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Waibel

[11] **3,837,461**

[45] **Sept. 24, 1974**

[54] **PRINT STATION FOR A MATRIX PRINTER**

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[73] Assignee: **The Singer Company,** New York, N.Y.

[22] Filed: **Mar. 13, 1973**

[21] Appl. No.: **340,869**

[52] **U.S. Cl.** **197/126,** 197/148, 101/287

[51] **Int. Cl.** **B41j 11/58**

[58] **Field of Search** ..... 197/2, 3, 127, 124, 126, 197/148, 138, 128; 101/93 R, 93 C, 287, 288

[56] **References Cited**

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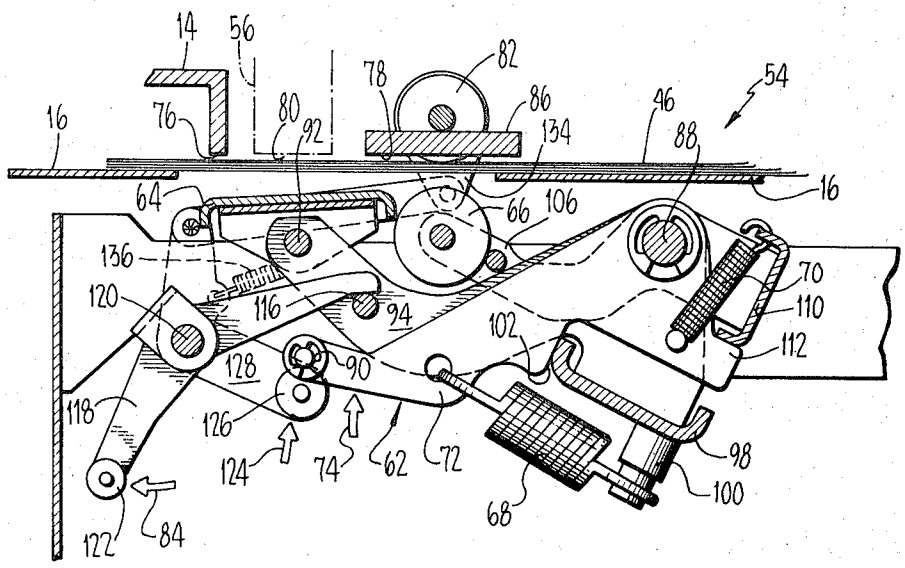
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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—R. T. Rader
Attorney, Agent, or Firm—Edward L. Bell; Joseph R. Dwyer

[57] **ABSTRACT**

A platen assembly for feeding and holding single or multi-layer record media for printing thereon which accommodates the rather limited thrust of the wires of a matrix type printer, said assembly comprising a platen and one of a pair of feed rollers pivotally mounted so as to yieldingly engage the record media during the printing operation. The platen yieldingly engages and holds the record media against guides which determine the gap between the matrix head for proper operation of the wires and the roller yieldingly engages the record media to hold the media against a power feed roller during the printing operation. For line-by-line printing, the platen is temporarily disengaged from the record media while the pressure roller and power feed roller move the record media the required distance before the platen again engages the media. This platen assembly is particularly useful in point-of-sale data terminals where the record media is usually multiple copy forms of varying numbers for bills of sale, invoices, contracts of sale, and the like.

