United States Patent [19]

McInnis et al.

[11] **3,800,700**

[45] **Apr. 2, 1974**

[54] **MULTIPLE SHEET IMPRINTING APPARATUS**

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[73] Assignee: **Sheldon Industries Inc.**, Monrovia, Calif.

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[21] Appl. No.: **290,168**

[52] **U.S. Cl.** **101/269**

[51] **Int. Cl.** **B41f 3/04**

[58] **Field of Search** 101/269–274

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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—E. M. Coven
Attorney, Agent, or Firm—William W. Haefliger

[57] **ABSTRACT**

An imprinter includes a head section closable toward a base section on which have been placed multiple sheets to be imprinted. When the head is locked in down position, a pressure roller carried by the head section travels relatively along and over stacked sheets to pressurize them alternately between the roller and indicia on the base, and between the roller and a rail on the base, and in a manner to prevent uncontrolled smudging of the sheets near the indicia, and to accept controlled smudging over the rail.

18 Claims, 15 Drawing Figures

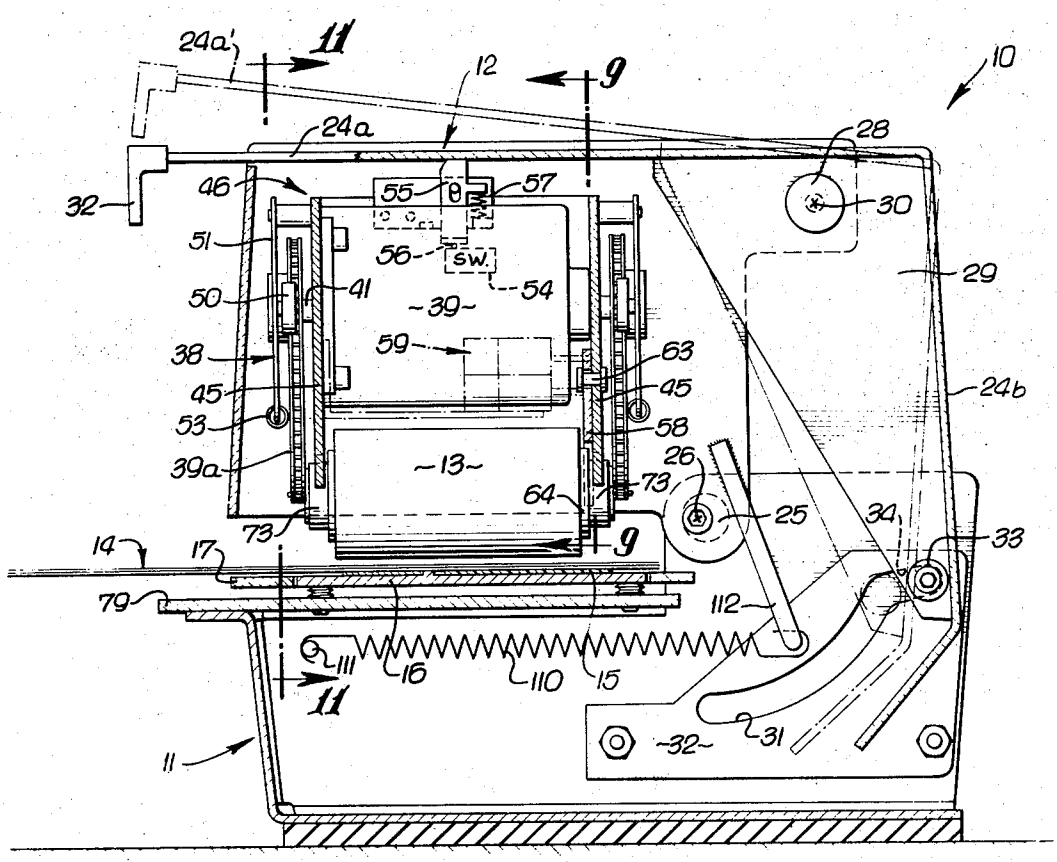


FIG. 1.

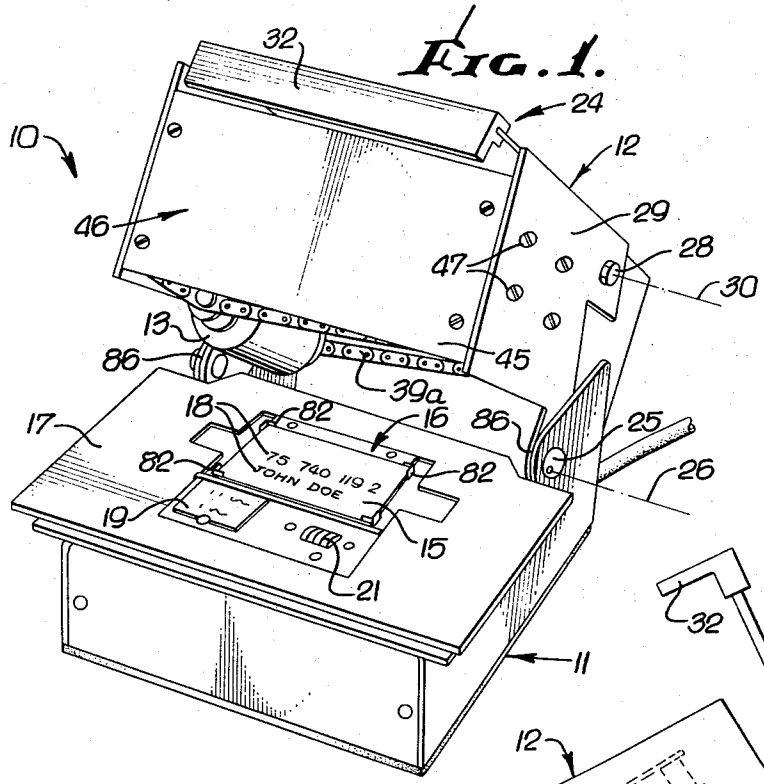


FIG. 13.

