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Publication number:

**0 111 667
B1**

12

EUROPEAN PATENT SPECIFICATION

45 Date of publication of patent specification: 04.01.89

51 Int. Cl.⁴: B 41 J 13/00, B 41 J 13/22

21 Application number: 83110303.1

22 Date of filing: 17.10.83

54 High speed printer or the like.

38 Priority: 20.12.82 US 451650

43 Date of publication of application:
27.06.84 Bulletin 84/26

45 Publication of the grant of the patent:
04.01.89 Bulletin 89/01

84 Designated Contracting States:
DE FR GB IT

58 References cited:
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CH-A- 493 889
FR-A-1 428 363
GB-A-1 406 482
US-A-4 030 588
US-A-4 030 588
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Courier Press, Leamington Spa, England.

EP 0 111 667 B1

Description

This invention relates generally to printing or scanning systems and more particularly to such systems in which the movement of a printing or scanning carrier is coordinated with the rotation of a document holding rotatable drum.

The advent of low cost home computers, small office computers and word processing equipment has led to a great deal of interest in decreasing the size and cost and increasing the functions of printers used as output devices for these data processing and office products. There has also been a requirement for scanning devices such as those used in facsimile systems to encode for storage or communicate previously noncoded information derived from existing documents.

For both the printer and scanner environments some type of automatic paper handling capability greatly increases the function of this equipment. Further, any increase in speed that is possible as a result of a particular design inherently increases the function of the input or output device.

The most conventional sheet printers generally include a platen, in the form of a cylindrical drum having an horizontal axis, upon which the print medium (e.g. sheet of paper) is partially or wholly rolled, and a print head, mounted on a carrier which may be moved in both directions along a rectilinear path extending parallelly and close to a drum generatrix. While the drum remains unmoved, the carrier is appropriately controlled and moved from left to right to print a line of text. Then the drum is rotated by one increment corresponding to the desired distance between lines of text, while the carrier is quickly moved from right to left until its start position where it is then ready to print another line of text.

It will be easily understood that the step by step movement of the drum, and the go and forth movement of the carrier do not permit very fast printing operation. Moreover, since the movements of both the drum and the carrier are of different nature and magnitude and do not occur at the same time, complex timing and driving devices must be provided to obtain quick and appropriate operations of these members. Such an arrangement does not lend itself well to the use of a single motor to drive both members.

Document FR—A—1 428 363 discloses a printer which comprises

- a substantially cylindrical drum rotatable about its longitudinal axis,
- means to hold a substantially rectangular print medium around said drum, in a skewed manner with respect to the generatrices of said drum,
- a transducing head mounted for movement along a rectilinear path extending parallel and close to a generatrix of said drum, to print or scan characters on said medium, and
- motor means to simultaneously and continuously rotate said drum and move said head in a first direction from a first point to a second point of said path, the skewed position of said medium, the position of said first and second points and

both the movements of said drum and of said head being such that said head describes a print line which is substantially parallel to one edge of said medium for each revolution of said drum.

The present invention relates to a low cost, compact, high speed printer or scanner which overcomes the drawbacks of the prior art devices as stated above. Moreover the system of the invention requires only a single motor for providing both the print head printing and indexing movements, and the medium loading and unloading operations.

Accordingly, a highly efficient and economical high speed printer or scanner is provided comprising a cartridge for retaining a stack of paper sheets to be loaded, one-at-a-time, onto a rotatable drum for printing or scanning. The sheets in the cartridge are so oriented as to present their lateral edges (the longer ones generally) parallel to the drum axis. Feed rollers are provided for loading the top sheet of paper out of the cartridge in a direction parallel to the top and bottom edges of the sheet and into engagement with a plurality of paper clamps on the drum. When loaded onto the drum the paper is skewed relative to the longitudinal axis of the drum. During rotation of the drum with the paper retained thereon a carrier having a print head or optical scanning transducer moves continuously from one end of the drum toward the other end of the drum in a plane substantially parallel to the axis of the drum. The axial movement of the carrier relative to the drum rotation is such that the transducer generally describes a spiral line over the paper and is timed such that in each rotation of the drum the carrier has escaped a distance equal to the desired distance between printed lines of text and is therefore automatically and properly positioned to start printing or scanning the following line of text. Thus, the printer of this invention is capable of printing a plurality of lines of text parallel to each other and also parallel to the top and bottom edges of a rectangular sheet of paper while the drum is continuously rotating and the transducer is moving from one end of the drum to the other. In either a printing or scanning environment it is possible to provide a print head or scanning head having the ability to print or scan a wide enough band in each rotation of the drum such that all points on the page are addressable. In the preferred embodiment a lead screw which provides escapement of the carrier is belt or gear driven from the drum so that a single motor can drive both the carrier and the drum.