12 Claims, 6 Drawing Figures



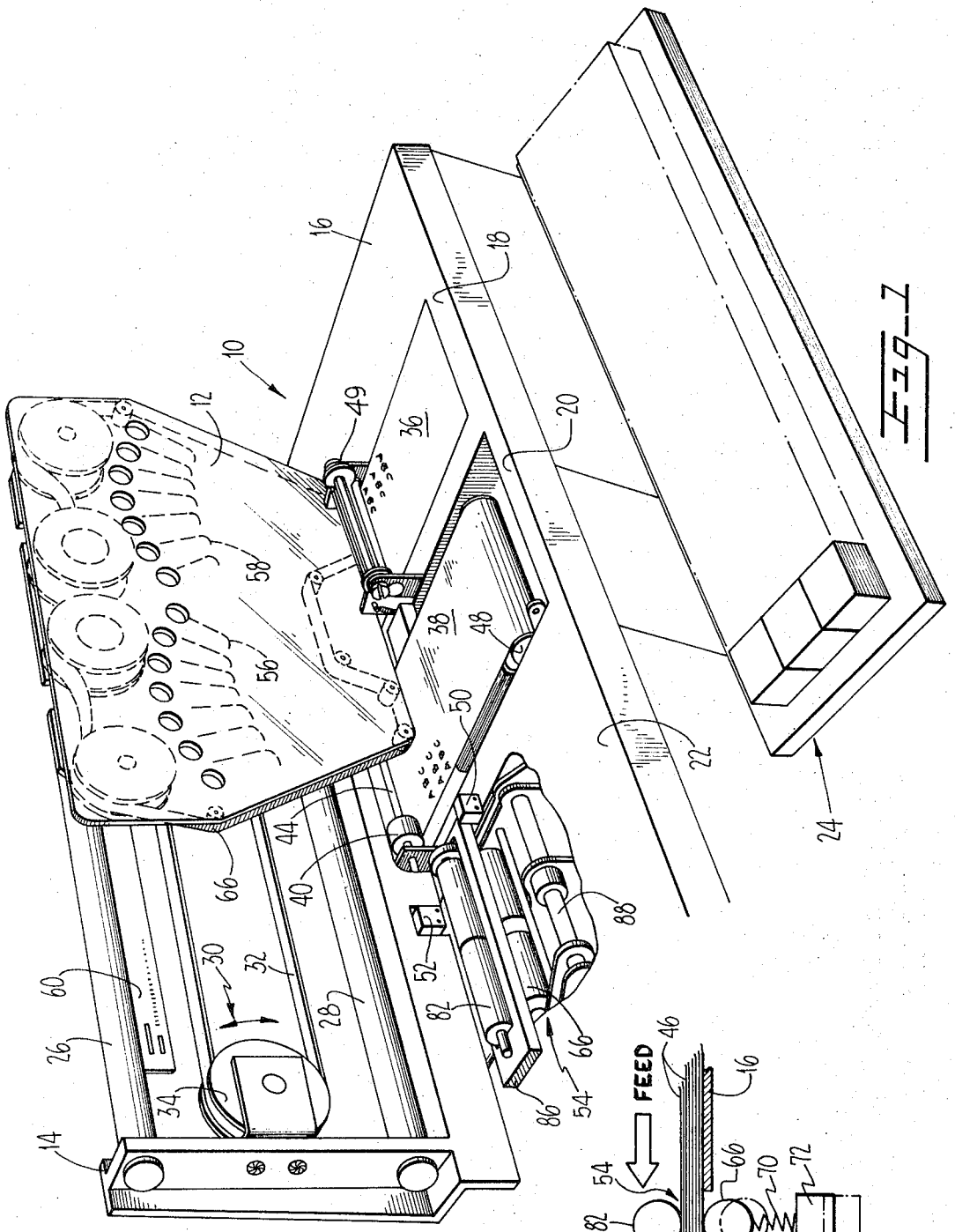

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Fig. 1

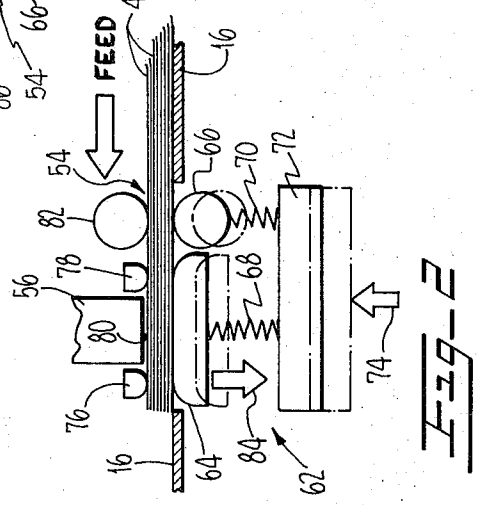

FEED
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Fig. 2

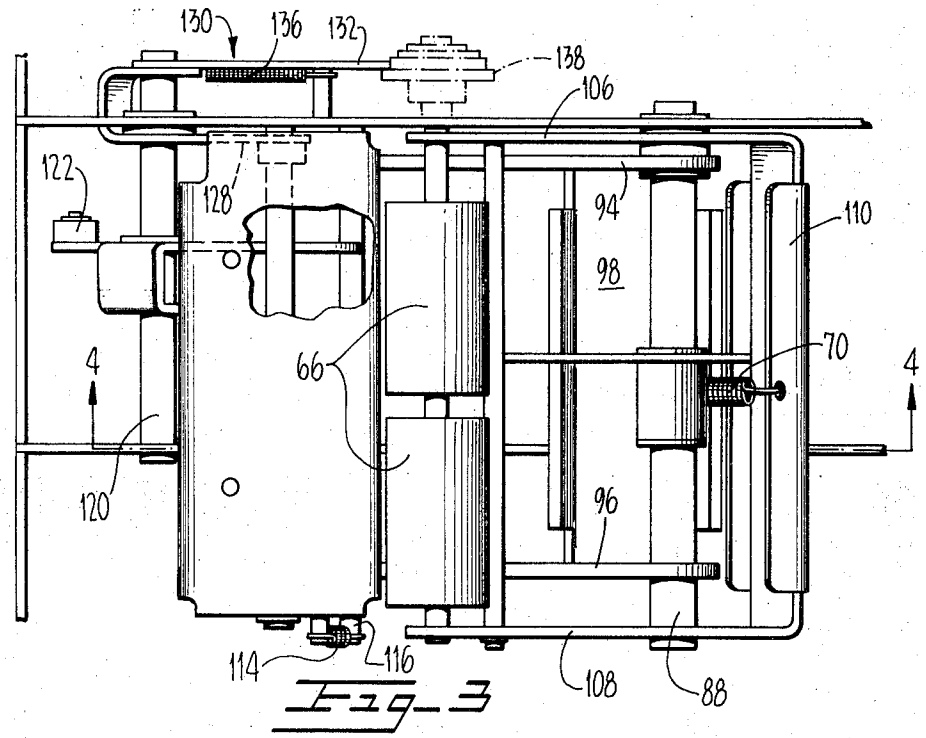


Fig 3

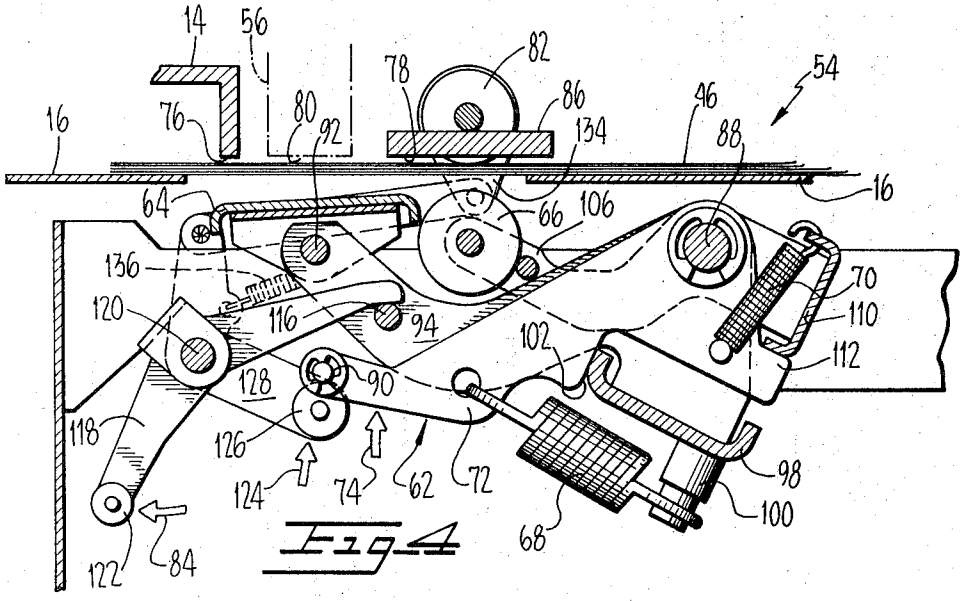


Fig 4

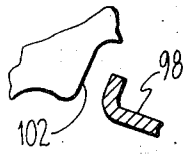


Fig 4A

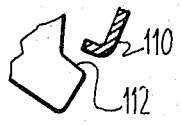


Fig 4B

PRINT STATION FOR A MATRIX PRINTER

CROSS-REFERENCES TO RELATED APPLICATIONS

U.S. application entitled "Character Strobing in a Data Terminal" of Hartley M. Naas, Julian C. Sutherland and Dale D. Nesbitt, filed Jan. 5, 1973, Ser. No. 321,177;

U.S. application entitled "An Assembly for Spooling an Audit Trail in a Data Terminal" of James G. Savage and Arnold L. Hawkins, filed Jan. 5, 1973, Ser. No. 321,196;

U.S. application entitled "A data Terminal with Dual Trhee-Station Printing" of Howard R. Cederberg and Charles W. Wiedeman, filed Jan. 5, 1973, Ser. No. 321,176; and

U.S. application entitled "Data Terminal Printing Assembly With Improved Ink Supply", filed Jan. 29, 1973, Ser. No. 327,515.

BACKGROUND OF THE INVENTION

1. Field of Invention