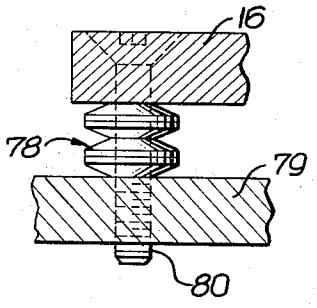
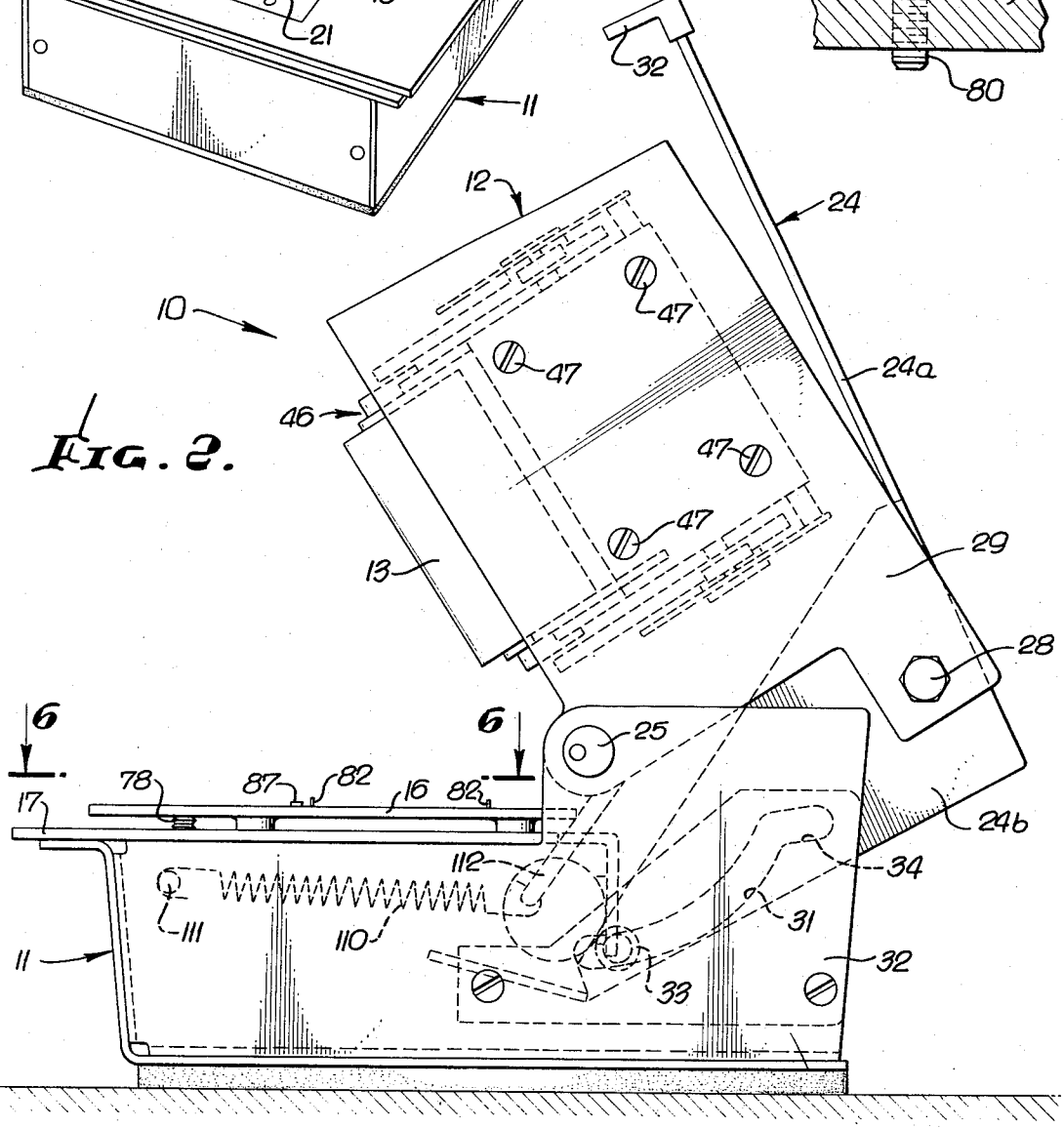


FIG. 2.



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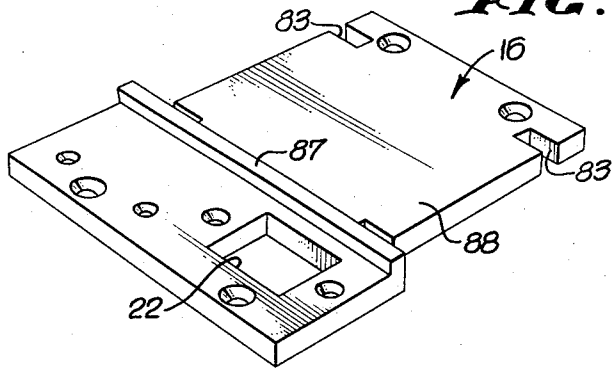

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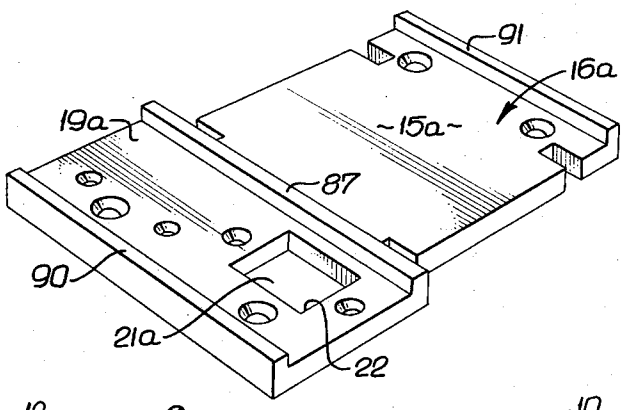


FIG. 3.

