# United States Patent [19]

**McInnis**

[11] **3,820,458**

[45] **June 28, 1974**


[54] **ELIMINATION OF UNCONTROLLED BACKGROUND REPRODUCTION DURING PRINTING**


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[21] Appl. No.: **290,169**

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

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

[58] **Field of Search** ..... 101/269–274, 101/407, 45



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[57] **ABSTRACT**

A pressure roller travels relatively over a sheet to urge the sheet either against indicia or against rail means, to prevent uncontrolled smudging and to accept controlled smudging.


**13 Claims, 12 Drawing Figures**

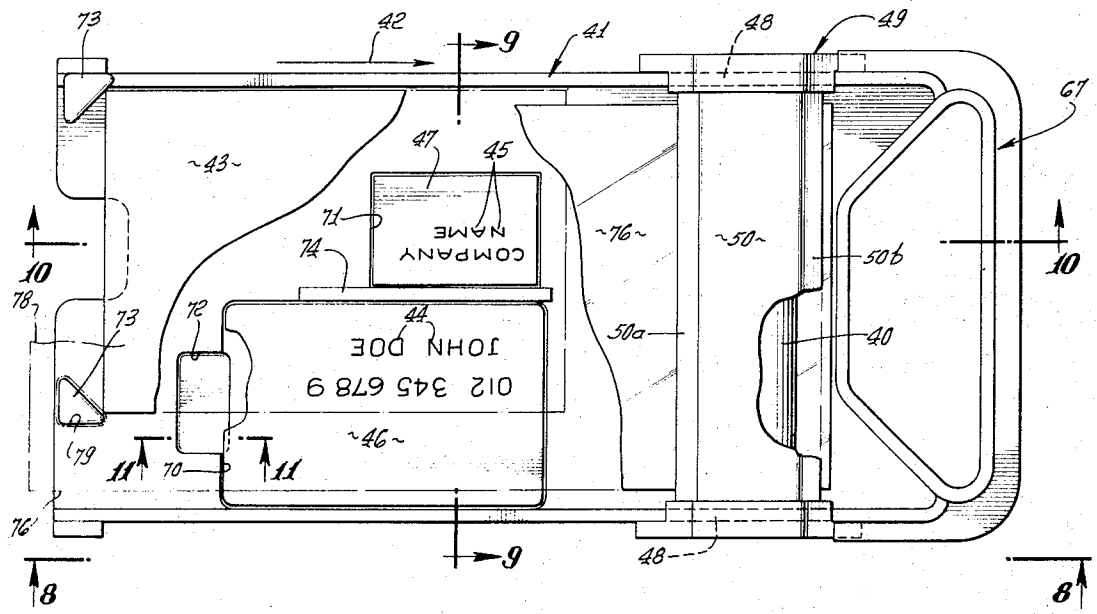


FIG. 1.

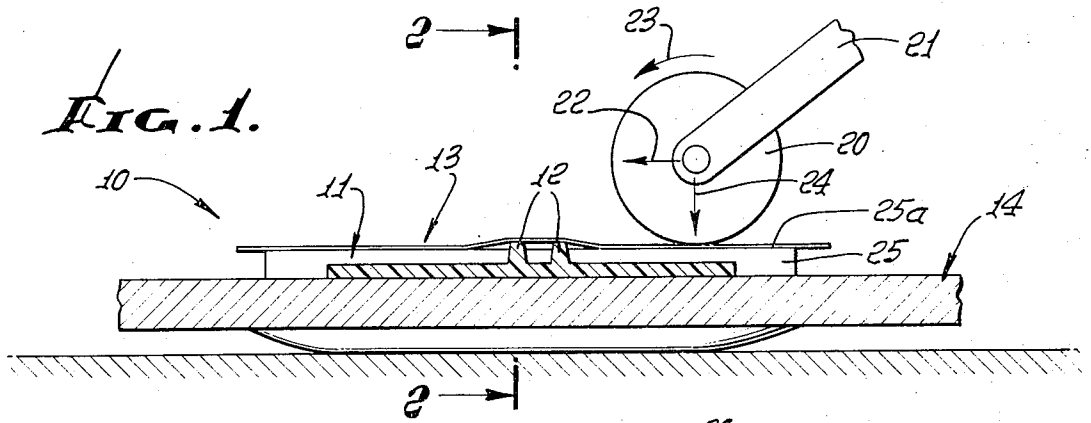



FIG. 2.