After a printing or scanning operation has taken place relative to the paper clamped to the drum, the system is cycled to feed the paper off of the drum into engagement with a plurality of pairs of exit rollers which pull the paper out of the clamps on the drum and transport the paper to a stacking area built into the paper cartridge.

The foregoing and other objects, features, extensions, and advantages of the invention will be apparent from the following more particular description of preferred embodiment of the

invention, as illustrated in the accompanying drawings.

FIG. 1 is a front perspective view of the printer of this invention.

FIG. 2 is a rear perspective view of the printer of this invention.

FIG. 3 is a side view of a portion of the printer of this invention which shows the paper path during loading and exiting of paper onto and off of the drum.

FIG. 4 is a view of the drum and a sheet of paper clamped thereon showing the skewed orientation of the paper relative to the drum.

FIG. 5 shows the paper cartridge used with the printer of this invention.

FIGS. 6 and 7 show different positions of the clutch latching mechanisms of the printer of this invention.

FIGS. 8 and 9 are views of the drum paper clamp opening mechanism in different positions.

FIG. 10 is a view of the paper aligning gate actuation mechanism of the printer of this invention.

Referring now to FIG. 1 a front perspective view of the printer or scanning system of this invention is shown. A motor 1 capable of electronic control for operation at various speeds in both directions, such as a D.C. motor, is rigidly mounted to a left frame plate 2. A motor shaft position sensing assembly 3, such as a capacitive angular position sensing transducer, is mounted on one end of motor 1 to deliver to a system of control electronics (not shown) accurate information relative to the angular position and number of turns of the shaft 4 of motor 1. At the other end of the shaft of motor 1 is a motor drive pulley 5 which, in the preferred embodiment, has timing teeth to drive a timing belt 6 with no slippage. Throughout the remainder of the description of this invention all belts and pulleys have timing teeth and it will be assumed that no slippage occurs relative to the belts and pulleys.

Belt 6 drives a document drum drive pulley 7. Pulley 7 is pinned to a document drum drive shaft 8, and shaft 8 is pinned to a document drum 9 so that any angular movement of motor shaft 4 causes corresponding angular movement, according to the ratio of the diameters of pulleys 5 and 7, of drum 9.

Also pinned to shaft 8 is a carrier lead screw pulley (not shown) which drives carrier lead screw belt 10 and carrier lead screw pulley 11. A carrier lead screw 12 is pinned to pulley 11 so that any angular movement of motor shaft 4 causes angular movement of lead screw 12 according to the ratios of the diameters of the two pairs of pulleys between motor shaft 4 and lead screw 12.

A lead screw follower 13 is associated with the lead screw 12 to move left or right according to the rotation of lead screw 12. Lead screw follower 13 is rigidly attached to a printing or scanning carrier 14 to provide left or right movement of carrier 14 along frame rails 15 and 16 in accordance with lead screw motion.

When the system of this invention is used a

printing system, carrier 14 has mounted thereon a printing transducer 17 which may be selected from a number of printing technologies. Such printing technologies may include, but are not limited to, drop-on-demand ink jet printing, wire matrix printing, resistive, ribbon printing, and thermal printing. If the system of this invention is used in an image scanning system to scan and digitally encode previously generated images, an appropriate light source and light sensitive detector assembly would be mounted on carrier 14 for translation relative to an intelligence bearing document mounted on drum 9. It will be understood by those skilled in the art that the choice of appropriate printing or scanning transducers is not a part of the paper handling system of this invention.