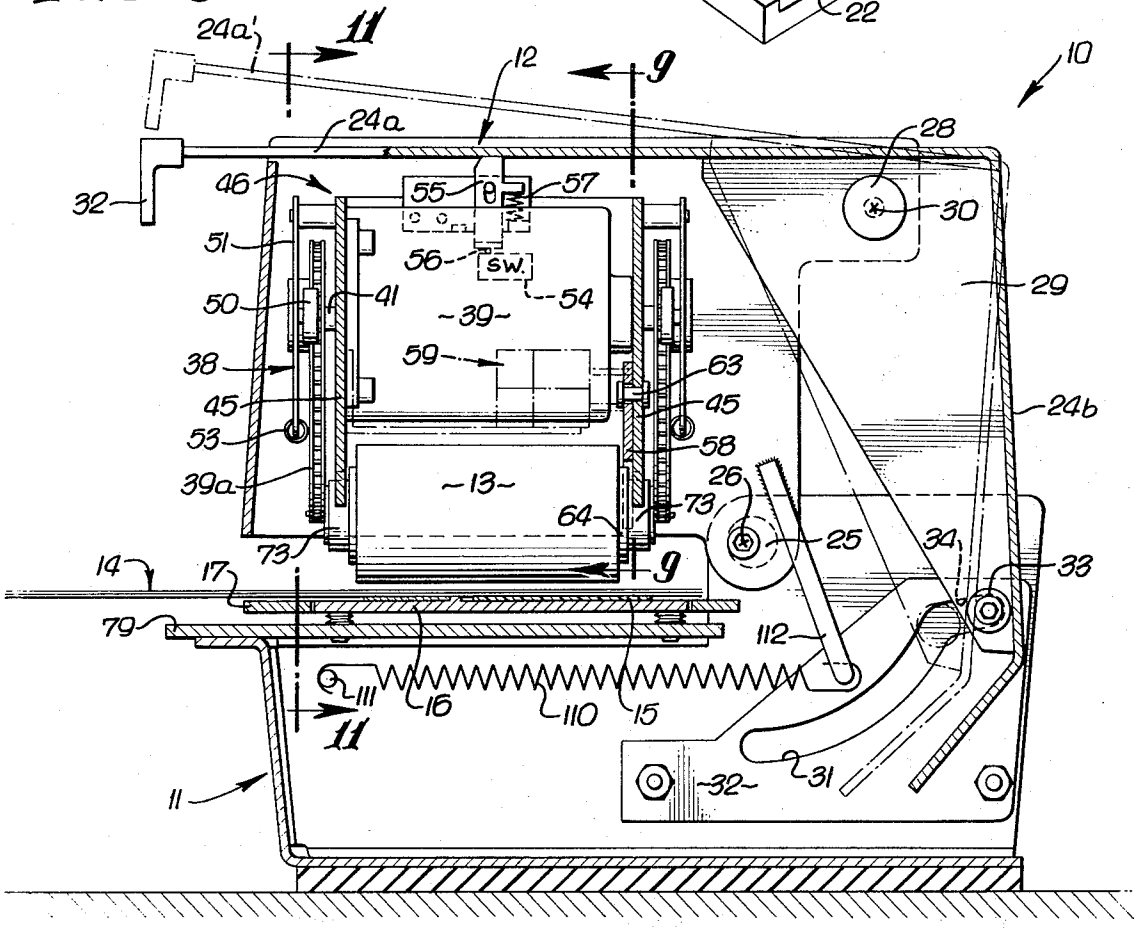
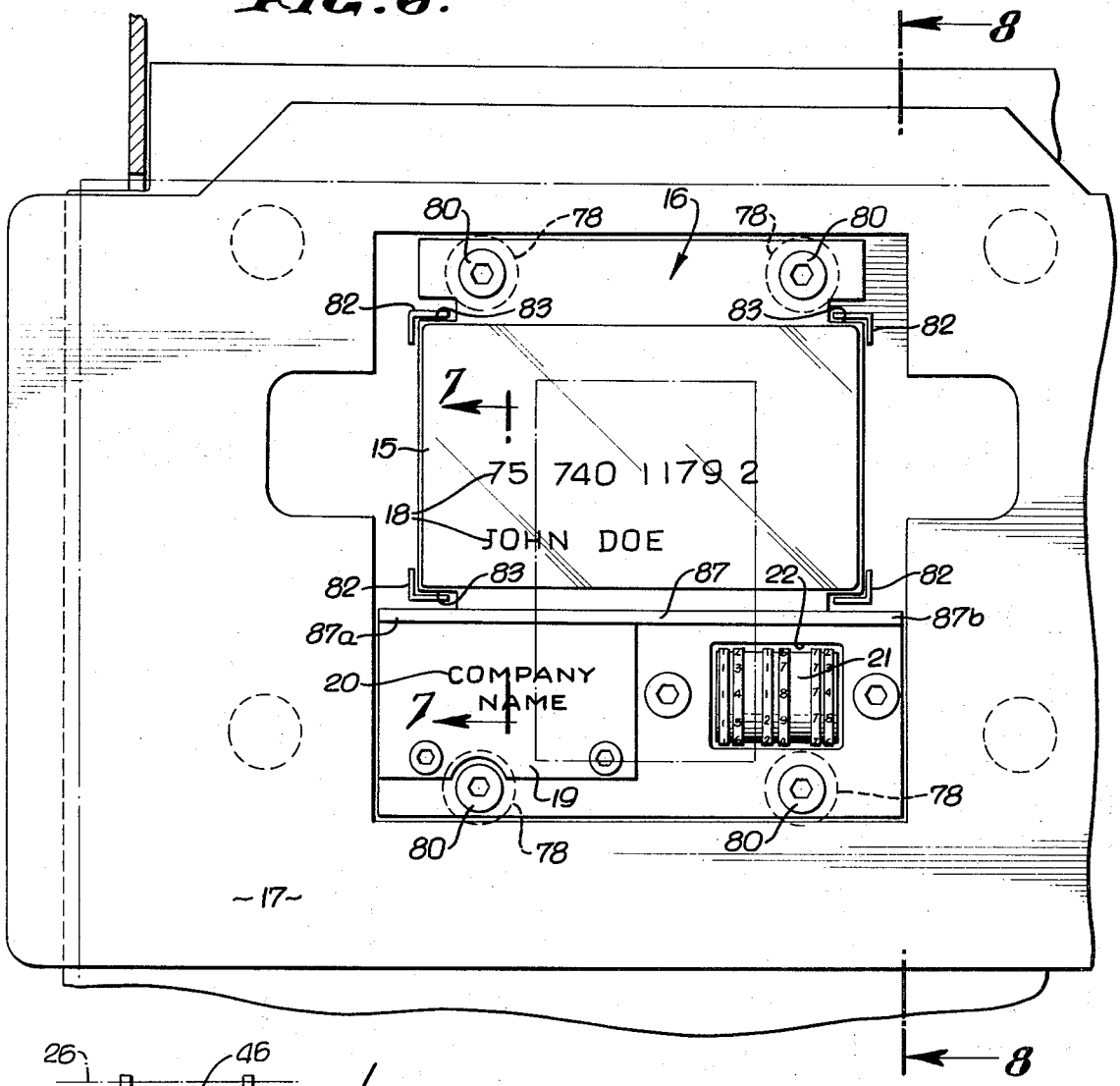


FIG. 6.



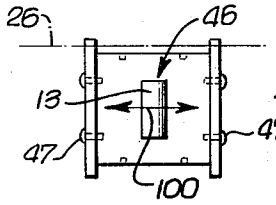


FIG. 14a.

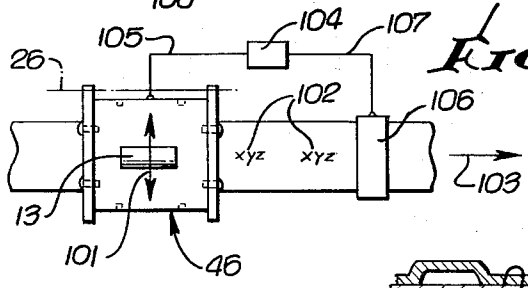


FIG. 14b.

FIG. 7.

