

United States Patent

[11] 3,548,746

[72] Inventor Harold E. Hepp
Dayton, Ohio
[21] Appl. No. 763,587
[22] Filed Sept. 30, 1968
[45] Patented Dec. 22, 1970
[73] Assignee The National Cash Register Company
Dayton, Ohio
a corporation of Maryland

3,288,264 11/1966 Gabrielson et al. 197/133
3,334,722 8/1967 Bernard. 197/133

Primary Examiner—William B. Penn
Attorneys—Louis A. Kline, Wilbert Hawk, Jr. and George J.
Muckenthaler

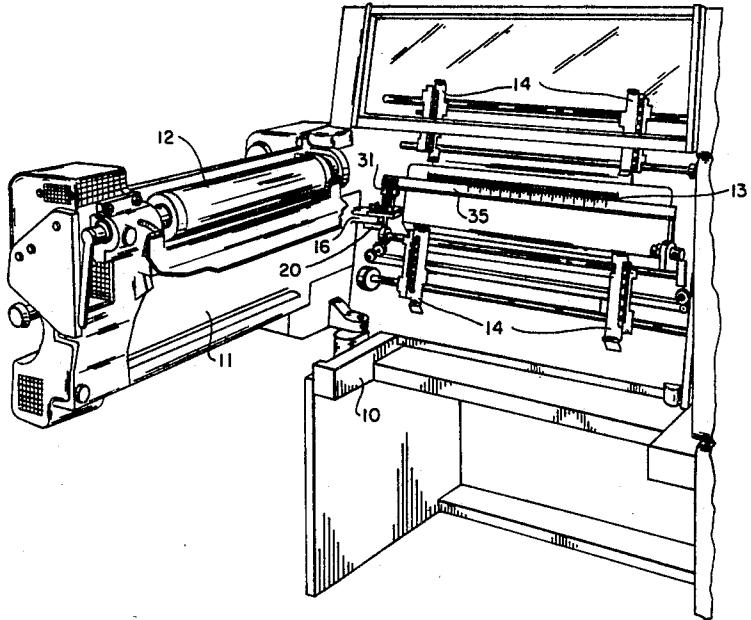
[54] **WEB POSITIONING MEANS AND ALIGNING
MEANS IN HIGH SPEED PRINTING MACHINES**
19 Claims, 8 Drawing Figs.

[52] U.S. Cl. 101/93
[51] Int. Cl. B41j 15/04
[50] Field of Search. 101/93, 96,
336; 197/133, 189, 190, 187

[56] **References Cited**
UNITED STATES PATENTS

2,921,661 1/1960 Scozzafava 197/133
3,001,470 9/1961 Nessel 101/96
3,035,680 5/1962 Fondiller 197/190
3,185,075 5/1965 McGregor et al. 101/93

ABSTRACT: A columnar guide mechanism for use in a high-speed printer including a spring-loaded cable and pulley arrangement for moving the guide from a retracted position to a record-material-aligning position. The guide is pivoted on a swingable typedrum casting in such a way that, when the casting is swung open, the guide is automatically carried therewith while in its normal downward, or retracted, position. This positioning of the casting and the guide enables the loading of the record material into the machine and onto the material-advancing tractor mechanism. The guide has an overriding feature, so that, with the casting open, the guide can be manually swung independently of the casting and is urged upwardly therethrough automatically by the action of a compressed spring into a position for determining alignment of the record material in the machine. Closing the casting to the typeline position then pulls the guide downwardly against the action of the spring, and the guide is moved out of the path of the printing hammers.