A load dog clutch assembly 18 mounted concentric with and near the right end of drum shaft 8 is engageable with shaft 8 to turn gears 19 and 20 which rotate drive rollers to drive a sheet of paper to be loaded onto drum 9, as will be explained in detail hereinafter. An exit dog clutch assembly 21 is mounted concentric with shaft 8 just to the left of dog clutch assembly 18. The dog clutch assembly 21 is intermittently engaged relative to shaft 8 to drive belt 22 which turns paper exit rollers 23 for driving paper out of the system from drum 9, as will be explained in detail hereinafter.

With respect to both of the dog clutches 18 and 21, the details of which will be understood by those skilled in the art, the clutches are engageable to turn gear 19 and to drive belt 22, respectively, one revolution after having been tripped and during counterclockwise rotation of shaft 8 relative to the right end of FIG. 1. Shaft 8 has mounted thereon single dog teeth associated with each of dog clutches 18 and 21.

A load clutch latch lever 24 associated with dog clutch assembly 18 and an exit clutch latch lever 25 associated with dog clutch assembly 21 are separately pivotable about a shaft 26. Latch levers 24 and 25 are engaged and tripped by load clutch trip lever 27 and exit clutch trip lever 28, as will be described in more detail hereinafter. Trip levers 27 and 28 are mounted for movement along with movement of carrier 14.

A pulley 29 is selectively engageable to shaft 8 through a spring clutch 30. The application of a radial force to the outside of spring clutch 30 toward the center of shaft 8 causes engagement of spring clutch 30 which drives pulley 29, belt 31, and pulley 32. A rotatable auxiliary shaft 33 is pinned to pulley 32. Pulley 34 is axially slidable along auxiliary shaft 33 but is angularly keyed to shaft 33. Thus, engagement of spring clutch 30 during rotation of shaft 8 causes rotation of shaft 33, pulley 34, belt 35, and pulley 36. Pulley 36 has an axle (not shown) on carrier 14 and may be used to selectively impart rotational motion to carrier 14 for an auxiliary operation, for example escapement of an inked printing ribbon. A lever connected to a solenoid (not shown) may be used to selectively engage clutch 30.

Also shown in FIG. 1 is a partial view of a paper

cartridge 40 which is shown and described in greater detail hereinafter.

The rear perspective view of the system of this invention shown in FIG. 2 shows many of the aforementioned components of the system as were described relative to FIG. 1. For the purpose of clarity the same reference numerals are used for the elements described relative to FIG. 1.

In FIG. 2 a set of feed rollers 42 are shown which are pinned to a feed roller shaft 43. The feed roller shaft 43 is pinned to gear 20 so that rotation of rollers 42 occurs during the time of engagement of the load clutch 18, FIG. 1. A paper guide 41 is shown in FIG. 2, spaced from drum 9 by a suitable gap to maintain a document loaded onto drum 9 substantially in contact with the drum during the arc of the rotation enclosed by guide 41.

Referring now to FIG. 4 a sheet of paper 50 is shown clamped onto drum 9 by a plurality of spring loaded clamps 51. In their normal position, clamps 51 hold an edge of paper 50 onto the surface of drum 9. Clamps 51 may be simultaneously opened by rotation of a torque bar which runs the length of drum 9, inside the drum. An end of the torque bar is shown in FIG. 1 and is denoted by reference numeral 97.

At the appropriate time in each paper loading cycle an actuation mechanism which will be described in more detail hereinafter is moved by a pin extending from gear 19 to engage the torque bar to rotate and provide for momentary opening of clamps 51.

FIG. 4 shows, in an exaggerated manner, the skewed relationship of the edges of the rectangular sheet of paper 50 relative to the axis of drum 9. Carrier 14 is also shown schematically to be representative of any choice of printing or scanning technology.

