FIG. 7, a projection 194 on the inner surface of the leg 140 overlies the finger 190. Consequently, when the lever 182 is pivoted in a clockwise direction by the lug 82 on the under side of the printing field board, as previously described, the finger 190 engages the projection 194 and pivots the pusher bar 139 upwardly so that it clears the front edge of the printing field board against which it previously abutted. The spring spools 150 and 152 are then free to drive the roller assembly forwardly over the invoice 70 to print the desired information thereon. The spring spools 150 and 152 may be of any suitable type of spring spool that will provide the desired forward drive to the roller assembly after it has been cocked rearwardly by the insertion of the printing field board. By way of example only, a flat band-type coil spring appearing on the market under the trade name Negator has proved to be very satisfactory.

As previously noted, the top roller 118 is in rolling contact with the under side of the depressed central portion 162 of the pressure plate, and also drivingly engages the lower roller 116. With the lower roller driven in this manner, it rolls on the upper surface of the printing field board in a manner that virtually eliminates sliding movement between the lower roller and the invoice 70 which might tend to crumple or crease the paper invoice during the printing operation. It will also be observed in FIGS. 7 and 8 that a small tapered shoulder 196 is provided on the under side of the central portion 162 so that the forward portion thereof (the right end, as viewed in in FIGS. 7 and 8) is at a slightly lower level than the rear portion thereof. Thus, as the rollers 118 and 116 move over the invoice 70 the shoulder 196 creates a wedging effect that effectively increases the rolling pressure on the invoice 70 to improve the printing operation.

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After the roller assembly has completely traversed the portion of the invoice to be printed, the curved right end of the grooves 108 quickly lift the rollers 118 and 116 upwardly clear of the printing field board to the position illustrated in solid lines in FIG. 7. The printing field board can then be removed by lifting it upwardly to disengage the lugs 80 and 82 from their respective slots and pulling it outwardly. Since the pusher bar 138 is pivotally connected to the axle 130 by the legs 140 and 142, as previously described, it is free to swing upwardly to enable the printing field board to be lifted in this manner. As the field board is withdrawn, the supporting flanges 84 and 86 slide on the small flats 388 and the lugs 80 slide on the upper surface of the base plate 90 to insure that the bar 78 and the under side of the printing field board clear the numerals and characters projecting into the printing field.

As soon as the printing field board is completely withdrawn, the pusher bar drops down so that the shoe 148 again rests directly on the base plate 90. The purpose of the shoe 148 is to maintain the pusher bar in an elevated position above the printing field so that as the pusher bar moves rearwardly in response to the insertion of a printing field board, it will also clear the numerals and other characters which project above the surface of the base plate 90 and into the printing field. At this point it is also noted that the rolling, driving relation between the rollers 116 and 118 makes possible a virtually friction-free operation of the roller assembly. The top roller is in rolling contact with the under side of the central portion 162 of the pressure plate and the lower roller 116 is in rolling contact with the printing field plane, the result being that the only sliding friction existing is in the bearings provided by the axles 122 and 130.

Referring to FIG. 9, a plan view of the printing field board 48 in the position it assumes when it is fully inserted into the printing recorder is illustrated. This view clearly depicts the manner in which the invoice 70 is retained beneath the flanges 66 and 68 and against the lugs 58 and 60, as well as the information to be printed on the invoice, namely, the customer's identification on the lower portion of the credit card, the dealer's identification, the date, and the amount of the sale which is printed on the lower right corner of the invoice by a plurality of print bars 200-208. The invoice, of course, is a conventional type having a plurality of sheets with layers of carbon paper therebetween to provide the printing as the rollers press the invoice against the raised numerals and characters projecting above the upper surface of the base plate 90 into the printing field.

As previously stated, the customer's credit card and dealer's identification are actual cards made of suitable plastic or other material which are positioned within the depressions 54 and 56 on the upper side of the printing field board, whereas the date and amount of the sale are printed on the invoice by suitable dating rollers and the print bars positioned beneath the base plate 90 with the numerals and characters thereon projecting upwardly through the openings 72 and 74 in the printing field board 48 into the printing field.

As most clearly illustrated in FIGS. 6 and 17, dating rollers 210, which may be pre-set to print the date on the invoice, are carried on a suitable frame 212 which is pivotally mounted on lugs 214 by a pin 216. An angle-shaped bracket 218 is also secured to the under side of the base plate 90 with the horizontal flange 220 thereof underlying a web portion 222 of the frame 212 to enable a set screw 224 to be threadably mounted on the horizontal flange and abut against the web portion 222 to accurately adjust the projection of the dating rollers 210 through an aperture 225 in the base plate and into the printing field. With this construction the dating rollers may also be readily pivoted upwardly on the frame to the phantom position illustrated in FIG. 17 to enable the setting of the rollers to be changed by the operator from

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a position above the base plate 90 when the housing 28 is pivoted out of the way.

Referring to FIGS. 5-8 and 16, each of the print bars 200-208 are in the form of arcuate segments having the numerals 0-9 on separate bosses on the upper surface thereof and teeth 230 on the lower curved surface thereof. As most clearly illustrated in FIG. 8, each of the print bars 200-208 are rectangular in cross-section, with the upper portion being narrower than the lower portion to provide upwardly presenting shoulders on each side of each print bar which slidably engage the under side of the base plate 90, the narrower upper portions of the print bars projecting through separate slots 232 in the base plate which lie directly beneath the aperture 74 in the printing field board when it is in its fully inserted position as illustrated in FIG. 8. As most clearly seen in FIG. 16, edges 231 of the slots 232 and edges 233 of the aperture 74 are bevelled to provide more room for the print bars. A suitable print bar housing 234 is secured beneath the base plate 90 having side walls 236 and 238 and an arcuate bottom wall 237. With this construction each of the print bars is retained by the print bar housing and the under side of the base plate 90 for sliding movement along an arcuate path, the upwardly presenting shoulders on the print bars slidably engaging the under side of the base plate 90 adjacent to each of the slots 232.

