This application relates generally to printing devices wherein a pressure applying member operates to impress a record receiving medium against type faces formed on an information carrier for reproducing the information of said carrier onto the print receiving medium, the invention relating more particularly to the anvil or platen means of the device and the manner in which it is mounted for supporting said information carrier and print receiving medium in pressure engagement with said pressure applying member.

The invention is shown in an embodiment adapted for use with a printer of the type disclosed in my co-pending application entitled "Roller Printer," Serial No. 225,280, filed Sept. 21, 1962, now Patent No. 3,170,396. The machine of the aforesaid co-pending application is designed to reproduce on a print receiving medium in the form of a sales invoice the data contained on a credit card, the machine including a pressure applying member in the form of a roller adapted to impress the sales invoice against the surface of character type faces embossed in the credit card when the sales invoice and credit card are placed in superimposed position in the print station of the machine. The sales invoice and credit card are supported at the print station by an anvil or platen which resists the force of the pressure roller to thereby apply in cooperation with the roller sufficient pressure between the sales invoice and the credit card to effect an imprint on the invoice. Since the peripheral surface of the roller traverses the print station along a predefined plane, it will be evident that the amount of pressure applied between the sales invoice and the credit card will depend upon the orientation of the supporting surface of the anvil and the plane in which it lies in relation to the plane in which the surface of the roller is caused to travel. It will be readily evident that in order to obtain uniform and satisfactory print quality from embossed characters located in any discrete area of the credit card, the force resisting surface of the anvil must be precisely disposed within a plane parallel to the plane defined by the path of the roller and spaced therefrom the precise distance required to achieve the necessary and optimum printing pressure.

One of the problems which is encountered in the design of machines in this class is that of making provision for assuring that the plane of the anvil surface is precisely disposed along the plane parallel to the plane in which the roller travels and at the desired gap relative thereto so as to achieve the desired printing pressure. This problem is compounded by the fact that credit cards for which the machine is designed vary from one another in thickness due to the range of tolerances permitted in the manufacture of the cards or due to a flattening out or compression of the cards after repeated use in a machine of this class. Regardless of the reason therefor, it is found that credit cards commonly vary in thickness one from the other as much as .010 of an inch, which variation, unless means are provided to compensate therefor, renders it difficult to establish a gap between the anvil surface and the pressure roller which will provide satisfactory character imprint from cards of all thicknesses.

The mechanism according to the invention overcomes these problems by providing means whereby the force resisting surface of the anvil can be readily adjusted to lie in a plane parallel to the path of the roller while also enabling the anvil to be yieldably supported in such a manner as to compensate for credit cards of varying thickness without any deviation by the force resisting surface from its parallel planar relationship to the path of the roller. The mechanism is such as to provide substantially the same printing pressure on cards of maximum thickness as on cards of minimum thickness as well as providing uniform pressure over each discrete area of a single card regardless of its thickness.

The mechanism according to the invention includes an anvil which is generally rectangular in outline when viewed in the direction in which the pressure force applied, the head of the anvil being formed with a force resisting surface underlying and shaped to correspond to the information bearing area of a credit card, the base of the anvil being expanded and supported near each corner thereof by pivotal members each individually and adjustably connecting the anvil to a single spring biased force resisting member common to each of the anvil pivotal supports. Adjustment of the individual supports at each corner of the anvil enables the plane of the force resisting surface to be precisely established in parallel with the path of the pressure roller, and the employment of a spring biased resistance member common to each of said anvil supports assures that the reactive force supplied thereby will be applied uniformly regardless of to what discrete area of the anvil the force of said pressure roller is being exerted. The spring rate of the biasing spring together with the geometry of the interconnecting parts are such as to provide substantially the same reactive force against said pressure applying member regardless of whether the card at the print station is one of maximum or minimum thickness.

It is, therefore, an object of this invention to achieve uniform printing density in a machine of the class described from cards or information bearing carriers having varying thickness.

It is a further object of the invention to provide in a machine of the character described an anvil which compensates for varying thickness of the information bearing cards utilized to achieve a printing improvement.