PATENTED DEC 22 1970

3,548,746

SHEET 1 OF 4

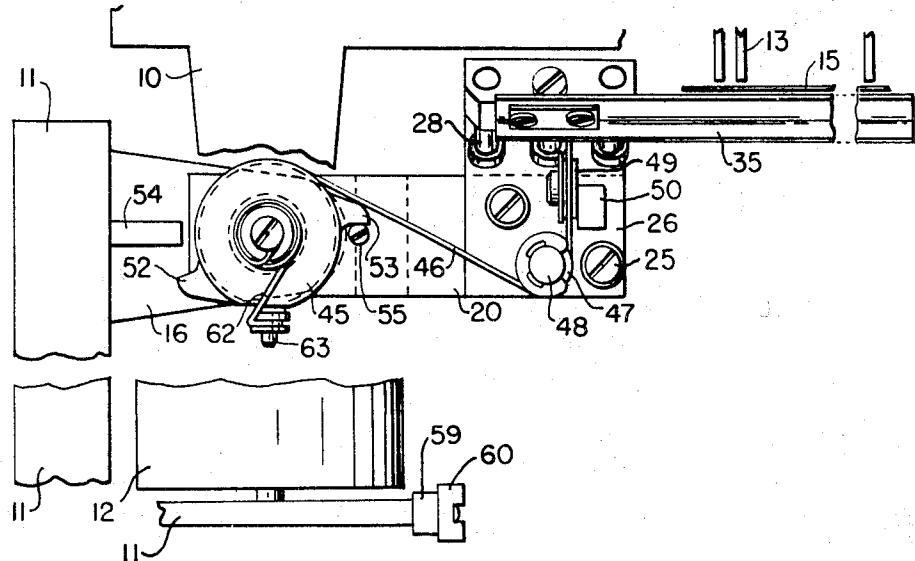


FIG. I

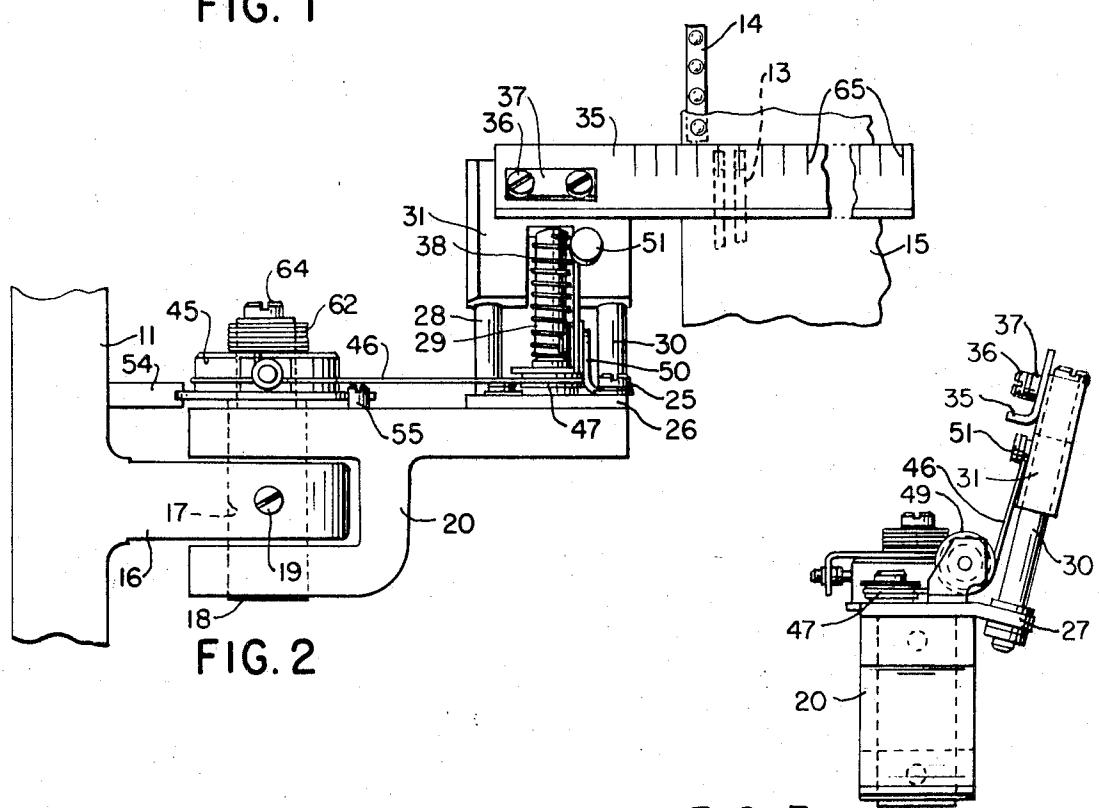


FIG. 2

FIG. 3

INVENTOR
HAROLD E. HEPP

BY Louis A Kline
Wilbert Hawk, Jr.
Geo J. Neckenthaler
HIS ATTORNEYS