The left end of a bent tie rod 239 (as viewed in FIG. 5) is pivotally connected to the right end of each of the print bars 200-208 and extends beneath the base plate 90. The right end of each of the tie rods 239 is pivotally connected to a lug 241 which projects downwardly from the right end of each of a plurality of racks 240-248. The five racks ride in an open slot 250 in the base plate 90 and are constrained to move linearly by downwardly presenting channel-shaped clips 252 secured to the upper surface of the base plate 90, and upwardly presenting channel members 254 and 256, secured to the under side of the base plate 90. As illustrated in FIG. 5, the rack 240 and print bar 200 are in their extreme left position and the change the number of the print bar exposed for printing the rack 240 would be shifted to the right. Reference is also made to FIG. 16, where the print bar 202 and its tie rod 239 are shown in the extreme right position that a print bar will assume when the rack associated therewith is moved to its extreme right position, the rack associated with the print bar 202 being the rack 242.

At this point it will be observed that an indexing blade 260 is provided beneath the print bar housing 234 and has spaced legs 262 on one end thereof pivotally connected to the outer surfaces of the walls 236 and 238 of the print bar housing. The other end of the indexing blade 260 has a wide upwardly projecting finger 264 projecting through a transverse slot 266 in the arcuate bottom wall 237 of the print bar housing, as best seen in FIG. 16. The finger 264 is sufficiently wide to span across each of the print bars 200-208 and has a knife edge on the upper end thereof which mates with one of the teeth 230 on the lower arcuate edge of each of the print bars to accurately fix and position each of the print bars and the numerals thereon exposed for printing during the printing operation. To adjust the print bars to change the numeral being printed, the indexing blade will of course have to be pivoted downwardly to clear the teeth of the print bars so that the racks 240-248 can be actuated to shift the print bars, as will be described in greater detail hereinafter.

Referring to FIG. 16 in particular, it will be observed that the annular groove 126 in the lower roller 116 is positioned to prevent more than one number on the upper curved surface of each print bar from being printed at one time. The numerals on either side of the numeral on each print bar to be printed cannot accidentally be printed because only a limited length of the roller 116, that is the portion between the groove 126 and the right

end of the roller, travels over the numeral to be printed. Assuming that each of the numerals on the print bars 200 and 202 illustrated in FIG. 16 begin with the numeral 0 on the first boss on the left end of the upper surface thereof and end with the numeral 9 on the last boss on the right end of the upper surface thereof, it will be seen that the number 9 on the print bar 200 and the number 0 on the print bar 202 will be printed and that the number 8 on the print bar 200 will not be printed since the highest portion thereof lies beneath the annular groove 126 on the roller while the number 1 on the print bar 202 will not be printed since it lies beyond the right end of the roller.

The manner in which the indexing blade 260 is actuated is perhaps most clearly illustrated in FIGS. 5-8. It will be observed that the side wall 238 is provided with a pair of spaced depending open bushings 271 which pivotally support a motion inverting linkage 273 by means of trunnions 275 projecting outwardly from each side of the linkage 273 and journaled in the open bushings 271. A set screw 277 is threadably mounted on the forward end of the linkage 273 and abuts against the under side of the forward end of the lever 182. The other end of the linkage 273 is provided with a lug 279 projecting upwardly from an offset portion of the linkage so as to clear the lever 182 and abuttingly engage the pivoting end of the indexing blade 260. With this construction, when the lever 182 is actuated downwardly by depressing the handle 52 of the printing field board after it has been fully inserted within the printing recorder, as previously described, the downward movement of the forward end of the lever 182 will pivot the linkage 273 in a clockwise direction as viewed in FIGS. 7 and 8 from the position illustrated in FIG. 7 to the position illustrated in FIG. 8 so as to pivot the indexing blade from a position wherein it clears the teeth along the lower edge of the print bars (as illustrated in solid lines in FIG. 5) to the position illustrated in phantom in FIG. 5, wherein it engages one of the teeth of each of the print bars to accurately fix them as previously described.

Referring to FIGS. 4 and 5, the racks 240-248 which actuate the print bars 200-208, respectively, are each independently reciprocated by a spur gear 280 drivingly connected thereto, and each of the spur gears are drivingly connected to one of the numbering wheels 34-42, so that rotation of each of the numbering wheels to a selected position moves a particular print bar to the same numbered position. Specifically, each of the spur gears 280 are fixed to a shaft 282 which is rotatably journaled above the base plate 90 by a plurality of forwardly disposed bushings 284 secured to the base plate adjacent to the forward ends of the shafts and a plurality of rearwardly disposed bushings 286 which journal the shaft near the rear end thereof. A bevel gear 288 is fixed to the inner end of each of the shafts and drivingly engages a bevel gear 290 secured to the right face of each of the wheels 34-42. Consequently rotation of each of the numbering wheels reciprocates the racks 240-248 to actuate the print bars as previously described. Specifically, rotation of the numbering wheel 34 actuates the print bar 208, the wheel 36 actuates the print bar 206, the numbering wheel 38 actuates the print bar 204, the numbering wheel 40 actuates the printbar 202, and the numbering wheel 42 actuates the print bar 200.

