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3,410,207

PRESSURE CONTROL MEANS FOR TRAVELING ROLLER
IN BED AND CYLINDER PRINTING MACHINES

Filed Dec. 8, 1965

2 Sheets-Sheet 1

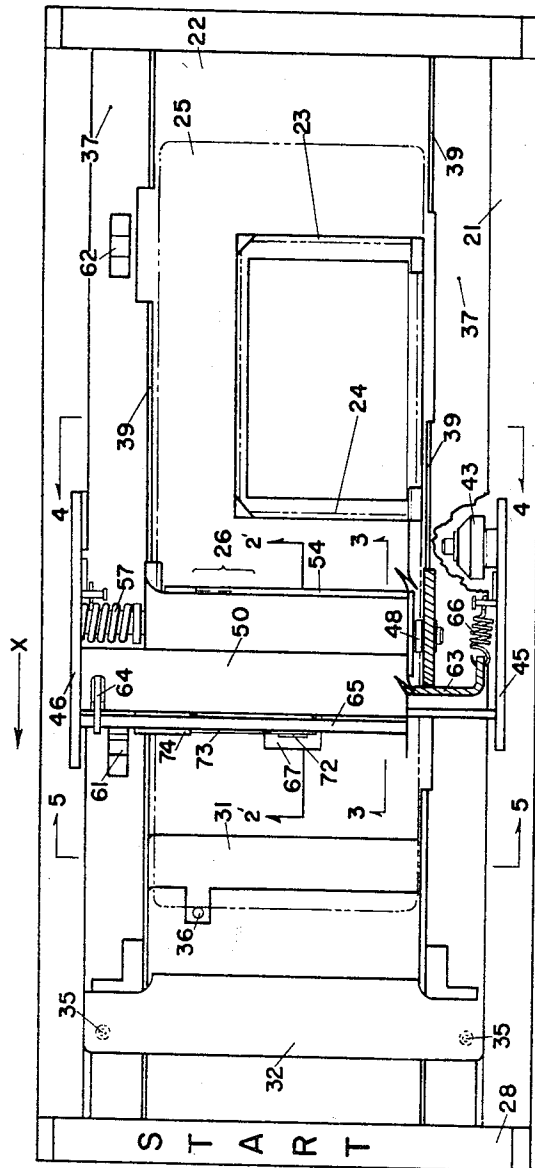


FIG. 1

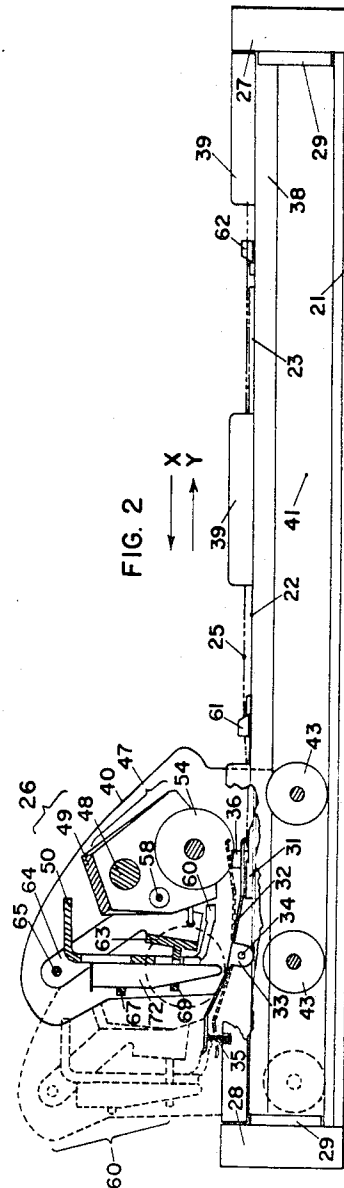


FIG. 2

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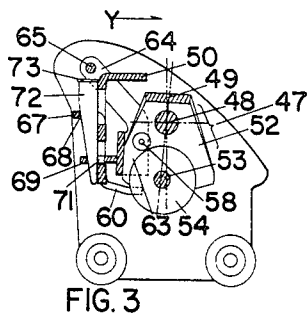