It is a still further object of the invention to provide in a machine of the character described an anvil which compensates for varying thickness of the information bearing carrier and which is readily adjustable to support the carrier in a plane parallel to the path of a pressure applying member adapted to traverse the surface area of said carrier to achieve the printing improvement.

Further objects of the invention, together with the features contributing thereto and advantages accruing therefrom, will be apparent from the following description when read in conjunction with the drawings wherein:

FIG. 1 is a plan view of the anvil and supporting mechanism showing the relative positions of the credit card and sales invoice when located at the print station.

FIG. 2 is a sectional view, looking from the front of the machine of the mechanism, taken along the line 2--2 of FIG. 1 and illustrating the path and travel of the print roller in relation thereto.

FIG. 3 is an exploded isometric view of the anvil and its supporting mechanism.

FIG. 4 is a sectional view of the mechanism taken along the line 4--4 of FIG. 2.

FIG. 5 is a sectional view of the detail of the mechanism taken along the line 5--5 of FIG. 2.

FIG. 6 is a plan view of an information carrier in the form of a credit card which is used in the machine for recording the information thereof onto the sales invoice. The credit card shown in the detail view of FIG. 6 may be formed of plastic, metal, or other suitable material and contains thereon embossed characters and numerals representing information identifying the card.
holder such as by name, address, and account number. In the example shown, the embossed characters 6 occupy a portion of the lower half of the card. The card 5 is shown in phantom lines in FIG. 1 indicating the position it occupies when inserted in the print station of the machine in underlying relation to a sales invoice 7 also indicated in phantom lines in FIG. 1. Suitable means, not shown, are provided for holding the credit card and sales invoice in registered superposed relation wherein a portion of the upper half of the sales invoice overlays the embossed area in the lower half of the credit card. The sales invoice 7 preferably comprises a carbon pack form which when impressed against the embossed area of the credit card causes reproduction of the information embossed in the card onto the original and carbon sheet copies of the sales invoice. The machine includes a top section which comprises the roller housing and a base section in which the anvil mechanism hereinafter to be described is supported. FIG. 2 shows a portion of the roller housing comprising the upper section of the machine. The rear wall 10 thereof is cut away to form a horizontally extending slot 11 which in cooperation with a similar slot in the front wall of the roller housing, not shown, defines a horizontal path of travel for a print roller 12, the roller being mounted on a roller shaft 13 journaled in bearings 14 slide fitted in the slots 11 formed in the front rear walls of the roller housing. The base section of the machine is contained within a framework which includes a horizontal main frame plate 20 and a plurality of vertical ribs 21, 22, and 23. The frame plate is cut away to accommodate with a slight amount of clearance the head portion 25a of an anvil 25 which is generally rectangular in configuration and has a top surface which may be considered a force resisting surface 25c of anvil area. The anvil 25 has in the area of the top surface a rib 25d extending substantially parallel to the sides thereof. A plurality of vertical ribs 21, 22, and 23 are provided adjacent thereto. The head portion 25a of anvil 25 is also substantially rectangular but of increased dimensions relative to the head portion 25b of the anvil which area of the card is also in register with an area in the upper half of the sales invoice 7. The base section 250 of the anvil, which forms a portion of the head portion 25a, is also substantially rectangular but of increased dimensions relative to the head portion 25b of the anvil. The bottom surface of the base section 250 of the anvil is formed with a pair of parallel and relatively deep narrow grooves 26 each of which opens into and is coincident with a relatively wider and shallower groove 27. The grooves 26 serve to accommodate and align the upper edges of anvil supporting means in the form of bellcranks 30 of which there is one cooperating with each of the four corner areas of the anvil base 25b. Bellcranks 30 are mounted in pairs on associated pivot rods 31 supported at each end thereof in the base frame ribs 22, 23. Since the anvil base overlies one of the pivot rods 31, the base is formed with a transverse semicircular groove 32 to accommodate and allow clearance between a respective one of the rods 31 and the anvil base. Each of the bellcranks 30 carries support stud 33 which underlies a respective one of the corners of the anvil base and which is seated in one of the grooves 27 formed in the under surface of the anvil base. A retainer 34 secured to the base section by a screw 35 serves to hold the studs 33 and the anvil base 25b in proper seated engagement. Each bellcrank at its lower end also carries a shouldehead rivet 36 which pivotally joins the bellcrank with the anvil supporting means. It will be noted that that portion of the arm embracing the pivot rod 31 and support stud 33, which may be referred to as the anvil support arm of the bellcrank, is perpendicular or substantially so relative to the resistance arm thereof, i.e. that portion of the bellcrank which embraces the pivot rod 31 and the rivet 36. It will also be noted that the anvil support arm as above defined extends in a substantially horizontal plane parallel to the plane of the force resisting surface 25c of the anvil. That portion of the bellcrank which is pivotally connected to the anvil supporting means may be considered an anvil support arm of the bellcrank. Each operating arm of the anvil support arm of the bellcrank is adapted to be pivotally connected to the anvil support arm of the bellcrank at a pivot portion of the bellcrank. Each operating arm is pivotally connected to the anvil support arm of the bellcrank as shown at 40 and set screws 51 coupling the four anvil supporting bellcranks 30 with the common resistance block 45. From the foregoing it will be evident that due to the configuration of the anvil and the individually adjustable
support therefor at each of the four corners thereof, the construction, in addition to providing means for readily locating the anvil resisting surface precisely in a plane parallel to the path of the print roller, also provides assurance that every discrete area of the anvil surface will supply an equal reactive force against the force of the print roller to thereby achieve uniformity in print density regardless of the area of the credit card in which the embossed characters may be located. By reference to FIG. 1 it will be noted that the area of the force resistant surface 25c of the anvil lies entirely within the confine said dimensions defined by the base of the anvil 25b when projected in the direction in which the printing force or pressure is applied. For this reason and since the base of the anvil is supported at each corner by connections to a common resistance member, the resistance to the force exerted by the print roller will be the same over all areas of the surface of the anvil. Moreover, the same uniformity in print density over all areas of the anvil will hold true in the case of cards having varying thickness one from another since the supporting structure assures that with any yield or variation in the level of the anvil surface occasioned by a creased or abnor- 
mal thickness of the card or a creased anvil surface 25c will always remain in parallel relation to the path defined by the periphery of the print roller.