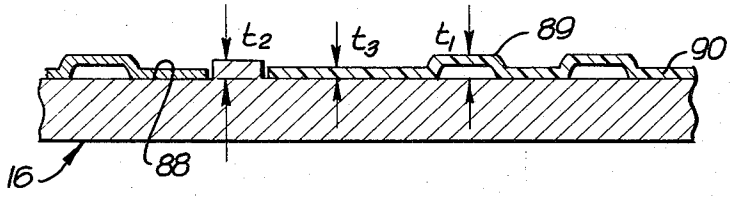


FIG. 9.

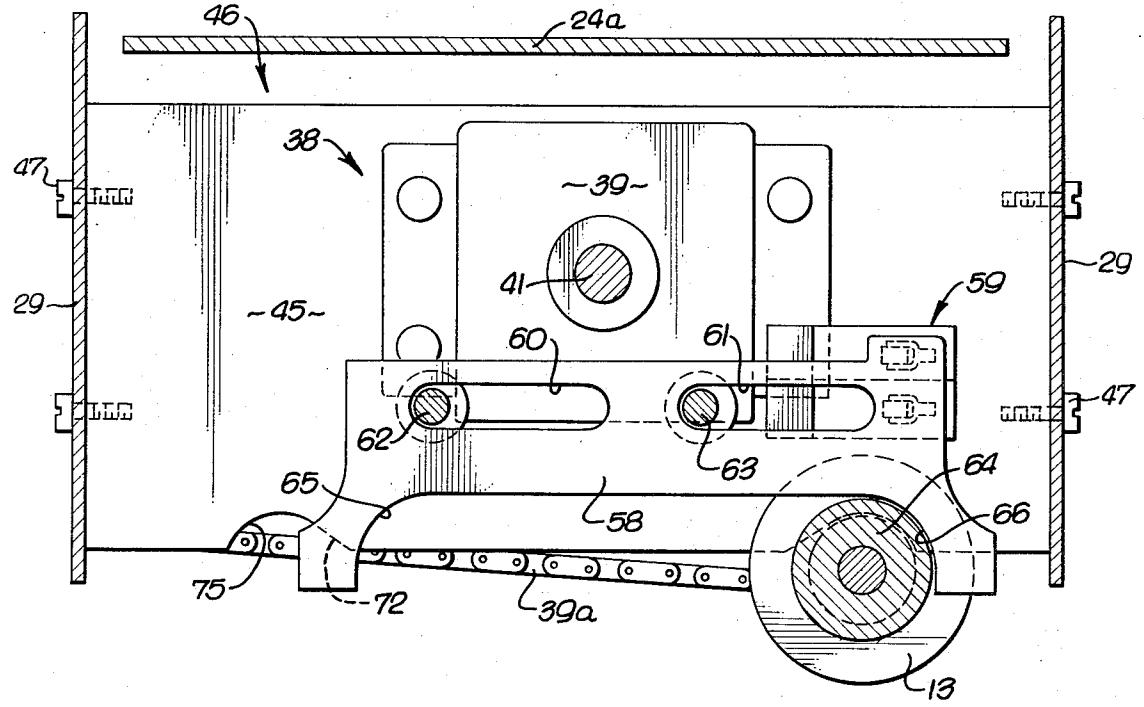
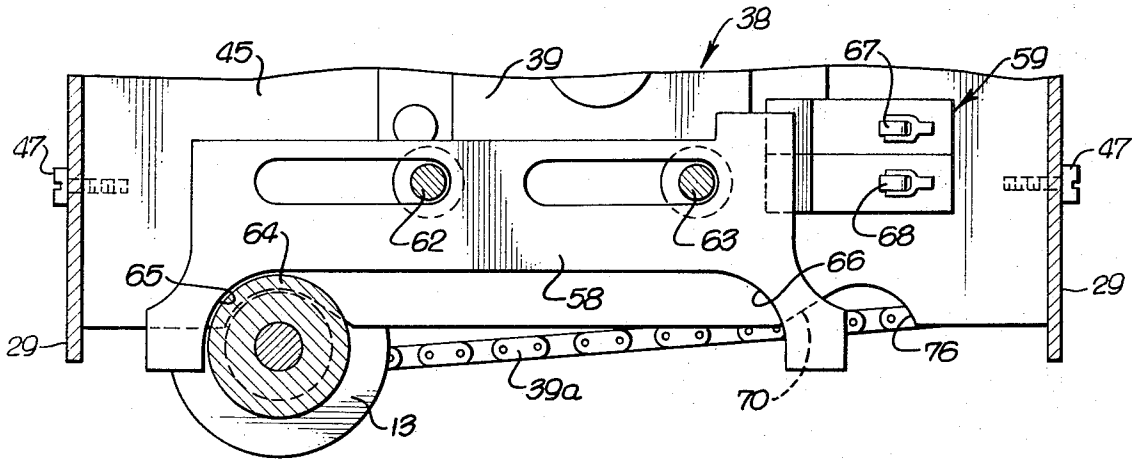


FIG. 10.



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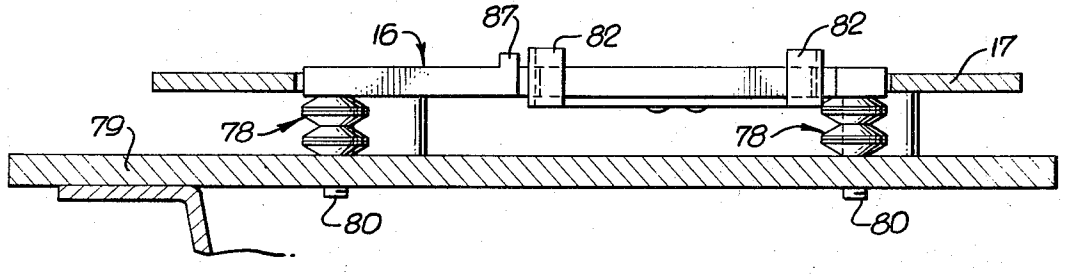

FIG. 11.

