United States Patent

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[54] **IMPRINTER UTILIZING COMPENSATING ROLLER PLATEN**
13 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **101/269,** 100/169, 29/130, 29/116, 101/252
[51] **Int. Cl.** **B41f 3/20**
[50] **Field of Search** ..... 101/269, 375, 376, 379, 401.3, 395, 36, 37, 250, 222, 216, 212; 29/110, 113, 116, 130; 100/155, 160, 163, 169, 162 B, 93

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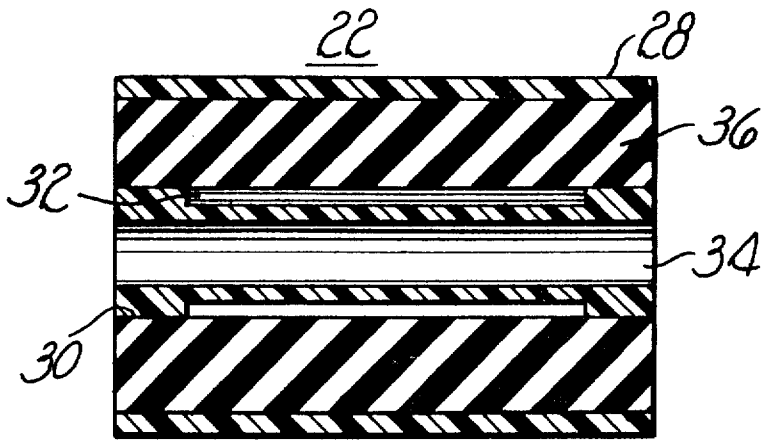
ABSTRACT: Disclosed is an imprinter for printing upon documents from a printing plate, the imprinter utilizing a compensating roller platen. The platen may be of the dry roll-type and includes a plastic or nylon outer sleeve of typically 80 to 90 durometer hardness, Shore "D" scale. An inner sleeve is also provided, the inner sleeve being rotatably mounted with respect to the imprinter carriage. This sleeve has a peripheral grooved portion disposed along a substantial portion of the length thereof. The inner sleeve is also of 80 to 90 durometer hardness, Shore "D" scale. Disposed between the inner and outer sleeves is an intermediate, annular, cylindrical resilient member which has a Shore "D" scale hardness of typically 40 to 45 durometer and which may be may be made of rubber. Because of the groove on the inner sleeve, the resilient intermediate member has room in which to retract whenever the combined thickness of the printing plate and the document encountered by the roller platen is greater than that for which the imprinter was originally set. Thus, a wide range of printing plate and document thicknesses may be accommodated.