PATENTED DEC 22 1970

3,548,746

SHEET 2 OF 4

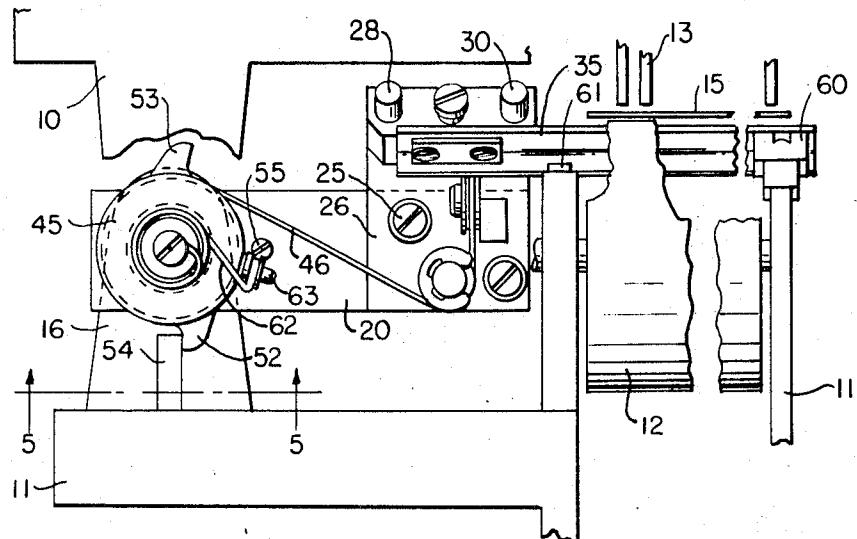


FIG. 4

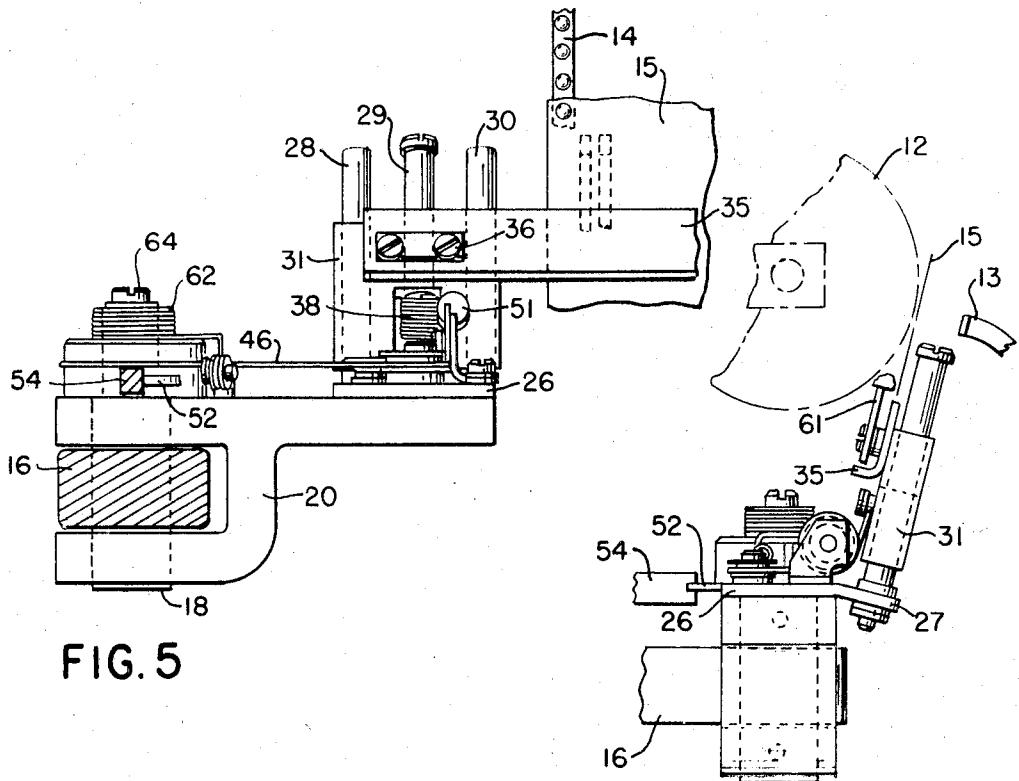


FIG. 5

FIG. 6

INVENTOR
HAROLD E. HEPP
BY *Louis A. Klein*
Albert Hawok, Jr.
Leo J. Muckenthaler
HIS ATTORNEYS