FIG. 3

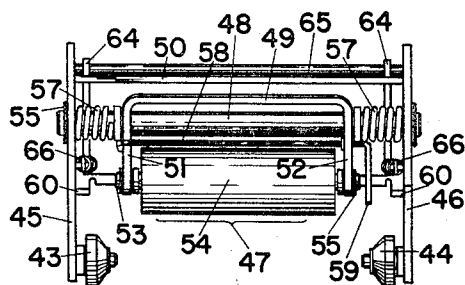


FIG. 4

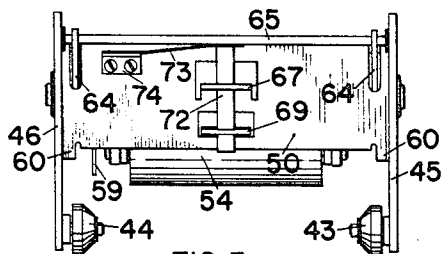


FIG. 5

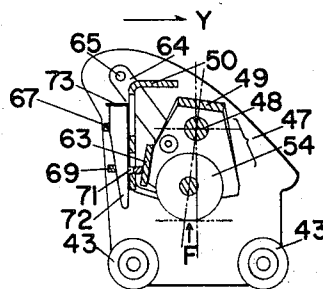


FIG. 6

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3,410,207

PRESSURE CONTROL MEANS FOR TRAVELING ROLLER IN BED AND CYLINDER PRINTING MACHINES

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6 Claims. (Cl. 101-269)

ABSTRACT OF THE DISCLOSURE

A printing apparatus is disclosed of the type which utilizes a portable printing plate for printing data on a document such as a sales invoice. In such apparatus, the printing plate is placed upon a print bed and over the plate is positioned the document. The operator then causes a carriage containing a platen assembly which includes a roller platen to be moved over the print bed to effectuate the printing operation. The level of the roller platen with respect to the print bed is optimized by providing within the carriage a pivotally mounted compensating bracket which is biased to a first position. The platen assembly is also pivotally mounted within the carriage such that it is rotated from a non-operative position into contact with the compensating bracket so that the level of the roller platen with respect to the print bed corresponds to the minimum combined thickness of the printing plate and the document anticipated for use with the printing apparatus whereby the printing pressure for this condition is optimized. Movement of the carriage over the print bed causes the roller platen to engage the document and printing plate to thereby effectuate the printing operation. If the combined printing plate and document thickness exceeds the anticipated minimum combined thickness, the roller platen forces the compensating bracket away from its normal first position. The platen assembly follows the compensating bracket and thus the level of the platen roller relative to the print bed is increased to thereby maintain optimum printing pressure during the printing operation. A further member is mounted within the carriage, the purpose of which is to lock the roller platen at its raised position and thereby prevent print smudge due to the roller platen springing back against the document.

The present invention relates to a printing machine and, more particularly, to an improved printing machine for recording data on documents from individual printing devices, of a kind suitable for use as identification tokens, by impressing a platen across the face of the document inserted between the path of the platen and the printing device.

Such printing machines are generally utilized in retail sales systems wherein sales are made on credit to enable data in possession of the individual to be printed upon a suitable sales record from which the individual may be later billed. Normally, the sales record comprises a single sheet or a form set having several copy sheets, the thickness of the form set varying in accordance with the number of copy sheets, which number of copy sheets may vary upon the particular transaction being made. In other cases the sales record might be fairly uniform and a few different types of known printing devices employed could vary in thickness. In printing systems of the type disclosed above, it is well known that in order to obtain uniform printing pressures within an optimum range on documents and/or printing devices having varied thicknesses, it is necessary to compensate for the difference in thickness encountered in performing each separate imprint operation. Furthermore, it has been found in most all conven-

tional imprinters, that when an increased combined thickness of a document and printing device are encountered by the platen roller to result in an increased printing pressure, the amount of print smudge transferred to the document is greatly increased, and in some instances the embossing on a printing device may be flattened out or crushed to an undesired degree.