This invention relates, in general, to feed mechanisms for holding record media to properly be printed thereon by a matrix type printer, and in particular, is related to a point-of-sale type data terminal having a matrix type printer and which must accommodate forms of the multi-layer type of various thicknesses such as a bill of sale or sales order form commonly used in retail sales.

2. Description of the Prior Art

Conventional matrix printers have a plurality of wires, each individually moved by a magnetic actuator, usually against a return spring, to impact a record medium to print a character; one wire printing one spot or dot of the character at a time. Such matrix printers use either seven or thirty-five such wires positioned in aligned configuration at the point of impact and are individually and sequentially strobed so as to print a character. The strobing of each wire, the positioning of the entire character on the media, and the spacing of the characters to form a printed line can be effected by electronic circuitry, usually timing devices or counters of some type.

In such conventional matrix printers, the magnetic actuator is a solenoid whose armature is either directly attached to the wire or is positioned to actuate an arm which, in turn, hammers the wire to move the wire to impact the record media for printing. In either instance, the thrust of the wire to the impact point with the record media is limited in its travel and, in the prior art, means have been provided for holding the record media close to the impact point of the wires. Typical examples of such means are platen assemblies, such as shown in U.S. Pat. Nos. 2,728,289 to W. E. Johnson et al. and 2,129,065 to J. N. Loop.

The problem with such prior art platen assemblies has been their inability to automatically accommodate either single or multiple layers of record media whose thicknesses vary. This deficiency reduced the performance ofmatrix printers, particularly in the field of data terminals of the point-of-sale type, where retailers may have different forms with one or more multiple copies for their merchandising operation. Too, since the number of layers, and the layers themselves vary in thicknesses from retail outlet to retail outlet, without some means for automatically accommodating such forms, each data terminal had to be customized for each retainer. The alternative, of course, is not to use matrix type printers and/or to have the retailer modify this operation to meet the requirements of the data terminal.