PATENTED DEC 22 1970

3,548,746

SHEET 3 OF 4

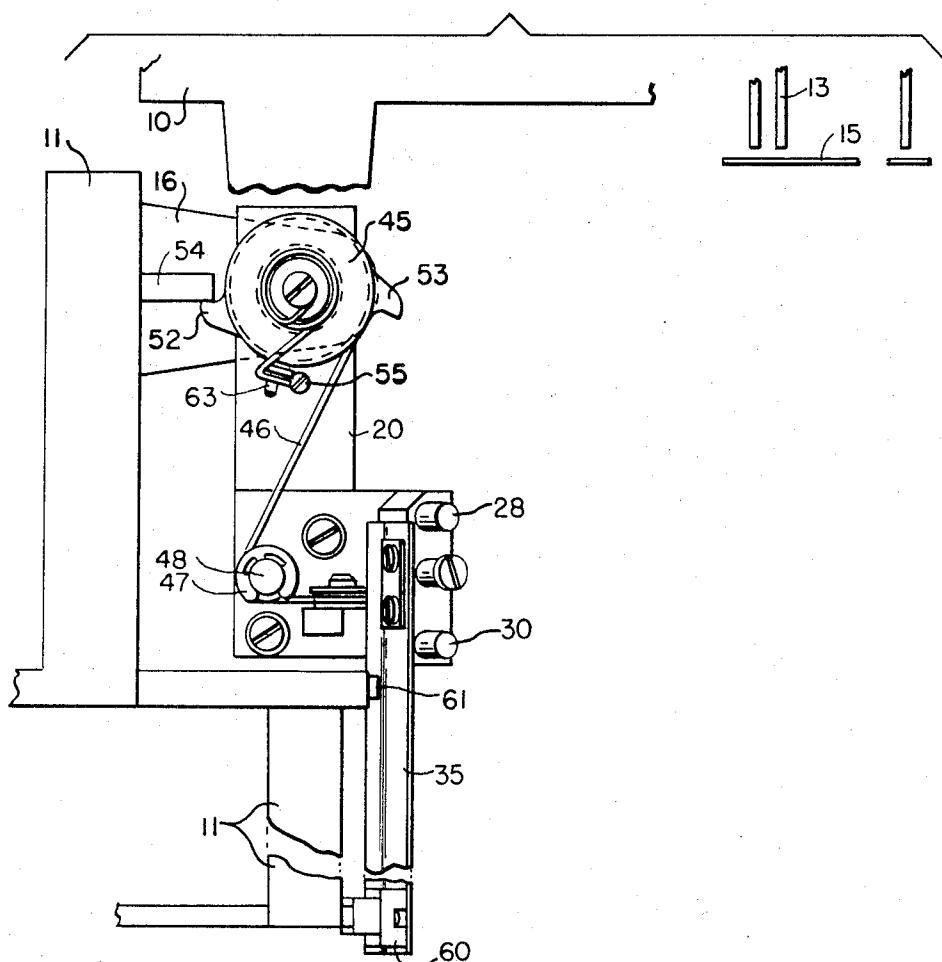


FIG. 7

INVENTOR
HAROLD E. HEPP

BY

Louis A. Kline
Willett Hawk, Jr.
Geo. J. Muchenthaler
HIS ATTORNEYS

PATENTED DEC 22 1970

3,548,746

SHEET 4 OF 4

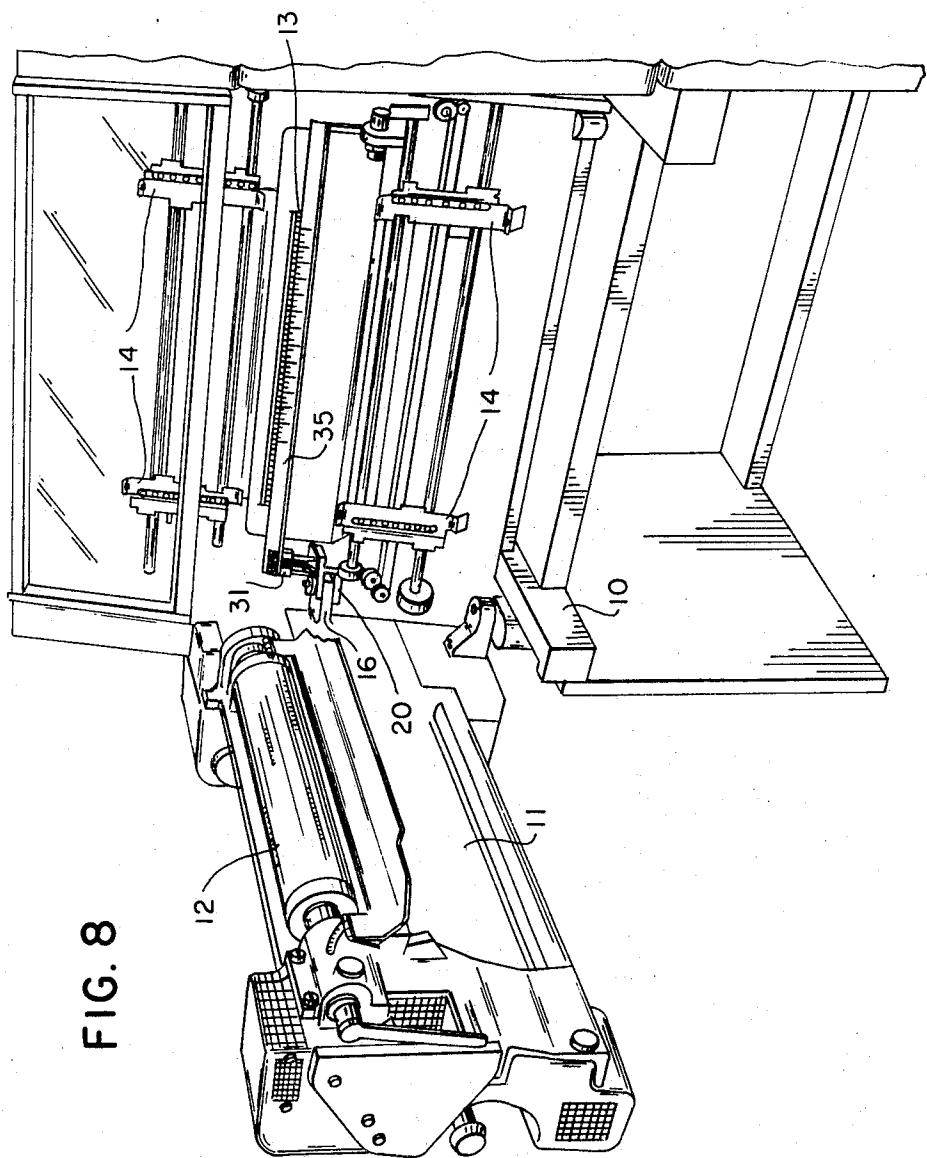


FIG. 8

INVENTOR
HAROLD E. HEPP

BY

*Louis A. Klein
Wilbert Hawk, Jr.
Geo. J. Muckenthaler*
HIS ATTORNEYS

WEB POSITIONING MEANS AND ALIGNING MEANS IN HIGH SPEED PRINTING MACHINES

BACKGROUND OF THE INVENTION

The advent of the higher speed printing machines has necessitated the use of mechanism and devices which more accurately control the positioning and advancement of the paper or other record material when it travels past the printing station. Improved tractor mechanisms and control thereof are responsible for carrying the paper or like record material at these higher speeds while at the same time maintaining the paper under proper tension for optimum printing of the characters.