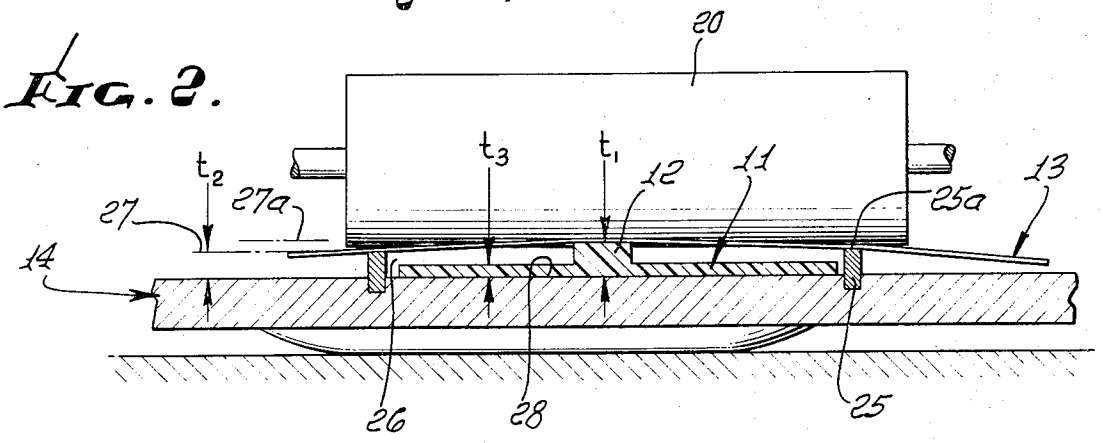



FIG. 3.

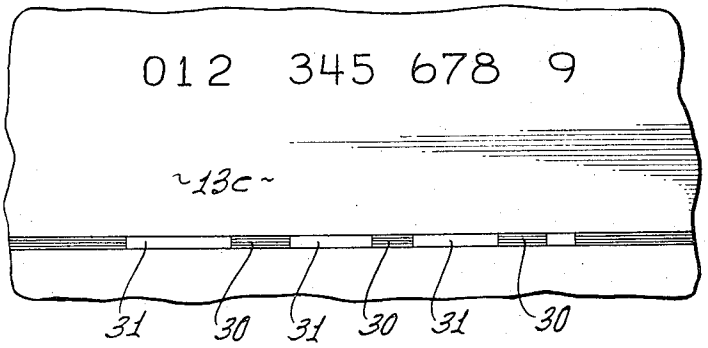



FIG. 4.

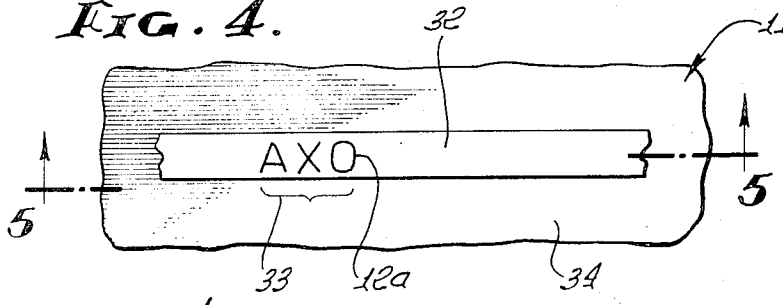



FIG. 6.

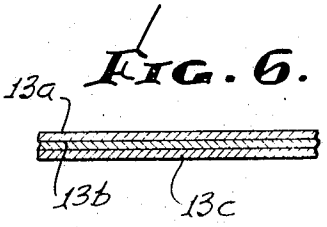



FIG. 5.