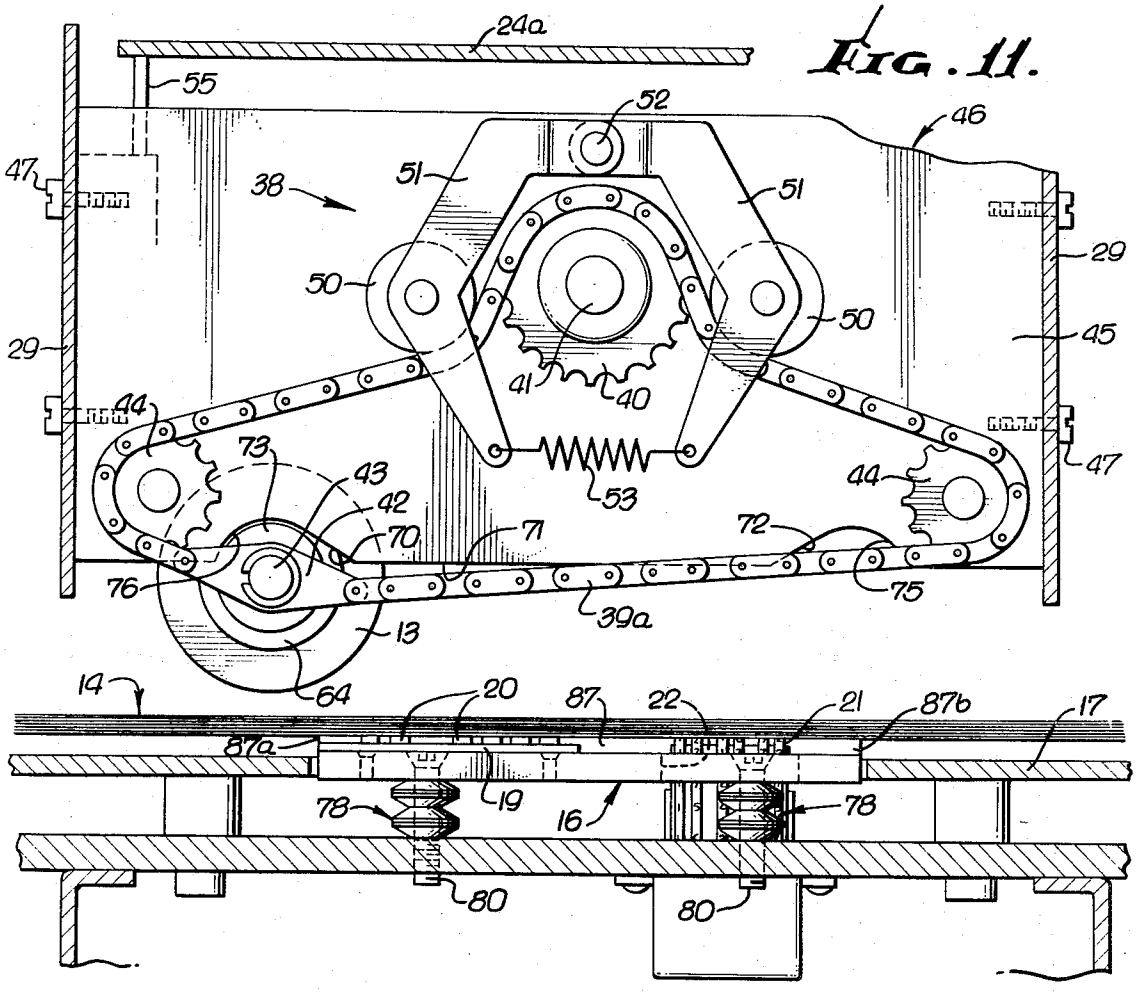
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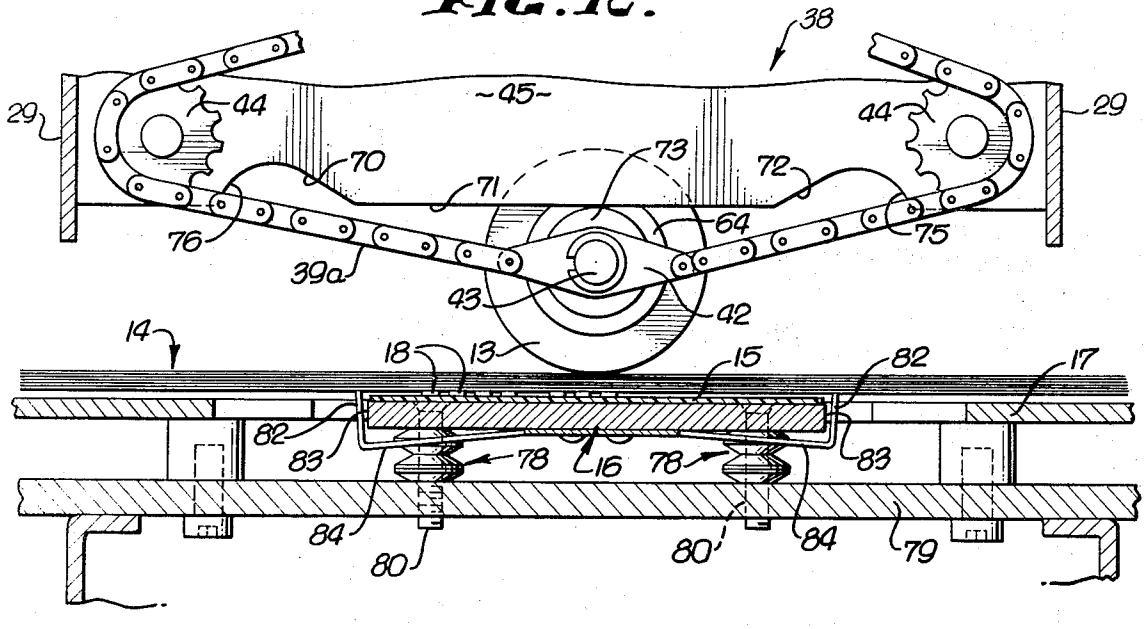
FIG. 12.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MULTIPLE SHEET IMPRINTING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates generally to printing, and more particularly concerns imprinting apparatus.

Previously developed imprinters have been characterized by a number of serious disadvantages in functioning and results. These include the difficulty of rapidly inserting a sheet or sheets to be imprinted into the apparatus and withdrawing the sheet or sheets therefrom; lack of capacity or ability to effect clear and legible imprinting of multiple sheets in a stack (say five to twelve sheets, for example); the tendency to jam when attempts are made to simultaneously imprint such multiple sheets, and to the extent that an indicia carrier such as a credit card cannot then be removed from the equipment without greater difficulty; the tendency of pressure rollers in prior imprinters to uncontrollably smudge the sheets due to unwanted pressure transmission to portions of the sheets other than those to be imprinted; fuzzing of the imprinted indicia arising from roller induced movement or skewing of the sheets at the moment of roller travel over the embossments defining the indicia. All of these difficulties as well as others become especially critical in imprinters of the type in which embossed plastic cards such as credit cards are removably inserted.

SUMMARY OF THE INVENTION

It is a major object of the invention to provide imprinting apparatus departing significantly in its construction and mode of operation from prior devices in order to avoid or overcome all of the above problems.