In addition to proper tensioning of the paper, it is important that the paper be correctly positioned both horizontally and vertically in place when it is loaded into the machine, and for maintaining this attitude under operating conditions. In this regard, the prior art shows a movable paper-positioning scale supported from a yoke mechanism in such manner that movement of the yoke and the printing element, from a retracted position toward a printing station, automatically withdraws the scale from the printing station, so that the scale cannot interfere with the printing element — such structure being shown and described in U.S. Pat. No. 3,288,264, issued Nov. 29, 1966, on the application of Samuel Gabrielson, Sr., and Joseph Konkel. The scale and yoke mechanism is pivotally connected, so that movement of the yoke causes the scale to slide upon a guide plate from an operational printing position to a retracted position which allows access for aligning the paper. U.S. Pat. No. 3,288,264 shows one approach for providing a movable scale from one position to another for enabling the operator to horizontally and vertically align the paper when the assembly is in the retracted position.

SUMMARY OF THE INVENTION

The present invention also relates to the positioning of paper or other record material in high-speed printers, and, more particularly, to an improved guide, swingable with the typedrum, which guide is selectively movable from a paper-aligning position to a retracted position and vice versa. The paper is carried by tractor mechanisms past a printing station which includes, as a part thereof, the typedrum and the printing hammers, wherein the paper, in the usual manner, is struck by the hammers to imprint selected characters from the typedrum thereon. Following the above-mentioned desirability of maintaining the paper in proper position in its travel through the machine, the present invention includes a guide bar mechanism pivotally connected to the typedrum carrier, which, in turn, is pivotally connected to the printer frame, the guide bar per se being located in a retracted position when the printer is in operation, and being positionable in an aligning position along the typeline for checking the alignment of the paper when the typedrum is swung to a nonprinting position.

In the printing position, the typedrum casting or door is closed and latched, the printing hammers strike against the paper being carried past the drum, and the guide bar, being pivotally connected to the door, is in a downward, retracted, position out of the path of the hammers. When it is desired to load the machine or to check the alignment of the paper in the machine, the typedrum is swung open, and, by reason of the guide's being held normally with and at a certain desired elevation relative to the door (that is, at the retracted position, just noted), the guide swings at this elevation with the door. With the door in the open position, the guide can be swung therefrom and towards the typeline, and, by reason of the spring-loaded cable and pulley arrangement, the guide bar is urged upwardly by the action of the compressed spring to the typeline position, where the operator can check the horizontal and vertical alignment of the paper.

The guide bar mechanism includes a heavy bracket pivotally supporting the guide bar, which is secured to a slide block on said bracket, a spool or drum on the bracket pivot, a

cable attached to the spool and to the slide block, and detent or stop means for limiting the movement of the spool to maintain the cable-held block against a spring encircling one of the pins carrying the block. The guide bar can be swung independently from the open casting or door when it is desired to check the paper alignment, and, as the bar is swung, the spool pays out the cable and allows the compressed spring to urge the slide block and the guide bar upwardly to the typeline. Swinging of the guide bar from the typeline towards the open door winds the cable around the spool, pulls the slide block and the guide bar downwardly, and compresses the spring, the guide bar then being in the retracted position and held in place against the door. When the guide bar is held against the door (that is, adjacent and along the typedrum), in either the closed or the open door position, the guide bar is maintained in the retracted position by the cable around the spool and against the action of the spring. When the guide bar is swung away from the door, the cable unwinds from the spool, and the bar is urged upwardly by the action of the spring to the typeline alignment position. The spool has a leg engageable with a stud secured to the door, so that, with the guide bar in the alignment position and as the door is swung to the printing position, the spool is rotated to wind the cable thereon and thus pull the slide block and the guide bar downwardly to the retracted position.

An additional feature of the invention includes a fail-safe stud, secured to the door or casting, which is in near contact with an upper surface of the guide bar when the bar is in the lower, or retracted, position, so as to prevent the bar from flying upwardly into the path of the printing hammers in case of a cable failure. This stud also would prevent the guide bar from moving upwardly in case the cable became loosened at one of the attaching points or if it became unduly stretched, which would allow the bar to move under spring urging into the path of the hammers.

In line with the above discussion, the principal object of the present invention is to provide an improved alignment guide for the record material in a high-speed printer.

A further object of the present invention is to provide a retractable columnar guide which swings away to allow free and unobstructed loading of paper into a printer.

An additional object of the present invention is to provide a guide bar separately swingable away from a supporting member to an upward position for determining alignment of paper in a printing machine, and retractable to a lower position when the supporting member is swung into position for a printing operation.