SUMMARY OF THE INVENTION

This invention, which solves the problems of the prior art devices as described supra, comprises a platen assembly for feeding and holding single or multi-layer record media on which characters may be printed by a matrix type printer and includes a spring-loaded platen and pressure roller; the platen holding the record media during the printing operation under yieldable pressure against position guides which determine the gap between the matrix head and the record media and the pressure roller holding the record media under yieldable pressure against a second roller. The platen is temporarily releasable to a second position independently of the pressure roller to permit the feed rollers (of which the pressure roller is one) to move the record media for line-by-line printing. It is the position guides and the yieldable pressure of the spring-loaded platen which correctly position the face of the record media relative to the impact ends of the wires of the matrix printer for proper printing relaionship.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective of a cutaway portion of a data terminal schematized to illustrate the relationship of the form printing station in which the platen assembly forming the present invention is incorporated and its cooperation with the rest of the data terminal, including the matrix printer which prints on the forms handled by the present invention;

FIG. **2** is a schematic illustration of the platen assembly showing the operation thereof in a simplified form;

FIG. **3** is a plan view of the specific embodiment disclosed;

FIG. **4** is an elevational view of the specific embodiment disclosed, taken along the line **4—4** and showing the platen assembly in its home position, i.e., the position in which the forms are inserted into the data terminal;

FIG. **4A** is an illustration of how the yieldable force is applied to the forms by the platen in position for printing; and

FIG. **4B** is an illustration of how the yieldable force is applied to the forms by the pressure roller and held to permit the feed rollers to move the forms.

DESCRIPTION OF THE PREFERRED EMBODIMENT

To illustrate a data terminal, in which the present invention may be used, a general description thereof is described first.

In FIG. **1**, the data terminal **10** (with cover removed for purposes of clarity) is shown as comprising, overall, a carriage **12** movable laterally with respect to a frame **14**, a work level surface **16** having three print stations **18, 20** and **22**, and an appropriate keyboard **24**. The three print stations **18, 20** and **22** are, respectively, a receipt station where the customer's receipt is printed (if a receipt is required), an audit station where the storekeeper's record (audit trail) of all transactions are

printed, and a form station where the customer's order form or bill of sale is printed, if required.

By this arrangement, the carriage **12** will move, not only from the printing position shown, viz, at the audit station and receipt station, but to the form station and audit station as well as traversing each pairs of stations so that appropriate rows and columns of data entered into the data terminal at the keyboard **24** is appropriately printed out. The carriage **12** is mounted on a pair of bars **26** and **28** to hold the carriage in parallel relationship with the platen **16** and the rest of the data terminal and traverse movement on the parallel bars is accomplished by a suitable drive mechanism **30** including a belt **32** attached to carriage **12,** and pulley means **34** motivated by a reversible motor (not shown).

In the embodiment shown, a receipt **36,** if required, is printed in the receipt station **18** and an audit trail **38** is printed in the audit station **20** when the carriage **12** is in the position shown as the two record media (paper) are moved forward, i.e., in the direction of the keyboard **24,** and forms a suitable supply, such as a roll of paper, by a suitable roller feed mechanism **40** driven by a motor and clutch means coupled to shaft **44.** When the carriage **12** is positioned to the left from that shown, a form **46,** such as a customer order form or bill of sale, is printed in station **22** at the same time the audit trail **38** is being printed.

The audit trail **38** is rolled onto a spool **48** partially shown in FIG. **1,** while the receipt **36** is servered, when a complete transaction is recorded, by a suitable cutting mechanism, indicated in its entirety as **49.** Also, the forms station is provided with a pair of electronic sensing means **50** and **52** which determine when a form **46** is properly located in the forms station, otherwise the terminal is inhibited from operating; suitable electronics being provided for this purpose. Rollers **54** feed the form in a direction opposite from the direction of travel of the audit trail by suitable gearing to couple the rollers to shaft **44** which moves the form and audit trail or audit trail and receipt, or audit trail alone, as the case may be, incrementally, in response to and in combination with printing mechanisms to form rows and columns of data as determined by the input to the keyboard **24.**

The carriage **12** is also provided with a pair of matrix printers **56** and **58** capable of printing on two of the three stations at the1same time, viz, the receipt station and the audit station, or when the carriage is positioned to the left from that shown on the form station and audit station.

For the proper positioning of the rows and columns of the characters on the record media, the combination of a mechanical strobe means **60** and suitable electronics cooperating therewith are provided but are described and claimed in a copending application in more detail.