Each of the numbering wheels is also provided with a detent plate 292 on the left face thereof as viewed in FIG. 4, the teeth of which are yieldably engaged by a detent 294 on the upper end of a spring arm 296 suitably secured to the base plate 90 such as by screws 298, as most clearly illustrated in FIGS. 22 and 23. The detent 294 and detent plate 292 associated with each of the numbering wheels cooperate to retain the particular numeral properly indexed into the printing field in position until it is forcibly displaced by subsequent rotation of the numbering wheel.

The profile of the detent plate 292 and also the numbering wheel 42 is clearly illustrated in FIG. 22, and it is noted that all of the numbering wheels are identical in size and shape. It will be observed that each of the numbering wheels has an arcuate slot 300 formed in the upper portion thereof and opening on an edge 302 thereof, and that the lower portion of each of the numbering wheels projects downwardly through a slot 304 in the base plate 90 and terminates in a solid radially-extending edge 306. Referring specifically to FIG. 4, the printing recorder is also provided with a reset bar 308 and a reset driving bar 310, both of which are positioned to extend freely through the arcuate slot 300 in each of the numbering wheels 34-42. The reset bar 308 is pivotally connected to a shaft 309 by parallel legs 312 and 314, suitable split rings being fixed within a groove near each end of the shaft, to retain the legs 312 and 314 against axial movement. The reset driving bar 310 is similarly pivotally connected to the shaft 309 by a pair of parallel legs 318 and 320 which fit between the legs 312 and 314 of the reset bar. The shaft 309 is mounted above the base plate 90 by upright supports 311 near each end thereof and each of the numbering wheels 34-42 are rotatably mounted on the shaft 309.

As best seen in FIG. 6, a stop bar 322 is suitably secured to the under side of the base plate 90 such as by screws 324 in position to be abuttingly engaged by the radial edge 306 of each of the numbering wheels to limit the counter-clockwise rotation of each of the wheels to the position illustrated in FIG. 18. With this construction, the reset bar 308 can pivot relative to each of the wheels 34-42 until it strikes the inner edge 326 of the arcuate slots 300, after which continued pivotal movement of the reset bar will rotate each of the numbering wheels to the position illustrated in FIG. 18. Likewise, the reset driving bar 310 can be pivoted to an extreme counter-clockwise position wherein it abuts against the reset bar 308. Since the reset driving bar overlaps the reset bar 308, it will engage and drive the reset bar 308 along with it, if the reset bar is at an intermediate position and the reset driving bar is moving to its extreme counter-clockwise position. The reset driving bar 310 and reset bar 308 provide what may be termed a zero reset function, which will be described in greater detail hereinafter.

FIGS. 4 and 18 illustrate the numbering wheels in their zero position and the reset bar and reset driving bar in the position they assume before a printing field board 48 is inserted into the printing recorder 26. In this position the numeral 0 of each of the wheels is positioned beneath the aforementioned windows 44 (FIG. 1) in the cover 30. When the numbering wheels 34-42 are rotated to set up the amount of a sale, the reset bar 308 is pivoted in a clockwise direction as viewed in FIG. 19, and its final position will be determined by the numbering wheel which is rotated the greatest amount. As illustrated in FIG. 19, the numbering wheel 36 immediately behind the numbering wheel 34 has been fully rotated until the leading edge 302 thereof abuts against the right edge of the stop bar 322, and in this position is set to indicate the numeral 9. The inner edge 326 of the arcuate slot 300 of the numbering wheel 36 therefore moves the reset bar 308 to the position illustrated in FIG. 19, the reset driving bar 310 remaining stationary during this movement. After the printing field board has been inserted into the printing recorder and the printing performed by the roller assembly 114 as previously described, the withdrawal of the printing field board actuates a suitable mechanism, to be described, to automatically pivot the reset driving bar 310 from the position illustrated in FIG. 19 to the position illustrated in FIG. 20 and return it to its original position as illustrated in FIG. 18. Since the reset driving bar overlaps the reset bar 308, as previously described, it will pick up the reset bar when pivoting in a counter-clockwise

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direction so as to drive the reset bar in a counter-clockwise direction to return it to the position illustrated in FIG. 18. This counter-clockwise movement, of course, automatically rotates each of the numbering wheels back to their zero position also. Thus, each time the printing field board is withdrawn from the printing recorder, each of the numbering wheels are automatically returned to their zero position.

The mechanism for actuating the reset driving bar 310 in the manner just described is most clearly illustrated in FIGS. 4, 9, and 11-14. It comprises a rack plate 330 slidably mounted in a depression 332 in the base plate 90. A rack 334 is formed along the right edge of the rack plate 330 and drivingly engages a spur gear 336 affixed to the leg 320 of the reset driving bar 310 so that sliding movement of the rack plate 330 will pivot the reset driving bar. A suitable coil spring 338, or the like, has one end attached to a pin 340 on the end of the rack plate and the other end suitably fixed to the base plate 90 so as to resiliently bias the rack plate 330 to the position illustrated in FIG. 9 wherein the rear edge thereof abuts against the rear wall of the depression 322. It will also be observed that the guide plate 102 overlies the left edge of the rack plate 330, as most clearly illustrated in FIG. 14, to help retain the rack plate in the depression 332.