The general purpose of this invention is to provide a novel printing machine which overcomes the above noted difficulties by automatically compensating for varying thicknesses among printing plates and/or sales documents and simultaneously eliminating the cause for the increased smudge transfer to the sales document and/or the undesired crushing of embossing on the printing device. To accomplish the above function there is provided a printing machine which contemplates a simple yet efficient means for automatically and uniformly displacing the platen through a large number of printing positions relative to a print bed in response to printing pressures which exceed an optimum printing pressure range and means exclusive of said printing pressure for simultaneously maintaining the platen at the newly assumed position as a result of the increased printing pressure previously encountered. In a unidirectional printer of the type disclosed herein, further provisions are made by automatically lowering the platen, prior to a print stroke into a printing position and elevating said platen, subsequent to a print stroke, into a non-printing position.

Objects of the invention are to provide a printing machine which produces clear-cut and uniform printing, which operates conveniently and with little effort, which permits the roller platen during a printing stroke to automatically assume and maintain a position for producing prints within an optimum printing pressure range for accomplishing a high quality imprint, and in addition which provides for automatic tripping of the roller platen in and out of printing positions, desirable for uni-directional printing, at appropriate intervals responsive to the movement of the roller platen during a printing cycle.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a plan view of an imprinter constructed in accordance with the principles of the present invention with the carriage cover removed, and the carriage being further illustrated in part by two cutaways at one end thereof.

FIGURE 2 shows a side elevation of the printing machine in FIGURE 1 with the carriage 26 portion slightly displaced to the right of return position 60 in dash lines and shown in section as taken on the line 2'-2' of FIGURE 1.

FIGURE 3 is a cross section view of the carriage prior to performing a printing operation taken along line 3-3 of FIGURE 1.

FIGURE 4 shows a side elevation of the carriage taken on the line 4-4 of FIGURE 1.

FIGURE 5 is a side elevation of the carriage taken on the line 5-5 of FIGURE 1.

FIGURE 6 is a cross section view of the carriage while performing a printing function taken along the line 3-3 of FIGURE 1.

Referring to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGURES 1 and 2, a printing machine comprising a base 21 having an upper planar surface 22 defining a print bed. Located on the print bed is a guide device 23 for supporting and position-

ing a portable printing plate 24 and overlying the printing plate and a portion of the print bed is a document or business form 25 upon which an imprint is to be made. If desired, an anvil could be provided on the print bed for affixing thereto such information as the station or user's address, assigned number for recordation purposes, etc., and a variable numbering wheel could additionally be mounted thereon for the recording of further information such as the date of a transaction. The printing plate 24 may be of the type of construction shown in Patents 2,620,729 or 3,034,430, being formed with raised characters.

Supported for reciprocal movement over the print bed is a carriage 26, and at each end of the base is one of a pair of end walls 27 and 28 fixedly attached thereto by conventional fastening means, to prevent the movement of carriage 26 externally of the printing machine. Secured to each of the end walls are resilient bumpers 29 for absorbing the shock introduced by the traveling carriage 26 should it strike one of the walls during a printing cycle. To one end of the print bed is a platform 31 situated underneath a clamp 32 which clamp has a pair of side ear portions 33 formed at right angles thereto, the ear portions being intersected by rods 34 fixedly seated within the sides of the base member allowing clamp 32 to be pivotable thereabout. The left end of the clamp, as viewed from FIGURE 2, is characterized by an inclined plane upwardly displaced from the print bed, the far left end being leveled off and vertically biased by a pair of compression springs 35 seated within cut-outs in the base underneath and to either side of the clamp; the springs being sufficiently tensioned to normally force the clamp in a counter-clockwise direction about pivot rods 34 urging the right end of the clamp against platform 31.