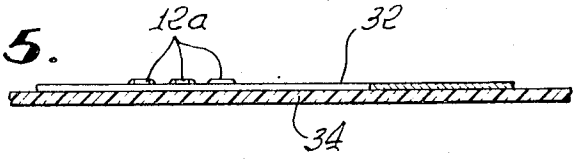


FIG. 7.



FIG. 11.



FIG. 12.

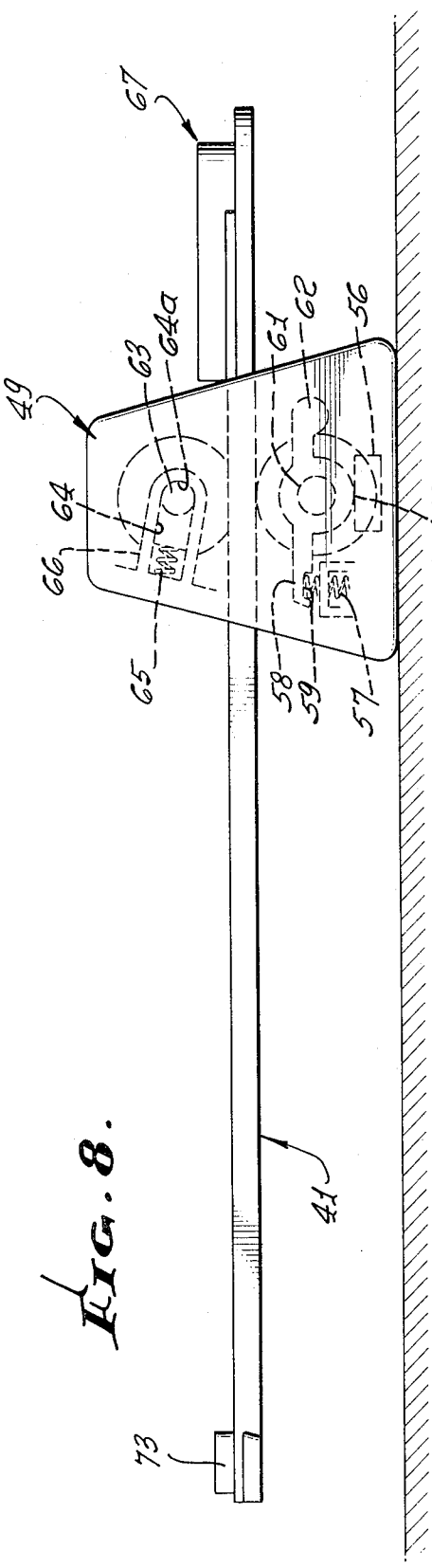



FIG. 8.

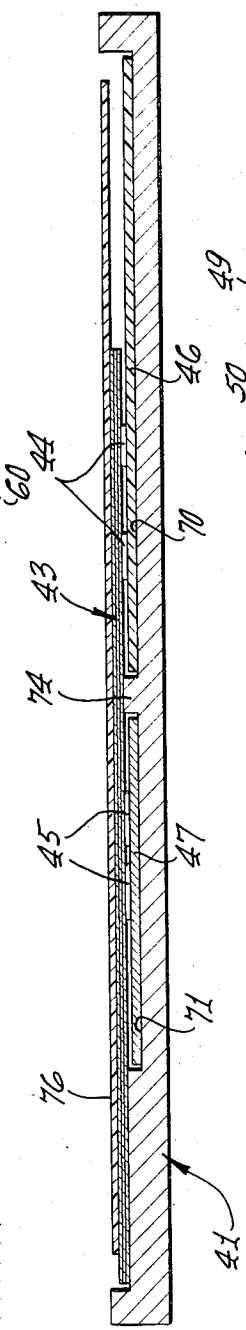



FIG. 9.