A pawl 342 is pivotally mounted on the rack plate 330 by a post 344 and a screw 346 or the like, and the pivoting end thereof projects through a slot 348 in the wall of the guide plate 102 so that the pivoting end of the pawl is in position to overlie a triangular notch 350 in the upper right edge of the printing field board when it is completely inserted into the printing recorder as illustrated in FIG. 9. A suitable pin 352 projects upwardly from the mid portion of the pawl 342 in position to engage the outer wall of the guide plate to limit the projection of the pawl through the slot 348 to the position in FIG. 9. A hairpin spring 354 is also mounted on the post 344 with one end thereof engaging the pawl to resiliently bias it toward the guide plate 102. Actually when the printing field board lies flat against the base plate 90, as illustrated in FIG. 8, it is disposed beneath the projecting end of the pawl 342, but when the printing field board is lifted upwardly prior to its withdrawal to clear the lugs 80 from the slot 172 in the base plate, the pawl 342 projects directly into the triangular notch 350. Consequently, as the printing field board is withdrawn, it engages the tip of the pawl in a manner to slide the rack plate 330 from the position illustrated in FIG. 9 to the position illustrated in FIG. 12, passing through the position illustrated in FIG. 11. This forward movement of the rack plate rotates the spur gear 336 to pivot the reset driving bar 310 from the position illustrated in FIG. 19 to the position illustrated in FIG. 20 to automatically reset the numbering wheels 34-42 to their zero position as previously described. As the rack plate 330 is moved forwardly in this manner, the pawl 342 is gradually cammed out of engagement with the triangular notch 350 by the forward edge of the slot 348. When the rack plate reaches the position illustrated in FIG. 12 the pivoting end of the pawl is retracted far enough to clear the triangular notch 350 to enable the printing field board to be completely removed from the printing recorder. As soon as the tip of the pawl clears the triangular notch 350, the coil spring 338 automatically returns the rack plate to the position illustrated in FIG. 9 which pivots the reset driving bar 310 in a clockwise direction back to the position illustrated in FIG. 18. Thus each time the printing field board is withdrawn, each of the numbering wheels and print bars are automatically reset to zero.

Another feature of the present invention provides an automatic stop for preventing the printing field board from being inserted into the printing recorder when the numbering wheels 34-42 are each set at their zero position.

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Consequently, before the printing field board can be inserted into the recorder, the amount of the sale to be printed on the invoice must be set on the numbering wheels. Referring to FIGS. 11-13, this feature is provided by a bar 360 which is pivotally mounted on ears 362 projecting from the guide plate 102 by a vertical pin 363. The counter-clockwise pivotal movement of the bar is limited by a projection 364 on the rear end thereof and a suitable coil spring 366 is disposed between the guide plate 102 and the bar 360 to normally resiliently bias the bar to the position illustrated in phantom in FIG. 11. A pin 368 projects from the side of the bar near the forward end thereof through an aperture 370 in the guide plate 102 and into the groove 108 on the inner surface of the guide plate. The location of the pin 368 in slot 370 is also illustrated in FIG. 7. It will be recalled that the groove 108 is the groove in which the axles 122 and 130 of the roller assembly 114 slide. Thus when the bar 360 is in the position illustrated in FIG. 12, the pin 368 will engage the axle 130 of the roller assembly after it has been pushed back a limited distance by the printing field board to prevent the insertion of the printing field board when the numbering wheels are set at zero.

However, when the amount of the sale to be recorded has been set on the numbering wheels, the bar 360 assumes the position illustrated in FIG. 11 to retract the pin 368 so that the roller assembly is free to move to its rearmost position. To automatically control the position of the bar 360, a detent 376 is secured to the leg 314 of the reset bar 308 in position to engage a detent groove 378 in the outer edge of the bar 360 when the reset bar is in the position illustrated in FIG. 18. In this position, of course, each of the numbering wheels is set at zero. With the detent 376 engaged in the detent groove, the bar 360 is retained in the position illustrated in FIGS. 12 and 14 so that the pin 368 will prevent the roller assembly from moving rearwardly as previously described. However, when an amount has been set on the numbering wheels, the reset bar is pivoted in a clockwise direction, as previously described, which disengages the detent 376 from the detent groove and enables the coil spring 366 to pivot the bar to the position illustrated in phantom in FIG. 11 wherein the pin 368 is withdrawn from the groove 108 to enable the roller assembly to be moved to its rearmost position.

In order to more clearly understand the overall operation of the printing recorder of the present invention, a detailed description of the entire operation of the recorder will now be presented. Assuming that a printing field board is available with a dealer's identification plate already mounted in the depression 54 (FIG. 2) of the board, to record a particular sales transaction on an invoice, a customer's credit card is slipped into the depression 56 on the board under the retaining ears 58 and 60. An appropriate invoice form 70 is then slipped onto the board under the retaining flanges 66 and 68 into the position illustrated in FIG. 9 so as to cover the embossed characters on the dealer identification plate and the customer's credit card. It will be observed that the invoice form 70 also covers the openings 72 and 74 through which the dating rollers and print bars operate, respectively. The total amount of a sale to be recorded on the invoice form is then set into the machine by the manual rotation of the numbering wheels 34-42. For example, if a sale of \$4.50 is to be recorded, the wheel 38 is rotated to position the numeral 4 beneath the window 44 (FIG. 1) associated therewith, the wheel 40 is rotated to position the numeral 5, and the wheel 42 remains set at zero.