Additional advantages and features of the present invention will become apparent and fully understood from a reading of the following description taken together with the annexed drawings, in which:

FIG. 1 is a plan view of a part of a high-speed printer incorporating the device of the present invention, showing the guide in position for aligning the record material and showing diagrammatically a fragmentary part of the typedrum in the open position;

FIG. 2 is a view in front elevation of the guide structure shown in FIG. 1;

FIG. 3 is a view in right side elevation of the guide structure shown in FIGS. 1 and 2;

FIG. 4 is a plan view similar to FIG. 1 but showing the typedrum casting swung into position for a printing operation;

FIG. 5 is a view similar to FIG. 2 but taken along the line 5-5 of FIG. 4, and showing the guide in the retracted position, the typedrum being omitted for clarity;

FIG. 6 is a right side view of the typedrum and the guide structure in position for a printing operation;

FIG. 7 is a plan view similar to FIGS. 1 and 4 but showing the typedrum casting and the guide bar swung to an open, or nonprinting, position relative to the typeline; and

FIG. 8 is a perspective view of a portion of the printer showing the typedrum casting swung to an open or nonprinting position and showing the guide bar in an aligning position.

Referring to FIGS. 1 and 8, there is shown a portion of high-speed printer having a framework 10 swingably supporting a typeline structure including a typedrum door or casting 11 and a typedrum 12, the drum being shown at a right angle position from the line of print. A series of print hammers 13 are positioned to strike against record material 15 (not shown in FIG. 8 for clarity thereof) adjacent the drum for imprinting on the material, and tractor mechanism 14, shown in FIGS. 2 and 8, is suitably constructed and placed for advancing the record material 15 past the printing station. As is well known, the typedrum is driven at a specified r.p.m., and the selected print hammers are actuated at the precise moment to strike against the characters or type font on the drum, the characters leaving the marks or imprints on the record material 15. As mentioned above, it is desirable that the paper or other material be positioned correctly and, of course, be maintained in the desired position while the printer is operating. Business form paper may have extensive preprinted matter thereon, and a printer of the type for which the present invention is applicable adds additional information in spaces provided on the form paper. Therefore, it is extremely important that the material be correctly aligned during its travel through the printing station of the machine.

To accomplish the determination of this alignment, the present invention provides a guide mechanism which is supported from the swingable typedrum door or casting 11, having (FIGS. 1 and 2) extending laterally therefrom an arm 16, through which is a bore 17 for carrying a pivot pin 18. A set screw 19 is inserted through one side of the arm 16 and is engageable with the pin 18, so that the arm and the pin are in effect integral and therefore move as one unit. A Y-shaped support member 20 is rotatably borne by the pivot pin 18, and the pin 18 and the member 20 also carry, by means of the smaller diameter of the upper portion of the pin, a spool or reel 45, which will be described later.

Secured to the top surface of the support 20, by means of screws 25, is a plate 26, which has a rear portion 27 (FIG. 3) directed downwardly at approximately 15° from such surface (FIG. 3). Secured to the portion 27 is a pair of guide studs 28 and 30, directed upwardly, but normal to the portion 27, on which a slide block 31 rides. The block 31 itself has three bores therein, two of which slidably receive the studs 28 and 30, and the third of which freely receives a limit stud 29 likewise secured to the portion 27—the overall arrangement being such that the block can be reciprocatively carried a precise extent in an up-and-down direction for purposes to be described later.

A guide bar 35 is secured at one end thereof to the face of the slide block 31 by means of screws 36 and a clamp 37, the bar extending laterally across the machine when in the typeline-alignment-checking position. The bar 35 is angle-shaped (as seen from its end in FIGS. 3 and 6) and is presented on a plane parallel with the guide studs 28 and 30 and in the direction of travel of the record material 15, so as to be engageable with such material when positioned for checking alignment. As seen in FIG. 2, a spring 38 surrounds the stud 29 and exerts a force on the block 31, at a central recessed portion thereof, to urge the block upwardly on the guide studs 28 and 30. Of course, the spring 38 is compressible to allow lowering of the block 31 on the studs 28 and 30 when the guide bar is retracted from the typeline location.

The spool 45 is rotatably carried on the smaller diameter upper portion of the pin 18. Connected to the spool 45 is one end of a wire cable 46, which is trained therefrom around a pulley 47 journaled on a stud 48 on the plate 26 and around a pulley 49 journaled on a bracket 50 supported from the plate 26. The other end of the cable 46 is secured to the slide block 31 by affixing to a stud 51. The spool 45 lies adjacent the top surface of the support member 20 and has outwardly projecting lugs 52 and 53, the lug 52 positioned to be engageable by a square stud 54 secured to the casting 11, and the lug 53 positioned to be engageable with a stop stud on the support member 20. From the structure just described, it can be seen

that, as the spool 45 is rotated counterclockwise, as seen in FIG. 1, the cable 46 is carried around the spool and the pulleys, and thus pulls the slide block 31 downwardly on the guide studs 28 and 30 (FIG. 5), thus compressing the spring 38. The guide bar 35 also moves downwardly with the slide block to a lower, or retracted, position.