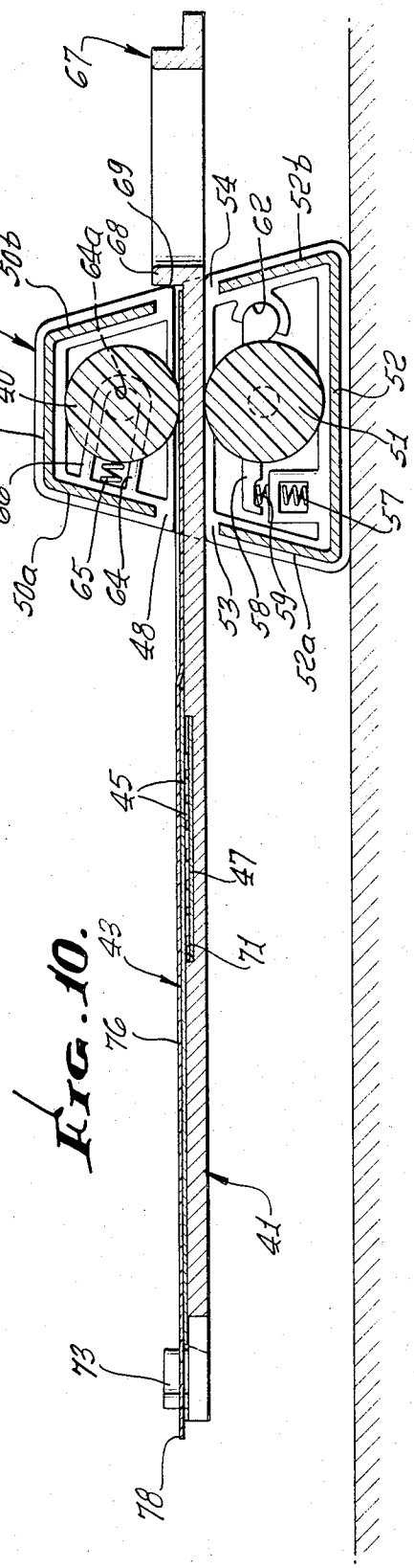



FIG. 10.

# ELIMINATION OF UNCONTROLLED BACKGROUND REPRODUCTION DURING PRINTING

## BACKGROUND OF THE INVENTION

This invention relates generally to printing apparatus, and more particularly concerns the prevention of unwanted clamping of a sheet during printing so as to eliminate uncontrolled smudging and movement of the sheet.

In certain printing operations, one example being the pressing of a sheet against raised indicia, the sheet may become clamped between the pressure exerting body, such as a roller for example, and support structure at a location offset from the raised indicia on the base. Such clamping may commonly produce uncontrolled and unwanted smudging of the sheet in instances for example where there is material associated with the sheet which, when clamped, will mark the sheet. Examples are carbon paper, and so-called NCR paper. This problem becomes acute in imprinters where the indicia is raised only slightly from the support structure as a carrier, one example being a plastic card which has been embossed to form the indicia. There has been no prior solution to this background smudging problem, to my knowledge, which offers the unusual advantages in structure, function and results now afforded by the present invention. Also, prior imprinters could not easily accommodate varying thicknesses of sheets or forms being processed, leading to a different "feel" of the equipment when changes in form thickness occurred; and prior imprinters required close tolerances as respects relatively movable parts, leading to objectionably high cost, and malfunction in the field.

## SUMMARY OF THE INVENTION

It is a major object of the invention to provide a solution to the above problems, the basic concept lying in the acceptance of smudging, but with predetermined control, so as to eliminate random, unwanted smudging of the sheet.

As will be seen, the invention in its apparatus aspects is embodied in printing apparatus adapted to use with a carrier for raised indicia engageable with a sheet or sheet assembly placed adjacent the indicia, and including:

a. a base to support the indicia carrier with the indicia presented away from the base for engagement with the sheet,

b. a clamping element relatively movable transversely over the indicia to clamp the sheet thereagainst, and

c. a stop projecting from the base to block clamping of the sheet between said element and carrier while permitting clamping of the sheet between the element and raised indicia.

As will be seen, the sheet or assembly may carry pressure sensitive material to form an image on the sheet or sheets in response to clamping of the sheet between the indicia and clamping element; the latter may comprise a first roller relatively movable along a defined path; the stop may comprise a shoulder extending lengthwise of that path, as on an upstanding rail integral with the base; and the carrier may comprise a plate (such as plastic or metal) seated on the base, the indicia projecting away from the base to an extent greater than the projection of the stop from the base.