Basically, the imprinting apparatus of the invention comprises a base section defining a zone for indicia presentation to contact with sheet means such as one or more sheets placed over that zone; a head section, including a pressure roller, relatively movable from retracted position in which the pressure roller is spaced from the base section to closed position in which that roller is presented for displacement across that zone in contact with the sheet; first means to releasably lock the head section in closed position in response to head section movement into that position; and other means to forcibly urge the roller relatively toward that zone in response to roller displacement thereacross, with the head section locked in closed position. Accordingly, despite the capability of the head section to be quickly retracted to completely release the sheet means, and preventing jamming of the sheet and indicia card against retrieval, the apparatus in locked condition permits development of maximum roller pressure against the sheet over the indicia to secure imprinting of multiple sheets in a stack. This is especially important in applications such as hospitals and governmental agencies where a large number of forms typically must be filled in with an individual's name and/or address and/or serial number. In other words, the invention enables positive, rapid and legible imprinting of a large number of forms or sheets in a stack, and simultaneously, using one or more removable, embossed cards, without chance of jamming of the forms or of the card or cards.

It is another object of the invention to provide for pivotal interconnection of the base and head section in such an imprinter, with an operating arm carried by the

head section and coupled with the base section to displace the head section toward and away from the base section, with "jaw" action, when the arm is rotated in opposite directions, the same arm being further swingable to limited extent when the head section is closed to effect interlocking of the head and base sections as described. Further, the same arm may advantageously, when so swung, effect actuation of a drive to translate the roller across the indicia zone, so that the multiple functions of opening and closing of the two sections, their interlocking and release, and drive energization are all controlled by movement of the one operating arm. As will be seen, the drive and pressure roller may be carried in a modular frame which is removably attached to the head section to be removed from servicing or replacement, or even for reorientation in the head section to extend imprinting capability as will be seen.

Additional objects include the provision of an indicia carrier support platen of unusually advantageous construction, and which is supported in the base section to accommodate reversal as desired and to be yieldably depressed in response to reception of pressure roller force application thereby to control the upper limit of pressure application to the sheets and indicia so as not to permanently deform the indicia. As will be seen, a rail or rails may be incorporated on the platen to block clamping of the sheet means between the roller and indicia carrier (preventing smudging) while permitting clamping of the sheet between the roller and the raised indicia. Further, the extent of the rail prevents sudden acceleration of roller rotation upon arrival over the raised indicia, which in turn prevents unwanted movement and skewing of the sheet during imprinting, as will be seen.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following description and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is a perspective showing of one form of apparatus incorporating the invention;

FIG. 2 is a side elevation of the apparatus as seen in FIG. 1;

FIG. 3 is a view like FIG. 2 showing the apparatus in closed and operating condition;

FIG. 4 is a perspective showing of a platen as used in the apparatus;

FIG. 5 is a perspective showing of a modified platen;

FIG. 6 is an enlarged plan view taken on lines 6—6 of FIG. 2;

FIG. 7 is a sectional elevation taken on lines 7—7 of FIG. 6;

FIG. 8 is a sectional elevation taken on lines 8—8 of FIG. 6;

FIG. 9 is a sectional elevation taken on lines 9—9 of FIG. 3;

FIG. 10 is a view like FIG. 9 but showing a shifted condition of components;

FIG. 11 is a sectional elevation taken on lines 11—11 of FIG. 3;

FIG. 12 is a view like FIG. 11 but showing a shifted condition of components;

FIG. 13 is a fragmentary elevation showing a modified yieldable support for the platen; and

FIG. 14*a* and 14*b* are plan views showing different use configurations of a modified form of the apparatus.

DETAILED DESCRIPTION

Referring first to FIG. 1, the illustrated imprinting apparatus 10 includes base and head sections as for example are seen at 11 and 12. The head section is relatively movable from retracted position (as for example the upwardly pivoted position illustrated in FIGS. 1 and 2) in which a pressure member such as roller 13 is openly spaced from the base section, to closed position (as for example is seen in FIGS. 3, 11 and 12) in which the roller is presented proximate the base section for lateral displacement across and in contact with sheet means 14 (comprising one or more sheets in a stack). When the head section is in retracted condition, the sheet means may be conveniently placed over an indicia carrier 15, a carrier support such as platen 16 and a sheet supporting table 17, elements 15–17 being carried by the base section. The carrier 15 may for example comprise a plastic card removably received on the platen, and which carries embossments 18 defining indicia (as for example a name and serial number) pressurally engageable with the sheet means to effect imprinting of the latter.

Other forms of indicia carriers may be carried by or presented at the platen 16, one example being a small metal plate 19 presenting embossments 20 (for example identifying a company name). Another example is an adjustable assembly of coaxial rotors 21 carrying embossments (for example identifying the month, day and year). The rotor assembly is carried by the base section and received in a through opening 22 in the platen for selected embossment presentation at a preselected level above the upper surface level of the platen.

It will be appreciated that, due to the capability of the head section to be raised or swing upwardly away from the base section, the sheet means 14 and card 15 cannot become jammed or stuck against removal from position between the roller 13 and platen, no matter how many individual sheets are in the stack defining the sheet means. Thus, if for any reason (as for example the attempted imprinting of a too thick bundle of forms) the roller is blocked against completed travel across the indicia zone, the head section may be lifted to immediately free the forms and the removable indicia carrying card and/or plate 15 and 19 for lift-off removal from the base section. Examples of imprintable sheets are carbon paper sheets interposed between other paper sheets such as forms, and so-called NCR paper containing very small, pressure rupturable, ink containing globules.

Referring to FIGS. 1–3, the two sections 11 and 12 may advantageously have pivoted interconnection as at 25 to accommodate upward and downward swinging of the head section about first pivot axis 26. Also, first means is provided to releasably lock the head section in closed position in response to head section movement into closed position. In the example, such first means includes an operating arm 24 which may be generally L-shaped to define arm segments 24*a* and 24*b*. The arm is carried by the head section, as for example at pivot connection 28 to head section side panels 29 defining a second pivot axis 30 parallel to axis 26. The arm segment 24 is also coupled to the base section to displace the head section toward and away from the base section when the arm is rotated in opposite directions relatively about axis 26. Such coupling may advantageously include arcuate cam elements, as for example like cam slots 31 defined by thickened portions of base section side panels 32, and follower elements such as follower pins 33 carried by the arm segment 24*b*. The inwardly facing slots 31 are generally circular about axis 26; however the pivots 25 defining axis 26 may be slightly eccentric to accommodate tracking of followers 33 in the slots 31, without binding. During such lifting and lowering of the head section by finger tip exertion on handle bar 32 at the end of arm segment 24*a*, the pins 33 are displaced in generally circular paths about axis 26. A tension spring 110 connected between the base section at 111 and a post 112 on the head section serves to provide counterbalancing force for easing lifting of the head section.