In FIGS. 4, 5, and 6, the typeline structure is shown in position for a printing operation, the typedrum casting 11 being swung to the closed position, the guide bar 35 being in the retracted location, and the typedrum 12 being proximal the paper 15 and the print hammers 13. It is noted that the spool 45 and the stud 54 have been rotated approximately 90° in a counterclockwise direction from that shown in FIG. 1, this rotation being accomplished by the swinging of the casting and the typedrum, the engagement of the casting stud 54 with the lug 52, and the carrying of the lug with the spool around the pivot pin 18 as the typedrum is swung from the open, or nonprinting, position in FIG. 1 to the closed, or printing, position of FIG. 4. FIGS. 2 and 3 show the slide block 31 and the guide bar 35 in the upward position, there urged by the spring 38, so as to be approximately on a line with the path of the print hammers 13. In contrast, FIGS. 5 and 6 show the block 31 and the bar 35 in the downward, or retracted, position, there urged by the winding of the cable 46 around the spool 45 as the spool is rotated by the stud 54, so as to be on a plane below the path of operation of the print hammers 13. FIG. 5 also shows the spring 38 being compressed when the bar 35 is so retracted for a printing operation. The overall movement of the typedrum casting and the guide bar in relation to the paper and the printing hammers is best seen from the positions of these parts in FIGS. 1, 4, and 7, where FIG. 4 shows the closed, or printing, position of the typedrum, FIG. 1 shows the nonprinting position of the typedrum but with the guide bar in the paper alignment position, and FIG. 7 shows the open position of the typedrum and the guide bar.

Secured to a boss 59 (FIG. 1) on the outer, or swinging, end of the typedrum casting 11 is a permanent magnet 60, which, when the guide bar 35 is positioned along the typedrum casting, automatically holds or retains the bar to the casting. Unless the guide bar is manually pulled away from the casting, the bar will thus swing with it, which is a safety feature to prevent uncontrolled swinging of the guide bar. An additional safety feature includes an elongated stud 61 (FIG. 6), secured to the typedrum casting 11 adjacent the left end of the drum 12 (FIG. 4), which is in near contact with the upper surface of the short leg of the guide bar 35 when the casting and the bar are in proximal position. This is a fail-safe feature which prevents the guide bar from flying upwardly by the urging of the spring 38, in case the cable 46 should let loose or break, into the path of the print hammers when the typeline structure is in the printing position. An additional feature is the inclusion of a torsion spring 62 having one end connected to a stud 63 on the spool 45 (FIGS. 1 and 4), the spring being wrapped around the upper reduced diameter portion of the pin 18, and secured at its other end to the upper end of the pin by a screw 64. The spring 62 tends to turn the spool counterclockwise, so as to maintain the cable 46 taut when the guide bar 35 is manually depressed and the slide block 31 moves downwardly against the spring 38, as best seen in FIG. 5.

In the operation of the device, assume that the typeline structure is in the closed, or printing, position, as seen in FIG. 4, and either it is desired to check the alignment of the paper traveling through the machine or it is desired to reload paper within the machine. The typedrum casting 11, with the guide bar mechanism held thereto, is first swung to the left, or open, position, as seen in FIG. 7, it being noted that the guide bar 35 is completely out of the way and away from the hammers 13, so that the machine can be reloaded with the paper. As seen in FIG. 1, the typedrum 12 is of course likewise away from the hammers at such time. To determine alignment of the paper, the guide bar 35 is next manually swung from the casting 11 (see also FIG. 8) and against the paper 15 at the typeline position, the bar moving automatically upwardly at the time of

such swinging by reason of the cable 46 paying out from the spool 45 and also the spring 38 urging the bar upwardly to the line of type. The pivot pin 18 does not rotate during this swinging movement of the guide bar 35 because, it is remembered, the pin is rotationally fixed in relation to the casting arm 16.

The paper is then correctly aligned by viewing along the guide bar 35 as to both horizontal and columnar alignment, the bar carrying suitable scribed lines 65 (FIGS. 2 and 8). Finally, when the material 15 is correctly positioned, the typedrum casting 11 is swung to the closed position (FIG. 4). This swinging movement rotates the pivot pin 18 and the spool 45 counterclockwise, by reason of engagement of the casting stud 54 with the spool lug 52, and the cable is wound around the spool to draw the guide bar 35 downwardly and out of the path of the print hammers 13 in readiness for a printing operation.

It is thus seen that herein shown and described is an alignment guide mechanism which includes all the advantages and features mentioned above. While only one embodiment has been disclosed, variations on the above may, of course, occur to those skilled in the art, so it is contemplated that all such variations having these features are within the scope of the invention.

I claim:

1. A guide mechanism for aligning record material in a business machine having a typeline casting and typedrum swingable from a printing position to a nonprinting position, said mechanism including:

a support means pivotally connected to the casting;
a guide element carried on said support means; and
means for moving and controlling movement of said guide element upon swinging thereof from a retracted position to an alignment position, said moving and controlling means including limit elements on the support means and on the casting engageable with respect to each other whereby said guide element is movable independently of said casting and typedrum when they are swung to the nonprinting position.

2. A guide mechanism in accordance with claim 1 wherein said guide element includes means slidably biased from said support means in a direction urging said element from the retracted position to the alignment position.

3. A guide mechanism in accordance with claim 2 wherein said means for moving includes cable means connected with said support means and with said guide element, and responsive in a direction opposite to that of the biasing of the guide element, thereby permitting controlled movement of said element from the retracted position to the alignment position.