Rotation of the numbering wheels pivots the reset bar 308 to disengage the detent 376 from the detent groove 378 to enable the bar 360 to pivot away from the guide plate 102 to retract the pin 368 from the groove 108 on the inner surface of the guide plate. Of course, when the numbering wheels 38, 40 and 42 are set in this manner, the print bars 204, 202 and 200, respectively, will also be set at 4, 5 and 0, the racks 244, 242 and 240, respectively,

being shifted the appropriate distance by the spur gears 280 associated therewith in response to the rotation of the numbering wheels 38, 40 and 42 to set the print bars.

The printing field board 48 may then be inserted into the opening 46 (FIG. 1) with the supporting flanges 84 and 86 of the board being guided into the grooves 108 on the inner surfaces of the guide plates 100 and 102 by the flared portions 112 on the front ends of the guide plates, the flared portions being most clearly seen in FIG. 5. As the board is thrust into the opening 21, the depending bar 78 on the forward end thereof engages the pusher bar 139 to push the roller assembly 114 rearwardly against the resilient restoring force of the two uncoiling spring spools 150 and 152. As the board is pushed into the machine in this manner, it is held above the base plate 90 by the two lugs 80 on the forward end thereof and by the two raised flat portions 388 at the front of the grooves 110 which slidably engage the supporting flanges 84 and 86 of the board. It is, of course, necessary to support the board in this manner as it is introduced into the printing field to make certain that it clears the embossed numerals and characters on the print bars and dating rollers as it passes thereover.

When the board is fully within the machine, the leading edge thereof is cammed downwardly by the sloping edges 170 (FIG. 8) so that the lugs 80 and bar 78 therebetween drop into the slot 172 in the base plate. At this point the supporting flanges 84 and 86 of the board clear the raised flat portions 388 at the front of the slots 110. The handle 52 of the board can then be depressed downwardly to move the board to the position illustrated in FIG. 8 and the lug 82 on the under side thereof pivots the lever 182 from the position illustrated in FIG. 7 to the position illustrated in FIG. 8. The pivotal movement of the lever 182 simultaneously pivots the lever 273 beneath the forward end thereof to urge the knife edge on the pivoting end of the indexing blade 260 into engagement with a tooth on each of the print bars to accurately fix them in position and against movement, and the finger 190 on the rear end of the lever 182 engages the projection 194 to pivot the pusher bar 138 upwardly so that the shoe 148 clears the leading edge of the field board to enable the spring spools 150 and 152 to drive the roller assembly forward over the invoice. In this manner, depressing the handle 52 triggers the forward movement of the roller assembly.

As previously described, printing pressure is developed by the wedging effect producing by forcing the rollers 116 and 118 through the restricted space between the top of the printing field board and the under side of the central portion 162 of the pressure plate 104, the central portion being lowered to the right of the shoulder 196 as most clearly seen in FIGS. 7 and 8 to provide this wedging effect over the portion of the invoice to be printed. It will be appreciated that the raised letters and numerals on the customer's credit card and dealer's identification plate and the raised numerals on the dating rollers 210 and the print bars 200-204, all of which project above the surface of the printing field board and into the printing field, will provide points of considerable pressure as the roller 116 rolls over the invoice form. In this manner the raised characters will be imprinted on the invoice due to the action of the carbon paper interleaving the copies of the invoice form. When the roller assembly returns to its forward position, the rollers are quickly lifted upwardly to the position illustrated in FIG. 7 by the upwardly curved right ends of the grooves 108 in which the axes 122 slides. The printing field board can then be lifted upwardly to clear the lugs 80 and bar 78 from the slot 172 in the base plate and to clear the lug 82 from the slot 180 in the base plate. This upward movement moves the triangular notch 350 over the tip of the pawl 342 so that as the printing field is withdrawn, it moves the rack plate 330 from the position illustrated in FIG. 9 to the posi-

tion illustrated in FIGS. 12-14 to pivot the reset driving bar 310 in a counter-clockwise direction as viewed in FIG. 20 to return all of the numbering wheels to their zero position, as previously described. At this point the tip of the pawl is retracted far enough to clear the triangular notch 350 so that the printing field board can be completely withdrawn and the spring 338 can retract the rack plate 330 back to the position illustrated in FIG. 9, the retraction of the rack plate pivoting the reset driving bar 310 back to the position illustrated in FIGS. 18 and 19. Of course, once the reset bar 308 is returned to its extreme counter-clockwise position as viewed in FIG. 18, the detent 376 thereon engages the detent groove 378 of the bar 360 to again position the pin 368 in the groove 108 to prevent the printing field board from being reinserted into the printing recorder before a new amount of sale is set into the numbering wheels.