Furthermore, asuitable ink supply means for the dual matrix printer located in the carriage are shown in FIG. **1** only schematically, since the ribbon, its novel inking supply arrangement and other details to improve the operation of the matrix printers and data terminals generally are described and claimed in a copending application.

No description of such mechanical strobe means and electronics for properly aligning the characters on the record media nor in the ink supply means for the printers will be described herein since this invention is directed to the platen assembly to facilitate the printing of the form at the form station which will now be described in more detail.

It should be noted at this time, however, that one of the many advantages of matrix printers in the data terminal is the ability to print legibly through several copies of forms, in the form station but without the platen assembly, as described and claimed herein, it is necessary to customize the data terminal since the platen assembly provides the automatic compensation for forms of varying numbers of layers and thicknesses. Also, by suitable electronics described and claimed in thecopending application, supra, the printing on the receipt is upside down relative to the printing on the audit trail and form. This upside down printing on the receipt enables the complete transaction, such as a sale, to be recorded and totaled in the manner in which any transaction is normally read; i.e., top to bottom, for the benefit of the customer. This is also true of the form printed at the form station since the form moves in a direction opposite to the direction of travel of the receipt. This is not true, however, for the printing on the audit trail, which is stored in the machine to be used by the vendor.

Turning now to FIG. **2,** it can be seen that the platen assembly comprising this invention is illustrated schematically to simplify and clarify the movement and position of the platen assembly. In this figure the form station **18** contains the matrix print head **56** and the previously described rollers **54** and the work level surface **16.**

In this figure, the platen assembly is identified in its entirety as **62** and comprises a platen **64** and a pressure roller **66,** both of which are spring-loaded, respectively, by springs **68** and **70** and the springs and platen and pressure roller are urged into engagement with the forms **46** by a pressure arm or block **72** in the direction as indicated by arrow **74.** As seen from the dotted positions of the block, platen and pressure roller, at the appropriate time, the block is moved from its home position to its upper or print position, uring the platen and pressure roller into engagement with the form. The platen **64** urges the form against a pair of gap guide means in the form of gap shoes **76** and **78** located on each side of the print head to provide the appropriate gap **80** between the matrix print head **56** and the form to position the form for proper thrust of the matrix wires and clearance of the head for movement thereof. Similarly, the pressure roller **66** urges the forms against its counterpart, the power feed roller **82.** Thus, the form is held during the printing operation in two places, by the platen and the rollers, and the matrix print head is free to traverse the form during the printing operation because of the gap **80** determined exactly by the gap guides **76** and **78.** It should be obvious that, with the platen **64** and pressure roller **66** being yieldingly engaged against the form and the top of the form being the part precisely positioned by the guides and the roller, the thickness of the form, be it one layer or several, is immaterial to the matrix print head.

After the matrix print head **56** is finished printing a line, or if it is desired simply to move the form one or more lines, means (not shown in the schematic) are provided for moving the platen **64** away from the form, as shown by the dotted arrow **84,** independently of the pressure roller **66** and against the force of the spring **68.** This permits the rollers **54** to move the form with-

out interference by the platen **64.** At the appropriate time, the action of the means for depressing the spring **68** is removed and the platen will again engage the form by the action of the spring **68.**

Turning now in more detail to the specific embodiment disclosed in FIGS. **3** and **4,** it can be seen that FIG. **3** is a plan view and FIG. **4** is an elevational view taken along line **4—4** of FIG. **3** and looking in the direction of the arrows. It should be noted that where the same parts, or their equivalent in structure or function, are disclosed in these figures, the same reference numerals as those used in FIGS. **1** and **2** are applied. For example, the guide means **76** and **78** in this specific embodiment are the lowermost edges of the bracket **14** holding the carrier **12** and the bar **86** holding the shaft of roller **80,** both of which are more clearly shown in FIG. **1.**