FIG. 5 shows a more detailed view of the paper cartridge 40. Cartridge 40 is known in the paper handling art as a "corner buckling" cartridge in view of the paper corner retaining clips 44 which normally retain the paper in the cartridge. A spring loaded plate 45 upwardly biases the stack of papers 55. Clockwise engagement of feed rollers 42, FIG. 3, with the top sheet of papers 55 causes the exposed edge of the top sheet of sheets 55 to buckle upwardly as the sheet is driven out of the cartridge until the two corners release themselves from the retaining clips 44. After these corners are released the top sheet can continue to be fed onto drum 9 by further movement of feed rollers 42. Cartridge 40 also includes a paper stacking tray 47 and associated paper stacking extension rack 48 on which sheets of paper are supported after they are exited from the printing or scanning operation that occurs while the paper is clamped on drum 9. Cartridge 40 is so designed and mounted as to present the sheets of paper in a skewed way corresponding substantially to the skew of the sheet on the drum.

Referring now to FIGS. 1, 2, and 3 the paper handling paths of the system are described. Looking from the right end of the drum back toward the left, counterclockwise rotation of drum 9

causes the print carrier 14 to traverse toward its first, rightmost, limit. Just before it reaches its rightmost limit feed rollers 42 are engaged to rotate one revolution in a clockwise direction. This drives the top sheet of paper in cartridge 40 out of cartridge 40 toward the drum as indicated by arrow 60 (FIG. 3). At this time, paper clamps 51 and the leading edge of the paper (not shown) being driven out of cartridge 40 are converging. At this convergence paper clamps 51 are opened against their normally self-closing spring tension. When this convergence has continued to the point that the leading edge of the paper is positioned underneath the opened leading edges of paper clamps 51, rotation of drum 9 is reversed into a clockwise direction. Paper clamps 51 close upon this reversal and the paper is now engaged by paper clamps 51 to be wrapped around drum 9 and rotate in a clockwise direction as viewed from the nearest end of drum 9 shown in FIGS. 1—2. During clockwise rotation of drum 9 carrier 14 traverses to the left (when viewed from FIG. 1, and away from the viewer with respect to FIG. 3), first to a joint where the printing or scanning operation will start, then to a second, leftmost, limit, where the printing or scanning operation ends.

When the printing or scanning operations have been completed relative to the sheet of paper (not shown) mounted on drum 9, the direction of rotation of drum 9 is again reversed into the counterclockwise direction. This moves the trailing edge of the paper in the direction indicated by arrow 61, FIG. 3. Eventually this trailing edge of paper is engaged by the pairs of exit rollers 23 which rotate at a speed slightly faster than the surface linear velocity of drum 9. This speed differential causes the paper to be pulled out of clamps 51 without necessitating the reopening of clamps 51 by their opening mechanism. The paper continues to be moved through exit rollers 23 in the direction indicated by arrows 62 until the paper is stacked on the stacking tray 47 of cartridge 40.

For a more particular description of the operation of loading a sheet of paper onto drum 9, refer to FIG. 6 and note the engagement of the ramp end of load clutch trip lever 27 relative to load clutch latch lever 24. A slight bit more rightward movement of carrier 14 and, therefore, trip lever 27 causes enough counterclockwise rotation of load clutch latch lever 24 (as viewed in FIG. 1) to trip the load dog clutch assembly 18.

Referring back to FIG. 1, when the load dog clutch 18 has been tripped, the engagement of the single dog tooth in that clutch assembly causes counterclockwise rotation of gear 19 and, therefore, clockwise rotation of gear 20. In FIG. 2 it will be noted that the clockwise rotation of gear 20 provides the clockwise rotation of driver rollers 42 to drive the top page of paper out of cartridge 40 toward the drum 9 as described relative to FIG. 3. Referring to FIGS. 8 and 9, during this counterclockwise rotation of gear 19 and drum 9, a pin 92 on gear 19 engages lever 93. Lever 93 is mounted

to shaft 94 and this engagement of pin 92 relative to lever 93 during counterclockwise rotation of gear 19 causes a clockwise rotation of shaft 94. Another lever 95 mounted to shaft 94 can now engage lever 96 which is pivotable relative to the right end of drum 9. The other end of lever 96 from that which engages lever 95 is caused to rotate in a clockwise arc and engages tab 97 on torque bar 98. Torque bar 98 runs the length of drum 9 and has a plate 99 mounted thereto which engages paper clamps 51 to open paper clamps 51 upon counterclockwise rotation of bar 98.