It is another object of the invention to provide an imprinter which will accommodate an indicia carrier in the form of an elongated tape which has been embossed to form the indicia.

It is a still further object of the invention to provide a lightweight, inexpensive imprinter which requires no adjustments, which has open tolerances so that jamming cannot occur; and which is characterized by the use of a pair of rollers between which a base may be passed, the base removably supporting one or more indicia carriers such as plastic or metal plates, one or more rails on the base located to receive roller pressure transmitted through the sheet or form assembly when such pressure is not transmitted to the indicia, and in a manner preventing uncontrolled smudging of the sheet.

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.

## DRAWING DESCRIPTION

FIG. **1** is a side elevation, partly in section, showing one form of the invention;

FIG. **2** is an elevation taken in section on lines **2—2** of FIG. **1**;

FIG. **3** is a plan view of a sheet which has been imprinted using the method of the invention;

FIG. **4** is a plan view of an indicia carrier comprising an embossed tape on a card;

FIG. **5** is a section taken on lines **5—5** of FIG. **4**;

FIG. **6** is an elevation taken through a printable sheet or sheet assembly;

FIG. **7** is a plan view of an imprinter incorporating the invention;

FIG. **8** is an elevation taken on lines **8—8** of FIG. **7**;

FIG. **9** is a section taken in elevation on line **9—9** of FIG. **7**;

FIG. **10** is an elevation taken in section on line **10—10** of FIG. **7**;

FIG. **11** is an elevation taken in section on line **11—11** of FIG. **7**; and

FIG. **12** is a view like FIG. **10**, after imprinting has been completed.

## DETAILED DESCRIPTION

Printing apparatus employing the invention is adapted for use with a carrier for raised indicia engageable with a sheet placed over the indicia. In the example seen in FIGS. **1** and **2**, the apparatus **10** is adapted for use with a carrier as for example is represented by master plate or card **11** on which raised indicia **12** project upwardly to engage a printable sheet **13** placed over the indicia. If a card is used, it may for example comprise a plastic credit card, the invention having special utility in this application.

In accordance with the invention, a base is provided to support the indicia carrier with the indicia presented away from the base for engagement with the sheet, one such base appearing at **14** and representing for example a card holder or base frame, or both. Further, a clamping element is relatively movable transversely over the indicia to progressively clamp the sheet against the letter; and a stop projects from the base to block clamping

of the sheet between the clamping element and the carrier. In this regard, the printable sheet may consist of any sheet capable of having an indicia image formed or printed thereon when pressed toward the indicia. Merely as an example, the sheet or sheet assembly seen in FIG. **6** includes layers **13***a*, **13***b* and **13***c*, the middle layer consisting of pressure sensitive carbon paper facing toward either or both of sheets **13***a* and **13***c*. Other printable sheets or composites may be employed, and so-called NCR paper may be used, the latter containing tiny capsules of ink which rupture when pressurized.

In FIGS. **1** and **2** the clamping element may take the form of a roller **20** urged by actuator **21** in the direction of arrow **22**, the roller rotating in the direction of arrow **23**. Actuator **21** also urges the roller downwardly in the direction of arrow **24**, toward the sheet **13**, and in the past the latter has been subject to unwanted and uncontrolled background smudging due to uncontrolled clamping of the sheet extent which does not directly overlie the projecting indicia **12**. Such smudging could and often did occur closely adjacent the printed images of the indicia on the sheet, interfering with reading of such indicia.