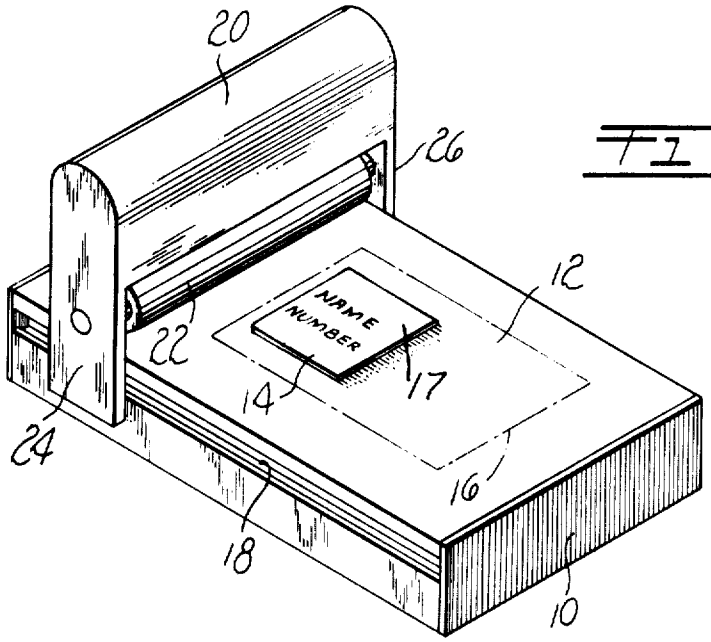


FIG-1

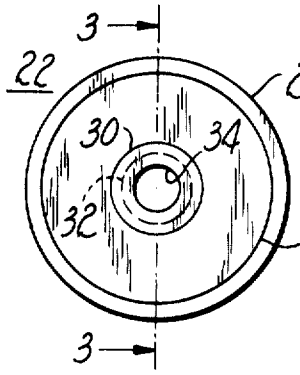


FIG-2

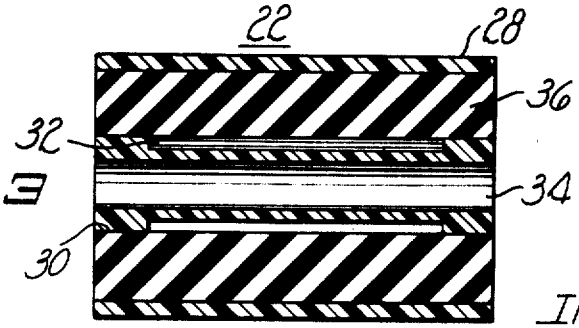


FIG-3

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IMPRINTER UTILIZING COMPENSATING ROLLER PLATEN

BACKGROUND OF THE INVENTION

This invention relates to imprinters and in particular to imprinters of the type which compensate for varying thicknesses of printing plates and/or documents used therewith. Further, in particular, this invention relates to an improved compensating roller platen.

In the imprinting art, it is well known that the documents printed upon are usually read by character reading equipment to facilitate automatic data processing. Because of the inherent sensitivity of the reading equipment, the printed matter which is read must be of the highest quality to minimize errors and to maximize document throughput.

A particular frequent and troublesome problem relating to the imprinting of documents is smudging. This quite often causes the character reader to make errors thereby decreasing document throughput. Smudging, in turn, is generally caused by excessive printing pressure. Usually, excessive printing pressure occurs whenever the combined thickness of the printing plate or credit card and of the documents encountered by the roller platen is greater than that for which the imprinter was originally set. Since, in practice, a wide range of card thicknesses are encountered because certain cards are used more than others, the problem of smudging is quite widespread and severe.

Further, the varying card and/or document thicknesses encountered in practice cause the print density of the printed characters to vary from very light to very heavy, thereby further restricting the capability of the character readers to efficiently and accurately read the printed matter.

Another problem with prior art imprinters arises because of a tendency to crush the embossed characters on the card or, in other words, to deboss the characters. After a card has be sufficiently debossed, it is quite difficult to obtain satisfactory print quality from it.

Many prior art devices have been proposed to compensate for the above discussed problems; however, most of these are awkward, expensive and difficult to maintain.

SUMMARY OF THE INVENTION

Thus, it is a primary object of this invention to provide an improved printing apparatus which substantially reduces smudging and which provides a relatively constant print density over a substantial range of combined printing plate-document thicknesses.

It is a further object of this invention to provide an improved apparatus of the above type which is economical to manufacture and simple to operate and maintain.

It is a further object of this invention to provide an improved compensating roller platen.

It is a further object of this invention to provide an improved imprinting apparatus and roller platen which minimizes the debossing problem.

Other objects and advantages of this invention will become apparent upon reading the appended claims in conjunction with the following detailed description and the attached drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an imprinter utilizing the compensating roller platen of this invention.

FIG. 2 is an end view of an illustrative embodiment of a roller platen in accordance with the invention.

FIG. 3 is a cross-sectional view taken on the line 3–3 of FIG. 2.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring to FIG. 1, there is shown a perspective view of an imprinter utilizing the improved roller platen of the invention. The imprinter comprises a base **10** upon the upper surface of which is disposed a print bed **12**. Positioned upon the print bed **12** is a printing plate **14** such as a credit card. Disposed over the plate **14** is a document **16** upon which is printed any information embossed or raised from the plate **14** in a well-known manner. Typically, the document **16** is a sales invoice and imprinted upon the document is a customer's name and account number such as indicated at **17**. Although not shown the imprinter of FIG. **1** may also include digit wheels which may be set by the operator to provide the printing of variable information upon the document **16**. Respectively disposed within the two long sides of base **10** are a pair of lengthwise slots, one of which is indicated at **18** and the other of which is not shown in FIG. **1**. Mounted for longitudinal movement along the slots is a carriage **20** which contains a roller platen **22** which may be of the inked or dry roll-type. Although not shown, a shaft extends between the vertical legs **24** and **26** of carriage **20**, the platen **22** being mounted upon the shaft for rolling movement whenever the platen engages a document placed upon the print bed **12**. The manner of mounting the roller platen and its associates shaft is a matter of design and many means for doing this are well known to those of ordinary skill in the art.