As the carriage is moved in the direction disclosed by the arrow X, approaching the start position, to bear against resilient bumpers 29 at end wall 28, the carriage will first encounter and force down the left end of the clamp to compress springs 35, thereby pivoting the clamp about rods 34 raising its right end above platform 31 to allow the document to be inserted thereunder against a form stop member 36. The clamp is thus used in one manner to literally clamp the document to be imprinted to the surface of the print bed. One of a pair of covers 37 overlies each rim at the top of base 21 extending the length thereof, running downwardly at 38 the outer edge in overlapping fashion with respect to the base, and raised upwardly at the inner edge to form a vertical wall 39 in relation to the print bed, the vertical walls 39 being employed in addition to clamp 32 and stop 36 for further properly locating the document or business form upon which an imprint is to be made. Each side of base 21 is channeled to form a pair of parallel guide rails 41 and 42 for respectively directing bearing pairs 43 and 44, which bearings support carriage 26.

The carriage 26, as is more clearly illustrated in FIGURES 3 and 4, is comprised of a pair of shoulders 45 and 46 connected by an inverted L-shaped cross frame member 50, a handle 40, and a platen assembly 47 adapted to be rocked about shaft 48, which shaft is loosely mounted within shoulders 45 and 46. The platen assembly consists of a U-shaped bracket 49 adapted to readily receive through its arms 51 and 52 a shaft 53 supporting a platen roller 54 for rotatable motion thereabout, the platen roller being either of the ink or dry type. The shafts 48 and 53 are respectively secured to shoulders 45, 46 and arms 51, 52 by retaining clips 55. One of a pair of spiraled compression springs 57 is placed on the opposite ends of shaft 48 to be concentric therewith and tensioned between the arms of U-shaped bracket 49 and carriage shoulders 45 and 46 to introduce friction therebetween for reasons which will hereinafter become apparent to the reader.

Lengthwise of the U-shaped bracket 45 is an elastic member comprising, in the preferred embodiment, of a torsion spring 58 one end of which is fixedly wrapped

about the arm 51. The other end of the torsion spring freely protrudes through arm 52 and is then bent at approximately a ninety degree angle to form a leg 59 extending downwardly towards the upper surface 22 of the base adapted for engaging each of a pair of tripping members 61 and 62 mounted on a covering 37 and situated in the path to be travelled by leg 59 as the carriage is reciprocated across the print bed.

Located in the carriage between inverted L-shaped cross frame member 50 and the platen assembly is a compensating bracket 63 having a pair of arms 64 extending upwardly at an obtuse angle relative thereto, and a pair of fingers 60 protruding downwardly at each side thereof. The upper ends of arms 64 are intersected by a rod 65 providing for pivotal movement of the compensating bracket toward the cross frame 50; however each side of the compensating bracket is secured by tension springs 66 to cleats protruding from a forward position of the carriage shoulders, each of the tension springs being selected to expand in uniform increments only when a pressure of more than twenty pounds is applied to it. Therefore, compensating bracket will not pivot about rod 65 in the clockwise direction, as viewed from FIGURES 2 or 3 unless a pressure greater than 40 pounds has been exerted against it in the X direction so as to expand tension springs 66.

To one side at a right angle to, yet integral with cross frame 50 is a fixed guide member 67 provided with a center aperture 68, below which is located a guide member 69 integral with however slightly cocked relative to compensating bracket 63 for movement therewith. Movable guide member 69 is also provided with a central aperture 71 lying below and partly offset relative to the larger aperture 68 enabling an adjustment wedge 72 to be loosely seated within apertures 68 and 71 as illustrated in FIGURE 3. The top of adjustment wedge 72 is normally urged downward by a lightly biased leaf spring 73 which spring is mounted on an extension 74 of cross frame 50.