In order to prevent the rapid motion of the reset bar 308 in driving the numbering wheels back to zero from causing the reset bar to rebound after the wheels reach their zero position and abruptly stop by virtue of the radial edge 306 thereof abutting against the stop bar 322 beneath the base plate, as previously described, which rebounding would disengage the detent 376 from the detent groove 378 and thus disable the "non-zero print" feature of the printing recorder, a radial shoulder 390 (FIG. 21) is provided on the periphery of the hub of the leg 312 of the reset bar. A lever 392 with an upwardly presenting lug 394 on the end thereof is pivotally mounted on the base 90 by a screw 396 or the like, as most clearly illustrated in FIGS. 4 and 21, and a suitable spring 398 is provided to resiliently bias the lever 392 toward the leg 312. Another upstanding lug 400 is formed on the left edge of the lever 392 adjacent to the right end of the reset driving bar 310. The lug 400 is bent away from the end of the reset driving bar so that as the reset driving bar moves from the position illustrated in FIG. 21 downwardly to a position wherein it abuttingly engages the base plate 90, the right end thereof will engage the lug 400 and pivot the lever 392 to the position illustrated in FIG. 4. However, when the reset driving bar 310 moves in a counter-clockwise direction in response to the withdrawal of a printing field board 48 from the printing recorder 26, the lever 392 is free to pivot against the leg 312 so that the lug 394 will snap under the shoulder 390 to prevent the reset bar from rebounding. However, the reset driving bar 310 is still free to be pivoted in a counter-clockwise direction by the return of the rack plate 330 to its starting position, as illustrated in FIG. 9, and cams the lever 392 back to the position illustrated in FIG. 4 just before abutting against the base plate 90. This removes the upper end of the lug 394 from beneath the shoulder 390 to enable the reset bar 308 to freely pivot when the numbering wheels are rotated to set up a new amount of sale.

Although the preferred embodiment of the invention described above utilizes a rack and gear system to transform the rotation of the numbering wheels 34-42 into linear movement to set the print bars 200-208, it is apparent that other suitable mechanisms could be used for providing this movement without departing from the spirit and scope of this invention. For example, a bell crank system, Bowden wire or other similar mechanism could be used to achieve the necessary motion transformation. Similarly, although the embodiment of the invention disclosed makes use of energy stored in a pair of spring spools 150 and 152 to provide the driving force for returning the roller assembly back to its forward position to perform the printing operation, it is apparent that other actuating means could be provided as well, such as, for example, an electric motor, a pneumatically operated cylinder, or an electric solenoid.

If an electric motor were used to produce the force

for driving the roller assembly, the motor would operate through a worm gear reduction to drive a spool to which one end of a drive chain or cable would be attached. The roller assembly push bar 139 would be eliminated to permit insertion of the printing field board 48 fully into the machine while the roller assembly remains at the front of the machine. In place of the push bar 139, a different yoke would be provided to which the other end of the drive cable would be attached. When the board is fully inserted within the machine and the handle 52 depressed, a pair of contacts on a switch associated with the lever 182 could be tripped to start the electric motor. The drive cable, as it wound about the spool, would pull the roller assembly over the printing field to mark the invoice. When the roller assembly reached the end of its rearward travel, a second switch, sensing the position of the assembly at the rear, would stop the electric motor. The printing field board could then be withdrawn and a second pair of contacts on the first mentioned switch could be used to again energize the electric motor in a reverse direction as soon as the printing field board is lifted and withdrawn to allow the drive cable to unwind and to permit the spring spools 150 and 152 to return the roller assembly back to its forward position. Because of the worm drive the electric motor would have to be reversed to enable the spring spools to return the roller assembly to its forward position. However, by regulating the unwinding of the drive cable in this manner, it would serve as an effective regulator of the speed with which the roller assembly returned to its forward position. An additional electric interlock could easily be provided in the form of a switch in one of the field board entry guides to prevent the reversal of the drive of the electric motor until the printing field board is completely out of the recorder.

It is also noted that the roller assembly pressure plate 104 could be hinged at the front end thereof to permit it to be pivoted upwardly to provide access to the inside of the printing area. Thus, should the insertion of a folded or torn invoice cause the roller assembly to be jammed, it could be readily freed. A latch would be provided at the rear edge of the pressure plate to keep the plate locked down in its printing position during normal cycles of operation.

These and other modifications come within the spirit and scope of the present invention, which is limited only as defined in the appended claims.

What is claimed is:

1. A printing recorder comprising a base plate, parallel spaced apart guide plates extending across one side of said base plate, a pressure plate mounted over said guide plates, a roller assembly slidably mounted between said guide plates and rolling against the under side of said pressure plate, means on said printing recorder for receiving and positioning a printing field board on the base plate between the guide plates, and means responsive to the positioning of said printing field board on said base plate for actuating said roller assembly to roll it over the printing field board after it has been positioned within the recorder to print information on an invoice form mounted on the upper surface of the printing field board.

2. A printing recorder comprising a base plate, parallel spaced apart guide plates extending across one side of said base plate from front to rear thereof, a roller assembly slidably mounted between said guide plates and rollingly engaging the under side of said pressure plate, spring means resiliently biasing said roller assembly to the front of the base plate, a pusher bar pivotally mounted on and disposed forwardly of the roller assembly with a depending lug on one side thereof slidably supported on said base plate, a guide groove on the inner surface of each of said guide plates for receiving supporting flanges of a printing field board to guide the insertion of the printing field board into the printing recorder, the printing

field board engaging the pusher bar to push the roller assembly rearwardly as the board is forcibly inserted against the spring biasing force tending to return the roller assembly to the front, cam means on the rear ends of said guide grooves to cam the leading edge of the printing field board flat against the base plate when it is fully inserted into the printing recorder, means responsive to the dropping of the printing field board flat against the base plate for lifting the pusher bar to clear the leading edge of the printing field board to enable the roller assembly to roll forwardly in response to the spring bias thereon to print the desired information on an invoice form on the upper surface of the printing field board, and means for quickly lifting the roller assembly at its forward position to facilitate withdrawal of the printing field board from the recorder.