A further mode of coupling of the arm segment 24*b* to the base section side panels 32 comprises a cam slot extension 34 which intersects slot 31 to receive the follower when the head section is in closed position. At such time, depression of the arm segment 24*a* from broken line position 24*a'* to solid line position as shown in FIG. 3 effects pivoting of the arm about axis 30 to carry the follower along cam slot extension 34 to the locking position. The head section is thereby releasably locked in closed position so that the roller may be displaced across the indicia zone while it exerts substantial force against the sheet means subject to imprinting. Further, unlocking of the sections following imprinting is very simply effected by slight lifting of the arm segment 24*a* to the broken line position 24*a'*. Note that slot extension 34 extends generally circularly about axis 30.

The described first means, such as includes arm 24, to releasably lock the head section in closed position may advantageously have the further function of effecting energization of the drive serving to displace the roller transversely across the indicia zone, as for example between roller positions represented in FIGS. 9 and 10. The drive indicated generally at 38 in FIGS. 3 and 9–12 includes an electrical motor 39 carried by the head section and coupled in driving relation with the roller as for example by means of drive chains 39a entrained on drive sprockets 40 connected with the oppositely projecting motor output shafts 41. Opposite ends of each chain are connected to roller carriers 42 journaled to the roller trunnions 43 as appears in FIGS. 12, for example. Idler sprockets 44 are carried by the front and rear panels 45 of a drive module or frame 46 removably attached as by fasteners 47 to the head section side panels or support structure 29. This allows removal of the drive module whenever desired for servicing or replacement. All elements of the roller drive carried by the module frame. Chain slack is removed by idler sprockets 50 carried by arms 51 pivoted to the panels 45 at 52, and spring urged at 53 to cause the sprockets 50 to mesh with and deflect the chain as shown in FIG. 11.

As seen in FIG. 3, a motor control switch 54 is carried by the module 46 on the head section so as to be actuated upon final lowering of arm segment 24*a* during locking of the head section in closed position. For this purpose, a pusher 55 is depressed by the arm segment 24*a* to depress the switch plunger 56 effecting motor energization. A spring 57 urges the pusher up-

wardly to release the switch plunger when the arm segment **24***a* is lifted to unlock the head section from the base section. Referring to FIGS. **9** and **10**, a plate element **58** is shiftable in opposite directions in response to roller travel in opposite directions across the indicia zone, and limit switch means indicated generally at **59** is actuable by the plate element to effect deenergization of the motor upon completion of roller travel across that zone. The plate **58** may contain guide slots **60** and **61** receiving pins **62** and **63** carried by the module **46** to support the plate and limit its endwise movement. The plate is moved to the left to FIG. **10** position during the final movement of the roller to the left, as by engagement of roller trunnion **64** with plate shoulder **65**; likewise, the plate is moved to the right to FIG. **9** position during final movement of the roller to the right, as by engagement of trunnion **64** with plate curved shoulder **66**. Upon engagement of the plate with limit switch actuator **67**, a rightward drive motor circuit is interrupted to deenergize the rightward drive. A second limit switch actuator **68** is also operated by the plate to partially close a switch in a leftward drive motor circuit, which is completely closed only when the main switch **54** is next closed by depression of arm segment **24***a*. In the latter event the roller is driven to the left, and the second limit switch actuator **68** is released by the plate during final movement of the roller to FIG. **10** position, to deenergize the leftward drive.

In accordance with a further aspect of the invention, other means is provided to forcibly urge the roller **13** toward the indicia on elements **15, 19** and **21** defining the indicia zone in response to roller displacement across that zone as described, with the head section locked in closed position. Such other means may advantageously comprise guideways on the head section, as for example are defined by shoulders **70, 71** and **72** on plates **45**, together with reduced diameter roller trunnion portions **73** riding on and movable along the guideways in response to roller bodily displacement between FIGS. **9** and **10** positions. Note that the guideways **70** and **72** define ramps angled to displace the roller carriers or trunnions in a direction forcibly moving the roller toward the base section and away from the head section, assuring development of sufficient pressure to effect imprinting of multiple sheets or forms in the stack applied over the embossments defining the indicia. The limits of roller trunnion travel are defined by arcuate shoulders **75** and **76**.

Referring to FIGS. **11** and **12**, yieldable means such as Belleville washer stacks **78** are carried on base plate **79** to support the platen in such manner as to yield and thereby control the force application to the sheet means by the roller **13**, such force application thereby being the same for a wide range of overall thicknesses of the sheet means **14**. Fasteners **80** project through the washers and are threadably attached to the base plate, allowing fastener adjustment to control initial compression of the washers and positioning of the platen. See also FIG. **13** in this regard. Locating fingers **82** for card **15** project upwardly via openings **83** the platen, and are resiliently mounted as by flat spring extensions **84** attached to the underside of the platen. Accordingly, the fingers are easily depressed downwardly by the sheet means or stack **14** in response to pressurization by roller **13**. Note also that the platen is endwise reversible 180°, as accommodated by removal of fasteners **80**, permitting relocation of the indicia as on card **15** further from the pivots **25** so as to permit imprinting at sheet locations further from the sheet edge advanced against structure locations **86** in FIG. **1**.

Referring to FIGS. **4** and **7** the platen **16** is seen to carry a rail **87** projecting outwardly from the platen surface **88** to an extent t_2 which is less than the outward projection t_1 of the indicia **89** on indicia carrying card **90** from the surface **88**, but to greater extent than the projection t_3 of the main body of card **90** from surface **88**. Merely as one example, t_3 may be about 0.030 inches; t_2 about 0.037 inches; and t_1 between 0.040 and 0.050 inches, for a currently used plastic credit card. The purpose of the rail is to prevent smudging of the sheet **14** during imprinting, as discussed in our copending U.S. Pat. application entitled, "Elimination of Uncontrolled Background Reproduction During Printing." Note that the rail **87** preferably extends at **87***a* and **87***b* endwise beyond the indicia presented upwardly in FIG. **6**. This results in the initiation of rotation of the roller **13** (in response to compressive force transmission to the roller from the rail) prior to arrival of the roller over the raised indicia, so that skewing or other unwanted displacements of the sheet which might then occurr are prevented, and irrespective of the degree of clamping force transmission by the roller and the speed of roller travel over the indicia. If desired, the rail surface may be etched or otherwise configured to imprint a pattern such as a name on the sheet means.

FIG. **5** illustrates a modified platen wherein two additional rails **90** and **91** are provided, parallel to rail **87**. Rails **87** and **91** embrace the plastic card zone **15***a*; and rails **87** and **90** embrace the metal card zone **19***a* and the adjustable embossing wheel zone **21***a*.