In this specific embodiment, the platen assembly **62** is pivotally mounted on a pivot shaft **88** for actuation by any suitable means for applying of force in the direction of the arrow **74.** This force applying means can be any suitable mechanism, such as cams or solenoids, the cams actually being used and represented herein by the cam follower **90** forming part of and mounted on an arm **72** (shown as a block in FIG. **2**). Also, pivotally mounted on shaft **88** is the platen **64** pivotally mounted as at **92** on a U-shaped bracket having a pair of arms **94** and **96** which terminate affixed to a channel bracket **98.** The bracket **98** and consequently the platen **64** is yieldably attached to the camming arm **72** by the pressure spring **68.** Spring **68** is attached at one end to arm **72** and a pin member **100** fixed to the bracket **98** attaching the other end of pressure spring **68** to platen **64.** The pressure spring serves to maintain the shoulder **102** on the arm **72** against the bracket **98** during the position shown in FIG. **4.**

Pressure roller **66** is also rotatably mounted on shaft **88** for actuation by arm **72** by a U-shaped bracket having arms **106** and **108** which terminate affixed to a channel member **110.** Spring **70,** attached at one end to the camming arm **72** and at the other end to the bracket **110,** serves to maintain the bracket against the shoulder **112** during the home position as shown in FIG. **4.**

As mentioned hereinabove, FIG. **4** is the home position of the platen assembly **62.** That is, the position in which forms **46** may be entered into the form station **22** in FIG. **1,** and when the sensors **50, 52** indicate that a form is in the proper position as, for example, when a credit charge is entered into the keyboard **24,** suitable circuitry (not shown) enable the force to be applied to the camming arm **72** moving the entire assembly **62** about the pivot shaft **88.** Platen **64** and pressure roller **66** will then engage the form. In this position, the bracket **98** disengages the shoulder **102** so that the resilience of the pressure spring **68** is applied to the forms, holding them with a yieldable force against the guides **76** and **78.** The amount of yieldable force depends upon the thickness of the form and, of course, provides for automatic compensation for this thickness, the guide means **76** and **78** determining the gap **80** regardless of the thickness of the form. Similarly, the pressure roller **66,** in engaging the form **46,** will cause the bracket **110** to disengage the shoulder **112** with the spring **70** (see FIG. **4B**) providing the yieldable force engaging the form and automatically compensating for the thickness of the form. Thus, the form **46** is held in two places by the platen **64** and the roller **66;** it being noted at this point that a suitable compensating spring **114** (FIG. **3**) is operatively positioned between the pivot shaft **92** and a second shaft **116,** the latter being affixed to the arms **94** and **96** of the U-shaped platen holding bracket to compensate for any misalignment as the platen engages the forms.

At the appropriate cycle of the printing operation, as when the matrix printers have printed a line on the forms or, for example, when it is simply desired to move the record media as indicated by some signal received from the keyboard **24,** a suitable force will be applied to bail **118** as indicated by the arrow **84** (shown pointing in a different direction in FIG. **2** because of the pivotal mounting of bail **118** about shaft **120**). Application of the force **84** can be by any suitable means, such as cams or solenoids, the cams being used and represented therein by the cam follower **122** forming part of and mounted on bail **118.** Bail **118** engages the shaft **116** and because of its pivotal nature, applies the force in a downward direction against the spring **68** enlarging the gap between the shoulder **102** and the bracket **98** as in FIG. **4A,** so that the platen disengages the forms and is in a position substantially shown in FIG. **4.** At the same time, however, since the pressure roller **66** is independent of the platen, the spring **70** continues to hold the pressure roller against the forms.

Also attached to the shaft **120** for pivotal movement by the force applied as indicated by the arrow **24** on the cam follower **126** is still another arm **128** forming part of an indexing means **130** (FIG. **3**) comprising a pair of arms **132** and **134** which are moved against the action of a return spring **136,** for rotating a one-way clutch **138** attached to the shaft **138** of the feed spool **82.** The further details of this form feeding indexing mechanism is not described herein, suffice to say that it moves the forms one line at a time and is functionally connected to the platen, so that, upon movement of the platen away from the forms, the forms are automatically moved one line. Obviously, any other type of form feed mechanism properly timed to the movement of the platen away from the forms, could be used.