3. A recorder for printing information on a print receiving medium which includes in combination, a housing, a removable printing field board positionable within said housing and adapted to carry said print receiving medium on the upper surface thereof, a plurality of embossed indicia projecting above the upper surface of said printing field board and engaging the under side of said print receiving medium and means positioned in said housing and responsive to the insertion of the printing field board into the recorder for automatically exerting a pressure over said print receiving medium to print the information of said embossed indicia on said print receiving medium when said printing field board is inserted in said housing in a predetermined stop position.

4. A recorder for printing information on a print receiving medium which includes in combination, a housing, a removable printing field board positionable within said housing and adapted to carry said print receiving medium on the upper surface thereof, a plurality of embossed indicia projecting above the upper surface of said printing field board and engaging the under side of said print receiving medium, a roller assembly slidably mounted in said housing positioned to roll over said print receiving medium to exert a pressure thereon to print the information of the embossed indicia on the print receiving medium and means responsive to the insertion of said printing field board in said housing for actuating said roller assembly to pass over said print receiving medium when said print field board comes to a predetermined stop position in the housing.

5. A recorder for printing information on print receiving medium which includes in combination, a printing recorder adapted to have a printing field board with a print receiving medium on the upper surface thereof positioned therewithin, print bar means within said printing recorder for printing indicia on the print receiving medium, means for actuating said print bar means to set them to the indicia to be printed, roller means within said printing recorder for exerting a pressure on the print receiving medium to print the information thereon, and reset means responsive to the withdrawal of the printing field board to automatically reset the print bar means to zero position.

6. The invention as defined in claim 5 including stop means on said printing recorder responsive to said reset means for preventing the insertion of the printing field board therein when the print bar means is set at zero position.

7. A printing recorder comprising a base plate, parallel spaced apart guide plates extending across one side of said base plate from front to rear thereof, a groove on the inner surface of each of said guide plates extending substantially parallel to the base plate and curving upwardly at the front end thereof, a pressure plate mounted on top of said guide plates and extending therebetween, a roller assembly having stub shafts extending laterally outwardly from opposite sides thereof, said roller assembly being slidably mounted between the guide plates with the stub shafts thereon being slidably disposed within said grooves, said roller assembly rolling on the under side

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of said pressure plate, means on said printing recorder for receiving and positioning a printing field board on the base plate between the guide plates, and means for moving the roller assembly from rear to front after the printing field board has been positioned to exert a rolling pressure on a print receiving medium on the printing field board to print desired information thereon, said curved forward ends of said grooves quickly lifting the roller assembly after it has passed over the invoice form to facilitate the removal of the printing field board from the recorder.

8. A printing recorder comprising a base plate, parallel spaced apart guide plates extending across one side of said base plate from front to rear thereof, a pressure plate mounted above said guide plates and extending therebetween, a roller assembly comprising an upper roller and lower roller rotatably mounted on parallel shafts and frictionally engaging one another, means for slidably mounting said roller assembly between said guide plates for sliding movement from front to rear thereof with the upper roller rolling on the under side of said pressure plate, means on said printing recorder for receiving and positioning a printing field board on the base plate between the guide plates, and means for actuating said roller assembly from rear to front to roll the lower roller over a print receiving medium on the upper surface of the printing field board to print desired information thereon.

9. The invention as defined in claim 8, including an annular groove in the surface of said lower roller near one end thereof, curved print bars having embossed numerals on the upper curved surface thereof mounted beneath said base plate with a portion of the upper curved surfaces thereof projecting upwardly through an opening in the base plate a sufficient distance to project upwardly through an opening in the printing field board so as to be engageable with the under side of the invoice form thereon, and means for mounting said print bars for sliding movement along an arcuate path to selectively position each of said embossed numerals beneath the portion of the lower roller between the annular groove and the end of the roller adjacent thereto.

10. The invention as defined in claim 9, including index blade means for releasably fixing each of the print bars against movement with the embossed numerals thereon in accurate printing position.

11. A printing recorder comprising a base plate, parallel spaced apart guide plates extending across one side of said base plate from front to rear thereof, a pressure plate mounted over said guide plates and extending therebetween, a roller assembly slidably mounted between said guide plates and rolling on the under side of the pressure plate, print bar means slidably mounted beneath said base plate and projecting upwardly through openings in said base plate, numbering wheels rotatably mounted on said base plate, drive means connecting said numbering wheels to said print bar means so that rotation of the numbering wheels slides the print bar means, and means for advancing said roller assembly from rear to front after a printing field board has been positioned on the base plate between the guide plates to exert a pressure on a print receiving medium on the upper surface of the board to print the desired information thereon.

12. The invention as defined in claim 11 including reset means on said printing recorder for returning each of said numbering wheels to their zero position in response to the withdrawal of the printing field board from the printing recorder.

13. The invention as defined in claim 12 including stop means responsive to the operation of said reset means for preventing the insertion of a printing field board into the printing recorder when said numbering wheels are at zero position.

14. The invention as defined in claim 13, including rebound preventing means cooperating with said reset

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means to prevent said numbering wheels from rebounding after they have been rapidly returned to zero position.

15. A printing recorder for printing desired information on a print receiving medium which includes in combination, a printing recorder having means therein for receiving and positioning a printing field board in position to have desired information printed on a print receiving medium carried on the printing field board, print bar means in said printing recorder adapted to engage the under side of said invoice to print the amount of a sale thereon, roller assembly means adapted to roll over the upper side of said invoice to exert a pressure thereon to perform the printing operation, a plurality of numbering wheels rotatably mounted on said printing recorder, drive means for selectively connecting each of said numbering wheels to said print bar means so that predetermined indicia to be printed by said print bar means can be set by rotating each of the numbering wheels, stop means for limiting the rotation of each of said numbering wheels in one direction to a zero position, reset driving bar means for driving each of said numbering wheels in said one direction to said zero position, and means for automatically driving said reset driving bar in said one direction in response to the withdrawal of the printing field board from the printing recorder to automatically reset each of the numbering wheels to the zero position each time the printing field board is withdrawn.