Further in FIGS. **1** and **2**, the stop may with unusual advantage take the form of a top shoulder **25***a* on a rail **25** extending generally lengthwise of the path of roller relative movement. Two such rails may be provided, as indicated, both extending in the same direction and forming a zone **26** between them to receive the carrier **11**. The rail or rails serve to support the roller in spaced relation to the projections **12**, the sheet **13** normally overlying the rail and being clamped against the rail excepting when the sheet is clamped against the projections. At such times, the roller is slightly elevated above the rail or rails, the lower edge of the roller lifting from level **27** in FIG. **2** to level **27***a*, for example. In that figure are also shown the dimensions $t_1$ (the height of a projection **12** above the top **28** of base **14**); dimension $t_2$ (the height of the top **25***a* of a rail **25** above top **28**); and dimension $t_3$ (the thickness of the carrier or card **11** which is the height of the carrier upper surface above top **28**). As illustrated, $t_3 < t_2 < t_1$. Merely as illustrative, in a typical application of the invention to a plastic credit card type imprinter, $t_3$ will be approximately 0.030 inches, $t_2$ will be approximately 0.037 inches, and $t_1$ will be between 0.040 and 0.050 inches.

Referring to FIG. **3**, a sheet **13***c* subjected to imprinting contains imprint zones designated by the spaced alphanumeric character groups 012, 345, 678 and 9. The typical rail imprint includes dark zones **30** and light zones **31**, the former dimensionally corresponding to the spaces between the alphanumeric character groups and the latter dimensionally corresponding to such groups, indicating very light (if any) roller pressure transmission to the rail when the roller is traveling over the indicia projections **12**. If desired, the rail surface may be etched or otherwise configured to produce an imprinted pattern, such as a name, on the sheet at the locations **30**.

Referring to FIGS. **4** and **5**, a carrier **11***a* is shown to include an elongated thin tape **32** which has been embossed at **33** to form the indicia forming projections at **12***a*. The tape may consist of plastic capable of crease whitening, when embossed, as is known, the back side of the tape supporting an adhesive layer. The latter may be adhered to a supporting plastic card **34** to be carried at the position of the carrier **11** in the FIGS. **1** and **2** apparatus.

Referring now to FIGS. **7–12**, the invention is therein shown as embodied within a lightweight and portable imprinter, which may for example be so inexpensively constructed so as to be considered virtually dispensable. As there illustrated, the clamping element comprises a first roller **40** (which may consist of plastic), there being guide means to loosely guide movement of the base **41** relative to the roller, and in the direction of arrow **42**, to effect clamping of the sheet assembly **43** against indicia such as indicated for example at **44** and **45** respectively on a plastic card **46** and on a metal plate **47**. FIG. **9** shows the sheet assembly **43** as comprising multiple layers, for example, one or more of the layers capable of transferring or producting imprints in response to pressure application at the indicia locations.

The guide means as referred to may advantageously take the form of elongated slots or ways **48** formed by housing structure **49**, the latter extending at **50** over the first roller and also beneath a second roller **51** at **52**. The housing structure, second roller and base may also consist of lightweight, molded plastic material. Note that the housing forms inlet and outlet openings **53** and **54** for receiving and passing the base **41** in the form of a panel moving between rollers **40** and **51**. FIG. **12** indicates that opening **53** is formed between housing walls **50***a* and **52***a*, and that opening **54** is formed between housing walls **50***b* and **52***b*.

The second roller **51** may be considered as one form of means for urging the base panel **41** toward the first roller **40** during such guided movement of the base between the rollers. Yieldable means, as for example polyethylene tubes **56** and springs **57** effect urging of the second roller **51** upwardly, by pressing upwardly against arbors **58** at points **59** and **60**, the arbors located at opposite ends of the second roller to support roller trunnions or shaft ends **61**, and being themselves pivotally mounted by and within the housing at **62**. Trunnions or shaft ends **63** on the first roller **40** may be received in downward and lateral guideways **64** formed by the upper housing, as seen in FIG. **10**, there being compression springs **65** urging those trunnions toward the guide bearing surfaces **64***a* via pushers **66**.

The base or panel **41** incorporates a pull handle **67** at one end thereof and there is an associated shoulder **68** engageable with the housing structure at **69** to block disassembly of the base from the roller housing structure. The base or panel is recessed at **70** and **71** to removably receive and locate first and second indicia carriers, as for example card **46** and plate **47** previously referred to. Note that these recesses may closely fit the card and plate, and that one or more finger recesses **72** may be formed in the panel **41** adjacent the card or plate recesses to permit removal of the card or plate. Stop shoulders **73** on the left end of the panel are engageable with the roller housing to block rightward removal of the panel from the housing.