At the appropriate time when the sensors **50, 52** indicate that the form is near its end, or upon the proper signal being received from the keyboard **24,** the force applied to the camming means **90,** as indicated by the arrow **74,** is terminated and the entire platen assembly **62** pivotally drops away from the forms to return to its home position such as shown in FIG. **4,** whereupon the forms can easily be removed from the form station **22.**

While the foregoing form feeding and platen assembly has been described in connection with a terminal, such as shown in FIG. **1,** obviously this assembly could be used wherever it is necessary for the proper positioning of the record media relative to a printer.

What is claimed is:

1. An assembly for holding one or more layers of record media for printing of characters thereon by a print head comprising:

platen means for urging said record media against guide means for spacing said record media relative to the print head for relative transverse movement therebetween;

means for feeding said record media for line-by-line printing of rows and columns of said characters

thereon, said feeding means being in continuous engagement with the record media;

an assembly for holding said platen means and said feeding means;

means for temporarily overcoming said platen means for urging said record media against guide means, independently of said feeding means, for a time sufficient to permit the record media to be moved by said feeding means.

2. The assembly as claimed in claim **1** wherein said means for urging said record media against guide means includes means for applying a force so that said record media yieldingly engages said guide means thereby automatically accommodating one or more layers of record media.

3. The assembly as claimed in claim **2** wherein said means for feeding said record media also includes means for applying a force so that said record media yieldingly engages said guide means thereby automatically accommodating one or more layers of record media.

4. The assembly as claimed in claim **3** wherein means are provided for temporarily overcoming said force on the means for urging the record media against said guide means for a time sufficient to permit said feeding means to move said record media.

5. An assembly for holding record media for printing thereon by a print head comprising:

guide means for spacing said record media relative to the print head so that said print head may traverse said record media and print rows of characters thereon;

platen means for urging said record media against said guide means;

means for feeding said record media relative to said print head for line-by-line printing of rows and columns of said characters an assembly for holding said platen means and said feeding means;

means for temporarily moving said platen means away from said record media, independently of said feeding means, for a time sufficient to permit the record media to be moved by said feeding means.

6. The assembly as claimed in claim **5** wherein said platen means includes means for automatically accommodating one or more layers of record media.

7. The assembly as claimed in claim **6** wherein said means for automatically accommodating one or more layers of record media is resilient means.

8. The assembly as claimed in claim **7** wherein said means for feeding said record media also includes means for automatically accommodating one or more layers of record media.

9. The assembly as claimed in claim **8** wherein said means for automatically accommodating one or more layers of record media comprises resilient means.

10. The assembly as claimed in claim **5** wherein said platen means and means for feeding the record media are both operatively connected for concurrent holding of said record media in two places when said print head traverses said record media, and both said last-mentioned means also include means for automatically accommodating one or more layers of record media.

11. The assembly as claimed in claim **6** wherein said means for feeding the record media comprises a pressure roller forming one of a pair of feed rollers.

12. An assembly for holding one or more layers of record media for the printing of characters thereon by a matrix print head comprising:

guide means for spacing said record media relative to the matrix print head for relative transverse movement therebetween and for proper operation of the print head wires;

a movable platen;

a power feed roller and a movable pressure roller acting as a pair for feeding the record media past the print head;

an assembly for holding said platen and said pressure roller and operative to move said platen toward said guide means and said pressure roller toward said power feed roller and including means for yieldably urging said record media into engagement with said guide means and said power feed roller by applying a spring force to said platen and said pressure roller; and

means for overcoming said spring force applied to said platen while permitting said spring force to be applied to said pressure roller to permit said rollers to feed said record media the required distance before allowing said spring force to again be applied to said platen for line-by-line printing of rows and columns on said record media.

* * * * *

Notice of Adverse Decision in Interference

In Interference No. 99,372, involving Patent No. 3,837,461, H. K. Waibel, PRINT STATION FOR A MATRIX PRINTER, final judgment adverse to the patentee was rendered Jan. 26, 1977, as to claims 5, 6 and 7.

[*Official Gazette May 3, 1977.*]