16. A printing recorder for printing desired information on a print receiving medium which includes in combination, a printing recorder having means therein for receiving and positioning a printing field board in position to have desired information printed on a print receiving medium carried on the printing field board, print bar means in said printing recorder adapted to engage the under side of said print receiving medium to print predetermined indicia thereon, roller assembly means adapted to roll over the upper side of said print receiving medium to exert a pressure thereon to perform the printing operation, a plurality of numbering wheels rotatably mounted on said printing recorder, drive means for selectively connecting each of said numbering wheels to said print bar means so that the predetermined indicia to be printed by said print bar means can be set by rotating each of the numbering wheels, stop means for limiting the rotation of each of said numbering wheels in one direction to a zero position, reset driving bar means pivotally mounted on said printing recorder and engageable with each of said numbering wheels to drive them in said one direction against said stop means to the zero position, said reset driving bar disengaging the numbering wheels when pivoted in a reverse direction, rack plate means slidably mounted on said printing recorder and drivingly engaging said reset driving bar means to pivot it in said one direction and reverse direction, resilient means for resiliently biasing said rack plate means to a retracted position wherein said reset driving bar means is pivoted in the reverse direction to a normal at rest position, and means on said rack plate engageable with the printing field board as it is being withdrawn from the printing recorder to advance said rack plate means to pivot said reset driving bar in said one direction to reset each of the numbering wheels to zero position whereby when the printing field board is completely withdrawn from the printing recorder the rack plate means will be resiliently biased back to its retracted position to pivot the reset driving bar in said reverse direction to its normal at rest position whereby each of the numbering wheels are free to be rotated to set the print bar means to indicate different predetermined indicia.

17. A printing recorder comprising a base plate, means on said base plate for receiving and positioning a printing field board on top of the base plate in position to have desired information printed on a print receiving medium carried on top of the printing field board, print bar means slidably mounted beneath said base plate and

projecting upwardly through an opening in the base plate in position to engage a portion of the print receiving medium lying over an opening in the printing field board when fully inserted in the printing recorder, a plurality of numbering wheels mounted on said base plate for rotation about a common axis, drive means for connecting each of said numbering wheels to said print bar means so that predetermined indicia to be printed by the print bar means can be changed by rotating the numbering wheels, each of said numbering wheels having aligned arcuate grooves therein, a reset driving bar extending through the groove in each of said numbering wheels, said reset driving bar being pivotally mounted on said base plate and being pivotable in a first direction to rotate each of the numbering wheels to a zero position and pivotable in a second direction to a normal at rest position without rotating any of the numbering wheels, a roller assembly means slidably mounted on said base plate in position to roll over the invoice form when the printing field board is fully inserted within the printing recorder to print the desired information thereon, rack plate means slidably mounted on said base plate and drivingly engaging said reset driving bar, resilient means resiliently biasing said rack plate means to a retracted position wherein said reset driving bar means is at its normal at rest position, pawl means pivotally mounted on said rack plate means and engageable with the printing field board as it is retracted from the printing recorder to advance the rack plate means to pivot the reset driving bar in said first direction to automatically rotate each of the numbering wheels to its zero position whereby said rack plate means will be returned to its retracted position by said resilient means after the printing field board is completely withdrawn from the recorder to pivot the reset driving bar back to its normal at rest position wherein each of the numbering wheels is again free to be rotated to change the predetermined indicia to be indicated by the print bar means.

18. The invention as defined in claim 17 including a reset bar extending through the groove in each of said numbering wheels and overlapping said reset driving bar,

said reset bar being pivotally mounted on said base so as to be pivoted in said first direction by the reset driving bar and to be pivoted in said second direction in response to rotation of the numbering wheels, and stop lock means on said base plate movable to a first position by said reset bar when at zero position to prevent the insertion of a printing field board into the printing recorder and movable to a second position when said reset bar has been pivoted in said second direction by any of the numbering wheels to enable a printing field board to be freely inserted.

19. The method of printing desired information on a print receiving medium having a plurality of sheets of paper interleaved with carbon paper, which includes the steps of, providing a printing field board having two rectangular depressions in the upper surface thereof with two rectangular openings adjacent thereto, positioning a dealer's identification card in one of said depressions and a customer's credit card in the other of said depressions, positioning a print receiving medium on said field board and covering said cards and openings, inserting the printing field board into a printing recorder, projecting indicia rollers of the printing recorder through one of said openings to engage embossed indicia thereon with the under side of the print receiving medium, projecting print bars having embossed indicia thereon through the other of said openings so that the embossed indicia thereof engage the under side of the print receiving medium, rolling a roller assembly over the upper side of said print receiving medium to exert a pressure thereon to print the desired information on the print receiving medium, and withdrawing the printing field board and print receiving medium from the printing recorder after the roller assembly has been passed thereover.

References Cited in the file of this patent

UNITED STATES PATENTS

1,924,288	Reardon	Aug. 29, 1933
2,582,187	Wolowitz	Jan. 8, 1952
2,682,217	Ginn	June 29, 1954
2,909,998	Maul	Oct. 27, 1959