The operation of the present invention may be best illustrated by first referring to FIGURE 2, wherein a phantom view of carriage 26 is disclosed in its start position at the extreme left end of the imprinting machine and a printing plate 24 has been inserted into guide device 23. The platen assembly comprising U-shaped bracket 49 is shown rocked about shaft 48 in a counter-clockwise direction to the extent that arms 51 and 52 have elevated the periphery of platen roller 54 from a position adjacent the plane of the print bed into a non-imprinting position, the platen assembly being held in the latter position as a result of the friction introduced by compression springs 57 between shoulders 45, 46 and arms 51, 52. In this start position 60' (shown in phantom) the fingers 60 on the lower sides of the compensating bracket will overlie and depress clamp 32 against springs 35 thus raising the front end of the clamp from platform 31 allowing one to place thereunder the document or business form to be imprinted. As the carriage is moved in the Y direction fingers 60 will be removed from the clamp allowing springs 35 to pivot the clamp clockwise about rods 34 and thus firmly clamp document 25 to the print bed.

As the carriage, during its travel, passes tripping member 61, leg 59 of the torsion spring will engage the tripping member to rock platen assembly 47 in a clockwise direction about shaft 48 as viewed from FIGURE 3, to the extent that arms 51 and 52 will come into contact with compensating bracket 63 thereby placing the lower periphery of the platen roller into an adjacent position relative to the plane of the printing bed, as shown in FIGURE 3, adapting the roller for imprinting upon document 25 from printing plate 24 prior to traversing the area occupied by the printing plate. It is noted the platen assembly has been rocked into a position slightly offset from a plane perpendicular to the print bed so that when pressure is transferred to the roller platen during an imprint stroke it will tend to force the platen assembly in a clockwise direction.

Attention is drawn to the fact that the distance between the lower periphery of roller platen 54 and the print bed has been set, when in the ready to imprint position, to provide uniform imprinting pressures within an optimum range for a minimum thickness of a document and embossed printing plate to be utilized in the machine. In the preferred embodiment we will assume a value of optimum imprinting pressure to be about the value F. Based on the latter assumption springs 66, which are tied to compensating bracket 63, are each tensioned for twenty pounds of pressure and accordingly prevent compensating bracket 63 from yielding, unless a printing pressure of greater than F pounds is encountered by platen roller 54 to be transferred to the compensating bracket as a force greater than forty pounds. In following with the above, a printing pressure of greater than F pounds would normally be encountered when the combined thickness of the document and embossed printing plate exceeds the minimum thickness for which the printing machine is basically set.

Thus, during a printing stroke in the Y direction, when the minimum combined thickness of the document and embossed printing plate is exceeded, the printing pressure encountered will be greater than F pounds, and the platen assembly will urge compensating bracket 63 to the left about pivot rod 65 as viewed from FIGURE 6, to a degree related to the amount of imprinting pressure greater than F pounds since the tension springs have been selected to expand at a uniform rate under such pressure. As compensating bracket 63 is urged toward the left, guide 69 is similarly moved in the same direction to bring aperture 71 more in alignment with aperture 68, allowing adjustment wedge to gradually fall downward through aperture 71 by way of gravity or as a result of the biased leaf spring 73. It is observed that the angular cut on the adjustment wedge has been carefully selected to accommodate a plurality of positions which may be assumed by the compensating bracket. Assuming that the combined increased thickness of a document and embossed printing plate might cause a printing pressure of fifty-five pounds which value is greater than F pounds, to be encountered by the roller platen, the platen assembly will be forced against compensating bracket 63 to urge the same backward and tension springs 66. Simultaneously adjustment wedge 72 will fall through aperture 71 a distance related to the backward movement of the compensating bracket and lock the compensating bracket into that spring tensioned state as shown in FIGURE 6. Should, during subsequent travel of carriage 26, a pressure greater than fifty-five pounds be encountered by platen roller 54, compensating bracket will be urged further back and further tension springs 66, allowing the adjustment wedge to fall through aperture 71 an additional distance related to the increased pressure.