While there has been shown and described what is considered to be a preferred embodiment of the invention, it will of course be obvious that changes in form can be made without departing from the spirit of the invention, and it is intended therefore that the invention be not limited to the exact form herein shown and described nor to anything less than the whole of the invention herein described and as hereinafter claimed.

What is claimed and desired to be secured by Letters Patent is:

1. In a printing device of the character described having a pressure applying member adapted to bear on the type face area of a type carrier and a print receiving medium disposed in superposed relation to each other at a print station, said pressure applying member being in the form of a cylindrical roller guided for travel across said print station, an anvil disposed at said print station to support said carrier and said medium for pressure engagement with said member, said anvil including a head section presenting a flat force resisting surface of an area at least commensurate with type face area of said carrier and said anvil having a base section presenting a substantially rectangular surface within a plane parallel to the plane of said force resisting surface, said force resisting surface being smaller in area than the surface area of said base section and lying within the boundaries defined by the edges of said base section surface when projected in a direction parallel to the direction in which the force of said pressure applying member is exerted, means for adjusting the plane of said force resisting surface to receive the force exerted by said pressure applying member uniformly within any discrete area of the carrier supported by said force resisting surface, said adjusting means including a plurality of levers including a separate one for supporting each corner of the surface area of said base section, each lever being individually adjustable to dispose said force resisting surface in a plane parallel to the path defined by the periphery of said roller when traversing said print station, and yieldable resistance means including a resistance member common to all said levers and coupled thereto providing a reactive force on said anvil through said levers in opposition to the force exerted by said pressure applying member for enabling said anvil to yield under force exerted by the pressure applying member in excess of a predetermined amount, the yielding movement of said anvil being in which said force is applied and without alteration of the adjusted planar orientation of the force resisting surface thereof, whereby substantially the same pressure is uniformly applied to type face carriers and print receiving media having combined thickness of varying amount.