A stop or rail **74** extends lengthwise of the base **41** and between the panel, and corresponds in its function to the previously described stops or rails **25**, as related to the indicia **44** and **45** and the sheet or sheet assembly **43**. The rail extends beyond the indicia in an endwise direction, in order to induce rotation of the roller **40** prior to arrival of the latter over the indicia, thereby to prevent sudden skewing of the sheet.

A liftable and flexible transparent flap **76** extends on the base over the recesses **70** and **71** for protectively covering the sheet **43** placed beneath the flap and over the indicia **46** and **47**, during carriage of the sheet on the base between the rollers. One end of the flap may be bonded to the base, as at **77**, and the opposite end **78** of the flap may be liftable, and removably anchored to one or both of the abutments or stops **73**. For that purpose, the flap may be perforated at **79**.

It will be noted that the device of FIGS. **7–12** provides for automatic adjustment to accommodate various sheet or form assembly thicknesses all with the same clamping pressure so that the feel of the apparatus remains the same during usage; tolerances as respect movable parts are not close so that high quality and expense are avoided.

Referring back to FIG. **1** a Belleville washer **110** resiliently supports the platen or base **14** on structure **111**, to control pressure exertion on the indicia idler **20**.

I claim:

**1.** In apparatus for imprinting a sheet,

a. a carrier having indicia thereon and a base to support the indicia carrier with the indicia raised relative to the main extent of the carrier and presented away from the base for engagement with the sheet,

b. rail means extending lengthwise along and projecting outwardly relative to the base less than the indicia but further than the main extent of the carrier,

c. a pressure roller relatively movable lengthwise of and over the rail means and over the indicia to urge the sheet thereagainst, and means for urging the roller toward the indicia and the rail means during said roller relative movement and carrying the roller to have a first spacing from the base in which the roller is supported by the indicia during one portion of said roller relative movement, and to have a second spacing from the base in which the roller is supported only by the rail means during another portion of said roller relative movement, the carrier extent other than the indicia remaining free of direct pressurization by the roller when the roller has said second spacing from the base during said other portion of roller relative movement, the rail underlying the roller when the roller overlies the indicia, and

d. support means resiliently supporting the base.

**2.** The combination of claim **1** including said sheet overlying the rail means and the indicia.

**3.** The apparatus of claim **2** wherein the sheet carries pressure sensitive material to form an image on the sheet in response to clamping of the sheet between the indicia and said roller.

**4.** The apparatus of claim **1** wherein said roller is relatively movable along a defined path generally parallel to the base and said rail means extending lengthwise of the path of roller relative movement.

**5.** The apparatus of claim **1** wherein said carrier comprises a plastic card.

**6.** The apparatus of claim **1** including said carrier in the form of an elongated tape, said indicia comprising embossed portions of the tape.

**7.** The apparatus of claim **1** wherein said rail means comprises at least two rails which are spaced apart on the base to define a zone therebetween to receive the carrier.

**8.** The apparatus of claim **1** including guide means to guide movement of the base relative to the roller.

**9.** The apparatus of claim **1** wherein said support means comprises a second roller, and yieldable means urging the second roller toward the first mentioned roller, the first and second rollers having generally parallel axes.

**10.** The apparatus of claim **9** including a housing for said rollers and defining inlet and outlet openings for receiving the base moving between the rollers.

**11.** The apparatus of claim **10** wherein the base is recessed to removably receive and locate the indicia carrier in the form of a plate.

**12.** The apparatus of claim **11** including a liftable and flexible flap carried on the base for protectively covering the sheet placed between the indicia and the flap during carriage of the sheet on the base between said rollers.

**13.** The apparatus of claim **10** wherein the indicia carrier comprises first and second plates, and the base is recessed to removably receive and locate said first and second plates.

* * * * *