4. A guide mechanism for aligning record material in a business machine having a typeline casting and typedrum swingable from a printing position to a nonprinting position, said mechanism including:

support means connected to the casting;
a guide element carried on said support means;
yielding means for urging said guide element from a retracted position to an alignment position; and
means for returning said guide element from the alignment position to the retracted position, and including stop means on the support means and on the casting engageable with respect to each other and responsive in a direction opposite to that of the urging means whereby said guide element is movable independently of said casting and typedrum when they are swung from the nonprinting position to the printing position.

5. A guide mechanism in accordance with claim 4 wherein said yielding means is a spring positioned between said support means and said guide element for urging said element to the alignment position.

6. A guide mechanism in accordance with claim 4 wherein said return means is a cable connected between said support means and said guide element for drawing said element to the retracted position.

7. A columnar guide mechanism for determining the alignment of record material in a high-speed printer having a typedrum swingable to an open position, said mechanism including:

5 a support member pivotally connected to the printer;
slide means on said support member;
a guide bar secured to said slide means and adaptable to be moved from a retracted position to an alignment position when said typedrum is in the open position;
10 a spool rotatably mounted on the support member;
means connecting said slide means and said spool; and
means on said slide means biasing said guide bar to the alignment position, said connecting means permitting the guide bar to move from the retracted position to the alignment position by reason of movement of the connecting means about said spool in response to said biasing means as the guide bar is swung from the typedrum open position.

20 8. A columnar guide mechanism in accordance with claim 7 wherein said slide means includes a plurality of guide studs and a block slidable thereon for carrying the guide bar from the retracted position to the alignment position.

25 9. A columnar guide mechanism in accordance with claim 8 including spring means for urging the slide block and the guide bar to the alignment position.

10. In a high-speed printer having a frame, a typeline casting swingable on the frame from a closed position for printing to an open nonprinting position, and guide means on the casting 30 for determining alignment of record material in said printer, said guide means including:

a support member pivotally connected with said casting and swingable therewith;
a guide stud secured to the support member;
35 a slide block reciprocatively carried on said guide stud;
a guide bar affixed to said slide block and extending laterally therefrom;
a spool carried on the support member and adapted to pivot with said casting; and

40 a cable connected to said spool and to said slide block permitting controlled movement of the guide bar into position for aligning the record material in the casting-open position, and for drawing said slide block and guide bar from the aligning position to a nonaligning position as said casting is swung to the closed position.

11. In a printer in accordance with claim 10 wherein said spool includes lug means engageable with said casting for rotating said spool and thereby drawing the guide bar to the nonalignment position as said casting is swung to the closed position.

50 12. In a printer in accordance with claim 10 including resilient means associated with said guide stud for urging said guide bar toward the record-material-aligning position.

13. A guide mechanism for aligning paper in a data-recording machine having a frame, a typeline casting on the frame including a typedrum casting swingable from a printing position to a nonprinting position, and a plurality of type hammers strikable against said typedrum in the printing position thereof, said mechanism including:

55 a support member pivotally connected with said casting for swinging therewith;
a plurality of guide studs secured to said support member, a slide block on said guide studs adaptable to move in an up-and-down direction thereon;
a guide bar secured to said slide block and extending laterally across the machine in a paper-aligning position;
a spool journaled on said support member, said spool having thereon a lug engageable with said casting for controlled rotation of the spool; and
a cable secured to said spool and to said slide block for drawing said block and said guide bar downwardly from the aligning position in response to the swinging of the typedrum casting from its nonprinting position to printing position.

14. A guide mechanism in accordance with claim 13 including a spring for urging said guide bar upwardly into the paper alignment position when said casting is in its nonprinting position.

15. A guide mechanism in accordance with claim 13 including stud means secured to said casting for preventing upward movement of said guide bar when the typedrum casting is in the printing position.

16. A guide mechanism in accordance with claim 13 including retaining means on said casting engageable with the free end of said guide bar for holding said bar against said casting when in its printing position.

17. A guide mechanism in accordance with claim 16 wherein said retaining means is effective for removably holding said guide bar against said casting when in its nonprinting position.

18. A guide mechanism for aligning record material in a high-speed printer having a typeline casting swingable from a printing position to a nonprinting position, and including:

an arm projecting from said casting;

10

15

20

25

30

35

40

45

50

55

60

65

70

75

a pivot pin connected to swing with said arm;
 a support member rotatably connected with said arm;
 a plurality of guide studs secured to said support member and extending upwardly therefrom;
 5 a spring-loaded slide block reciprocatively movable in an up-and-down direction on said guide studs;
 an angle-shaped guide bar affixed to said slide block and extending across the printer in a material-alignment position thereof;
 a spool journaled on said pivot pin and adapted to be rotatable with said member and by said casting; and
 a cable secured to said spool and to said slide block permitting said slide block and guide bar to move upwardly to the alignment position as said support member is rotated independently from said casting.

19. A guide mechanism in accordance with claim 18 including a torsion spring around said pivot pin adapted to bias said spool in one direction and maintain said cable in a taut condition.