Reference should now be made to FIGS. **2** and **3**, which respectively show an end view and a cross-sectional view of an illustrative embodiment of a roller platen in accordance with this invention. For purposes of illustration the platen of FIGS. **2** and **3** is of the dry roll-type. The roller platen comprises an outer sleeve **28**, which is typically made of nylon and which has a typical hardness of 80 to 90 durometer, Shore "D" scale. All hardness values hereinafter are in the Shore "D" scale. Alternatively, the outer sleeve **28** may be ink porous rather than of the dry roll-type.

The roller platen also includes an inner sleeve or shaft **30** which, as best seen in FIG. **3**, has a peripheral, grooved portion **32** which extends entirely around shaft **30** and along a substantial portion of the length thereof but less than the length of the roller platen. Further, the length of grooved portion **32** is greater than the height of print field of the printing plate, which in FIG. **1**, for example, would extend from the bottom of the NUMBER indicated at **17** to the top of the NAME also indicated thereat. Thus, the print field constitutes that area of the printing plate **14** containing the information to be printed. As will become more apparent hereinafter, the importance of the peripheral grooved portion is paramount and its presence brings about the desired results claimed for this invention. A journal opening **34** extends through the sleeve **30** which is adapted for rotatable mounting upon the shaft (not shown, but discussed hereinbefore) which extends between the vertical legs **24** and **26** of the carriage **20**. The opening **34** is optional and other means for rotatably mounting the sleeve **30** with respect to the carriage **20** may be provided. The inner sleeve **30** is also typically made of nylon and has a typical hardness of 80 to 90 durometer.

Disposed between the inner and outer sleeves **28** and **30** is an annular, cylindrical member **36** which is typically made of rubber and which has a typical hardness of 40 to 45 durometer.

In operation, the distance between the outer peripheral edge of outer sleeve **28** and the print bed will vary in accordance with the combined thickness of the particular printing plate **14** and document **16** disposed upon the print bed **12** of the imprinter of FIG. **1**. To insure relatively constant printing pressure regardless of the combined thickness encountered, the compensating roller platen **22** will permit the resilient member **36** to withdraw or retract into the peripheral grooved portion **32** to thereby retract the platen from the print bed whenever the thickness is less than that for which the im-

printer was originally set. Thus, because of the grooved portion **32**, a wide range of compensation is provided thereby minimizing the amount of smudging and causing a relatively constant print density.

It is to be understood that, although the invention has been described in relation to a roller platen of the dry roll-type, it may also be employed with platens of the inked roll-type wherein an inked sleeve would be disposed around either the sleeve **28** or the member **36** if the sleeve **28** were dispensed with. If the sleeve **28** were dispensed with, then the inked sleeve would become the "outer sleeve" as used in the claims.

Although particular materials have been described as being typical constituents for the members **28**, **30**, and **36**, it is to be understood that any material may be used so long as there is maintained between these members a relative resiliency or hardness which permits them to retract into the groove **32** whenever the situation so requires.

Further, although the resilient member **36** is shown as being of solid construction, a plurality of annular, resilient members may be disposed coaxially between the sleeves **28** and **30**. In such a case, a plurality of peripheral, grooved portions would extend along the length of sleeve **30** and would be respectively disposed adjacent the plurality of annular, resilient members to thereby permit the resilient members to retract into the plurality of grooved portions. The resilient members might be O-rings or the like.

The length of the groove **32** with respect to the overall length of the inner sleeve **30** can be adjusted to meet the demands of the particular situation. The only requirement is that the length thereof be sufficient to permit enough retraction of the resilient member **36** so as to insure effective compensating action.

Typical values of some of the dimensions of the roller platen of FIGS. **2** and **3** are now given to illustrate one working embodiment of the invention which has performed satisfactorily over a wide range of combined printing plate-document thicknesses. The outer diameter of the outer sleeve **28** may be 1 inch; the outer diameter of the annular member **36** may be seven-eighths inch; the outer diameter of the nongrooved portion of the inner sleeve **30** may be three-eighths inch; the diameter of journal hole **34** may be one-fourth inch; the depth of the grooved portion **32** may be one thirty-seconds inch; the overall length of the sleeve **30** may be 1 1/16 inches; and the distance between the outer end of sleeve **30** and the outer end of groove **32**, one-eighth inch.