2. The invention according to claim 1 wherein each of said levers is mounted for rotation about a fixed pivot and provides an anvil support arm of each lever extending in a direction normal to the direction in which force is applied by said pressure applying member to enable yielding movement of the force resisting surface of said anvil in the same direction.

3. The invention according to claim 2 wherein another arm of each said lever is pivotally joined to said resistance member common to all said levers, whereby the force applied to the force resisting surface by said roller is met by the same reactive force regardless of the discrete area of said force resisting surface in which the force of said roller is exerted.

4. The invention according to claim 3 wherein the anvil support arm in each lever is shorter than the said other arm pivotally joined to said resistance member to provide a favorable leverage ratio for the reactive force supplied by said resistance member.

5. In a printing machine of the character described having a pressure applying roller adapted to bear upon the type face area of a type carrier and a print receiving media disposed in superposed relation to each other at a print station, an anvil having a head section formed by a flat force resisting surface for supporting said carrier and carrier and a print receiving medium disposed in pressure engagement with said roller, said anvil having a base section formed to provide a substantially rectangular surface lying in a plane parallel to the plane of said force resisting surface, said force resisting surface being smaller in area than the area of the base section and lying within the boundaries defined by the edges of said base section surface when projected in the direction in which the force of said roller is exerted, a plurality of individual levers each mounted on a fixed pivot and each including an anvil support arm connected to the individual corners of the base section of said anvil, said anvil support arms extending in a direction normal to the direction in which force is exerted by said roller to enable movement of the force resisting surface of said anvil in the same direction, and a yieldable resistance member providing a reactive force on said anvil for enabling the anvil to yield under forces exerted by said roller in excess of a predetermined amount, said resistance member being adjustably coupled to another arm of each of said levers to enable corresponding adjustment of the plane of said force resisting surface relative to the plane defined by the periphery of said roller when traversing said print station.

6. The invention according to claim 5 wherein the couplings between each lever and said resistance member includes a link adjustable attachable to the resistance member, said resistance member carrying a threaded element for engaging an associated link and rotatably settable to precisely adjust the connection between said levers and said resistance member.

7. The invention according to claim 5 wherein said resistance member is biased by a flexure spring which provides a reactive force through said resistance member and said levers for the force resisting surface of said anvil.

8. The invention according to claim 7 including a threaded member engageable with said resistance member and settable to regulate the minimum limit of flexure for said spring and thereby determine the minimum reactive force to be applied to said force resisting surface.

9. In a printing machine of the character described having a pressure applying roller adapted to bear upon the type face area of a type carrier and a print receiving medium disposed in superposed relation to each other at a print station, an anvil having a head section formed to provide a flat force resisting surface for supporting said carrier and said print receiving medium in pressure engagement with said roller, said anvil having a base section
formed to provide a substantially rectangular surface lying in a plane parallel to the plane of said force resisting surface, said force resisting surface being smaller in area than the area of said base section and lying within the boundaries defined by the edges of said base section surface when projected in the direction in which the force of said roller is exerted, a plurality of individual levers each mounted on a fixed pivot and each including an anvil support arm connected to the individual corner areas of the base section of said anvil, said anvil support arms extending in a direction normal to the direction in which force is exerted by said roller to enable movement of the force resisting surface of said anvil in the same direction, a yieldable resistance member providing a reactive force on said anvil for enabling the anvil to yield under forces exerted by said roller in excess of a predetermined amount, links coupling said resistance member with each of said levers, said links being adjustably connectable with said resistance member to enable corresponding adjustment of the plane of said force resisting surface relative to the plane defined by the periphery of said roller when traversing said print station, a flexure spring biasing said resistance member to provide a reactive force through the resistance member and said levers for the force resisting surface of said anvil, and means settable to regulate the minimum limit of flexure of said spring and thereby determine the minimum reactive force to be applied to said force resisting surface.

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ROBERT E. PULFREY, Primary Examiner.
EUGENE R. CAPOZIO, Examiner.
HARLEIGH EWELL, Assistant Examiner.