Through use of the adjustment wedge two important functions which are desired in imprinting machines are achieved, that is, a significant amount of print smudge normally transferred to the document while being imprinted is eliminated and undesired crushing of embossing on a printing plate is significantly lessened. In most all imprinters a large amount of print smudge is normally attributed to roller spring back which occurs when the printing pressure encountered is sharply reduced between raised characters and at the end of a card or other printing medium having raised characters thereon. The smudge elimination is accomplished by locking the compensating bracket at virtually every adjusted position as it is moved to compensate for most any increase in printing pressure over F pounds, thus greatly reducing the spring back of the platen assembly.

Upon having traversed during the printing stroke the entire length of print bed 22, the carriage is returned in the X direction toward its start position, however, prior to being impelled back across the document, leg 59 will engage tripping member 62 to rock the head assembly

counter-clockwise about shaft 48, as viewed from FIGURE 2, elevating platen roller 54 from the print bed into a non-printing position. As the carriage traverses clamp 32 toward its start position, the bottom edge of adjustment wedge 72 will strike the clamp and gradually be forced upwardly as it slides across the inclined plane position of the clamp, thus returning compensating bracket 63 to its normal position as shown in phantom in FIGURE 2.

It will be appreciated that although the novel compensator and smudge prevention invention is, in the preferred embodiment, used in conjunction with the specific platen assembly tripping mechanism disclosed employing a torsion spring and tripping members placed on the base, said invention may be utilized independently of any tripping mechanism, and, if desired, may be readily used with other types of tripping mechanisms, different than that shown, for accomplishing the same result.

It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and the scope of the invention. It is desired, therefore, that only such limitations be placed on the invention as are imposed by the prior art and as set forth in the appended claims.

What is claimed is:

1. In the art of print machines of the type adapted to use portable printing means for printing data on a document, a machine comprising a base, a print bed on said base adapted to support said printing means and said document, a carriage mounted for reciprocating travel relative to the print bed to effectuate a printing operation, a platen assembly mounted for pivotal movement relative to said carriage, a roller platen mounted at one end of said platen assembly, compensating means mounted within said carriage, means for biasing said compensating means relative to said carriage to one position, means for rotating said platen assembly prior to said printing operation into contact with said compensating means when it is disposed at said one position to establish a reference level of said platen roller with respect to said print bed corresponding to the combined minimum thickness of said printing means and said document anticipated for use with said machine, said platen assembly forcing said compensating means away from said one position during said printing operation against the force exerted by said biasing means in response to the platen roller encountering a combined printing member and document thickness which exceeds the anticipated minimum thickness so that said platen assembly is raised with respect to the print bed to thereby optimize the printing pressure.

2. In the art of printing machines, the combination recited in claim 1 including means for rotating said platen assembly to a non-operative position after termination of each printing operation.

3. In the art of printing machines, the combination recited in claim 1 including means exclusive of the printing pressure for maintaining the platen assembly at the raised level resulting from the increased combined printing means and document thickness.

4. In the art of printing machines, the combination recited in claim 3 where said means for maintaining the platen assembly at the raised level includes a slideable wedge adapted to lock the biased compensating means.

5. In the art of printing machines, the combination recited in claim 3 where said means for maintaining the platen assembly at the raised level includes a bracket pivotally mounted relative to the carriage and adapted to be moved by the platen assembly when printing pressure is applied to the roller platen, said bracket being connected to the carriage through a spring, a guide member extending from said bracket into the carriage, and an adjustment wedge disposed between the guide member

7

and the carriage adapted for sliding movement in a single direction only when the bracket is biased by the platen assembly.

6. In the art of printing machines of the type adapted to use portable printing means the combination recited in claim 4 including compression springs placed between the platen assembly and the carriage for loosely holding the platen assembly in each of its displaced printing levels.

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8

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