Referring now to FIG. **14***a*, the module **46** is shown attached by fasteners **47** to the head structure so that the roller **13** moves across the indicia zone in the directions **100** parallel to pivot axis **26** previously referred to. If desired, the module may be removed and rotated 90° and refastened to the head so that the roller **13** will then travel across the indicia zone in the directions **101** generally toward and away from axis **26**. This enables very rapid production of imprints, as for example labels **102** on an elongated sheet indexed in the direction **103** between each imprinting. Such indexing may be controlled as at **104**, link **105** indicating actuation of arm **24** in predetermined timed relation to operation of sheet indexing drive **106** connected to the control by link **107**. The module **46** typically includes the roller **13** and its drive, including motor **39** and associated electrical circuitry. An electrical power plug may then be directly removably connected to the module.

Finally, it will be noted that the construction of the base and head sections enables their ready lateral expansion, for greater lateral travel of the roller, as over longer forms or sheets to be imprinted.

We claim:

1. In apparatus for effecting imprinting of a sheet, the combination comprising

a. a base section defining a zone for indicia presentation to contact with the sheet placed thereover,

b. a head section including a pressure roller, relatively movable from retracted position in which the roller is openly spaced from said base section to closed position in which the roller is presented for displacement across said zone in contact with the sheet, the base and head sections having pivoted

interconnection to accommodate swinging of the head section between said retracted and closed positions, and about a first pivot axis,

c. first means to releasably lock the head section in said closed position in response to head section movement into that position, and

d. other means to forcibly urge the roller relatively toward said zone in response to said roller displacement across said zone, with the head section locked in said closed position,

e. said first means including an operating arm carried by the head section and coupled with the base section to displace the head section toward and away from the base section when the arm is rotated in opposite directions relatively about said axis, the arm being swingable about a second pivot axis with the head section in said closed position and relative to both the head and base sections to effect said locking of the head section to the base section, the arm having pivotal connection to the head section to define said second axis which extends parallel to the first axis,

f. there being a drive comprising an electrical motor carried by the head section and coupled in driving relation with the roller to displace the roller across said zone, the drive including a motor control switch carried by the head section to be actuated by said first means only after said locking of the head section in closed position.

2. The combination of claim **1** wherein said coupling of the arm to the base section includes an arcuate cam element and a follower element therefor, one element on the arm and the other on the base section, there being a cam extension along which the follower is guided to travel away from the arcuate cam element in response to said arm swinging about the second axis.

3. The combination of claim **1** including an element shiftable in opposite directions in response to roller travel in opposite directions across said zone, and limit switch means actuable by said element to effect deenergization of the motor upon completion of roller travel across said zone.

4. The combination of claim **1** wherein said other means includes a guideway on the head section, and a roller carried movable along said guideway in response to said displacement of the roller across said zone, the guideway including a ramp portion angled to displace the carrier in a direction forcibly moving the roller relatively toward the base section and away from the head section.

5. The combination of claim **4** including an indicia carrier support on the base section, and yieldable means located on the base section to yieldably resist displacement of the support away from the head section in response to said roller forcible movement toward the base section.

6. The combination of claim **5** wherein said support comprises a platen to receive a carrier in the form of an indicia carrying sheet.

7. The combination of claim **6** including said carrier in the form of a plastic card which is embossed to form said indicia, the card received flatly on the platen.

8. In apparatus for effecting imprinting of a sheet, the combination comprising

a. a base section and a carrier thereon, the carrier having indicia presented away from the base section for contact with the sheet placed thereover, and rail means on the base section extending lengthwise along and projecting outwardly relative thereto further than the carrier other than the indicia,

b. a head section including a pressure roller, relatively movable from retracted position in which the roller is openly spaced from said base section to closed position in which the roller is presented for bodily displacement lengthwise of and over the rail means and over the indicia to urge the sheet thereagainst,

c. first means to releasably lock the head section in said closed position in response to head section movement into that position,

d. other means to forcibly urge the roller relatively toward said carrier in response to said roller displacement across said zone, with the head section locked in said closed position,

e. the indicia supporting the roller during one portion of said roller displacement and the rail means supporting the roller during another portion of said roller displacement, the carrier other than the indicia remaining free of direct pressurization by the roller during said other portion of roller displacement.

9. The combination of claim **8** wherein the base section includes a platen carrying the rail means and defining a zone in which the carrier is received.

10. The combination of claim **9** including resilient means supporting the platen to accommodate yieldable deflection thereof in response to roller transmitted force application thereto.

11. The combination of claim **10** including a base plate to which the platen is releasably attached by fasteners which also retain said yieldable means in position.

12. The combination of claim **9** wherein the carrier comprises an embossed plastic card.

13. The combination of claim **8** wherein the carrier comprises an elongated tape, the indicia comprising embossed portions of the tape.

14. The combination of claim **8** wherein the rail extends endwise in the direction of roller movement beyond the endwise limit of the indicia.

15. The combination of claim **8** including the sheet placed directly over the rail means and carried to be urged against the indicia during said one portion of roller displacement, and to be urged against the rail means during another portion of roller displacement.

16. In apparatus for effecting imprinting of a sheet, the combination comprising

a. a base section defining a zone for indicia presentation to contact with the sheet placed thereover,

b. a head section including a pressure roller, relatively movable from retracted position in which the roller is openly spaced from said base section to closed position in which the roller is presented for displacement across said zone in contact with the sheet,

c. first means to releasably lock the head section in said closed position in response to head section movement into that position,

d. other means to forcibly urge the roller relatively toward said zone in response to said roller displacement across said zone, with the head section locked in said closed position,

e. there being a drive comprising an electrical motor coupled in driving relation with the roller to displace the roller across said zone,

f. the head section including support structure and a frame, the frame carrying the pressure roller and said drive, and

g. means for releasably attaching said frame to said support structure in either of two alternate positions.

17. The combination of claim **16** wherein said two alternate positions have 90° relative angularity characterized in that the roller is movable across said zone in directions respectively parallel to, and toward and away from, an axis defined by a pivoted connection between said sections.

18. In apparatus for effecting imprinting of a sheet, the combination comprising

a. a first section and a platen thereon defining a zone for reception of a carrier for raised indicia to contact the sheet extended thereover;

b. a second section, including a pressure roller, relatively movable from retracted position in which said roller is openly spaced from the first section to closed position in which said roller is presented for displacement relatively across said zone in contact with the sheet over the indicia, thereby to urge the sheet against the indicia,

c. locking means to releasably lock the head section in closed position,

d. other means to effect said roller displacement with forcible urging of the roller toward said zone as it moves thereacross, and

e. rail means on the platen and projecting therefrom toward the head section to a level which is lower than the level defined by the indicia and greater than the surface level of the carrier from which the indicia project, the rail means being elongated in the direction of pressure roller displacement over said zone, the rail means fully supporting the roller during portions of said displacement thereof in which the sheet is free of pressurization by the roller against the indicia.

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