Although certain values for dimensions and durometers have been stated hereinbefore, it is to be understood that these values will generally vary depending, among other things, on the particular imprinter configuration utilized.

Numerous modifications of the invention will become apparent to one of ordinary skill in the art upon reading the foregoing disclosure. During such a reading it will be evident that this invention provides a unique imprinter with compensating roller for accomplishing the objects and advantages herein stated. Still other objects and advantages and even further modifications will become apparent from this disclosure. It is to be understood, however, that the foregoing disclosure is to be considered exemplary and not limitative, the scope of the invention being defined by the following claims.

I claim:

1. A compensating roller platen for use with apparatus for imprinting a document with information from raised characters on a printing plate comprising

an outer sleeve;

an inner shaft having a peripheral grooved portion extending entirely around said shaft, said grooved portion extending axially for a distance greater than the height of the print field of the printing plate but less than the length of the roller platen;

an intermediate, annular member disposed between said inner shaft and outer sleeve, the resiliency of said intermediate member being (1) substantially greater than that of said inner shaft to permit said intermediate member to retract within said grooved portion of the inner shaft and (2) substantially greater than that of said outer sleeve, the resiliency of said outer sleeve being substantially the same as or greater than that of said inner shaft, said roller platen being dimensioned such that the portion of said intermediate, annular member which overlies said grooved portion is depressed into said grooved portion whenever the combined printing plate and document thickness encountered by said roller platen is greater than that which the imprinting apparatus is normally used with, said grooved portion thereby compensating for combined printing plate and document thicknesses greater than normally encountered to minimize undesired background smudging and provide sharp contrast of the printed information.

2. Apparatus as in claim **1** where the hardness of said intermediate member is 40 to 45 durometer and said inner shaft is 80 to 90 durometer, all hardness values being in Shore "D" scale.

3. Apparatus as in claim **2** where said outer sleeve is of 80 to 90 durometer hardness, Shore "D" scale.

4. Apparatus as in claim **2** where said intermediate member is rubber.

5. Apparatus as in claim **4** where said inner shaft is made of nylon.

6. Apparatus as in claim **5** where said outer sleeve is made of nylon.

7. Apparatus as in claim **1** where said outer sleeve is ink porous.

8. Apparatus as in claim **7** where said peripheral grooved portion extends over a substantial portion but not all of the length of said inner shaft.

9. Imprinting apparatus for imprinting on a document comprising:

a printing plate containing information;

a base upon which is disposed a print bed which is adapted to receive said printing plate and said document, the information on the plate being printed on the document;

a carriage movably mounted with respect to said base for movement over said print bed;

a roller platen rotatably mounted within said carriage for effectuating the printing of said information on the plate onto said document whenever the platen engages the document to thereby exert printing pressure on said document;

said roller platen including

an outer sleeve;

an inner shaft having a peripheral grooved

portion extending entirely around said shaft, said grooved portion extending axially for a distance greater than the height of the print field of the printing plate but less than the length of the roller platen;

an intermediate, annular member disposed between said inner shaft and outer sleeve, the resiliency of said intermediate member being (1) substantially greater than that of said inner shaft to permit said intermediate member to retract within said grooved portion of the inner shaft and (2) substantially greater than that of said outer sleeve, the resiliency of said outer sleeve being substantially the same as or greater than that of said inner shaft, said roller platen being dimensioned such that the portion of said intermediate, annular member which overlies said grooved portion is depressed into said grooved portion whenever the combined printing plate and document thickness encountered by said roller platen is greater than that which the imprinting apparatus is normally used with, said grooved portion thereby compensating for combined printing plate and document thicknesses greater than normally encountered to minimize undesired background smudging and provide sharp contrast of the printed information.

10. Apparatus as in claim 9 where the hardness of said intermediate member is 40 to 45 durometer and said inner shaft is 80 to 90 durometer, all hardness values being in Shore "D" scale.

11. Apparatus as in claim 10 where said outer sleeve is of 80 to 90 durometer hardness, Shore "D" scale.

12. Apparatus as in claim 9 where said outer sleeve is ink porous.

13. Apparatus as in claim 9 where said peripheral grooved portion extends over a substantial portion but not all of the length of said inner shaft.