At this time drum 9 has rotated counterclockwise and paper clamps 51 are open. A sheet of paper has been driven by feed rollers 42 far enough to have the leading edge thereof positioned under paper clamps 51. The rotation of drum 9 is now reversed so that drum 9 rotates clockwise as viewed from the right end of FIG. 1. The sheet of paper is now clamped onto drum 9.

Clockwise rotation of drum 9 also reverses the direction of lead screw 12 and causes carrier 14 to traverse toward the left end of the paper handling system shown in FIG. 1. Referring to FIG. 6, during the paper loading operation the assembly of trip levers 27 and 28 have progressed as far right as possible during operation of the paper handling system. At the end of paper loading the left side of trip lever 27 was positioned just to the right of latch lever 24.

It will be noted that both trip levers 27 and 28 are rotatable about pins 101 and 102, respectively. However, tabs 103 and 104 on trip levers 27 and 28, respectively, interfere with the trip lever support 105 such that only clockwise rotation of trip lever 27 is possible and only counterclockwise rotation of trip lever 28 is possible. In the absence of any other forces to rotate trip levers 27 and 28, spring 106 biases both trip levers to the positions shown in FIG. 6.

Thus, referring to FIG. 7, trip lever 27 rotates clockwise as it passes the load clutch latch lever 24 and does not trip, this latch lever during clockwise rotation of drum 9 with carrier 14 traversing to the left. As the exit clutch trip lever 28 rides into contact with the exit clutch latch lever 25, this exit clutch latch lever is tripped relative to the exit dog clutch 21 to arm clutch 21 for paper unloading when drum rotation reverses again to a counterclockwise direction. However, it will be remembered that both of the dog clutches 21 and 18 engage for driving the pulley or gear, respectively, connected thereto only when drum 9 is rotated in a counterclockwise direction and only for one revolution after these clutches have been tripped.

With the paper loaded, the drum rotating clockwise and the exit clutch having been tripped as described above relative to FIG. 7, carrier 14 continues to traverse to the left during which time printing or scanning operations can occur. It will be understood by those skilled in the art that relatively high speed printing or scanning can take place because the drum is rotating continuously, without having to reverse direction, in

a high speed manner relative to carrier 14 and the printing or scanning element 17 rigidly attached thereto, which also move continuously. Further, in view of the skewed mounting of the sheet of paper on drum 9, the carrier 14 can be continuously indexed with any requirement for movement only between printed lines. Various printing technologies can be employed such as resistive ribbon printing, wire matrix printing, and drop-on-demand ink jet printing, as examples. If it is necessary to provide a means for feeding a ribbon in printing process, clutch 30 can be engaged to rotate pulley 29 relative to rotation of shaft 8 which, in turn, causes rotation of pulley 32, shaft 33, and pulleys 34. Belt 35 then transfers this rotation to pulley 36 mounted on carrier 14 which can be connected to a ribbon transport mechanism as will be understood by those skilled in the art. Clutch 30 can be an overrunning spring clutch to cause rotation of shaft 33 at any time that shaft 8 and drum 9 are rotated in a clockwise direction. Alternatively, if selective ribbon feed is desired clutch 30 can be a non-overrunning spring clutch selectively activated by an arm connected to an electromagnetic solenoid (not shown).

After the desired printing or scanning operation relative to a first side of the paper mounted on drum 9 has taken place, the paper handling system can be operated to cause the paper document to be removed from drum 9 and stacked on the stacking tray 47 of cartridge 40. An optical sensor (not shown) on carrier 14 senses the passage of the trailing edge of the document mounted on drum 9. Clockwise rotation continues for approximately one-half of a rotation more at which time the direction of drum 9 is reversed for rotation in a counterclockwise direction. This delay in reversing the direction of rotation allows the trailing edge of the paper to be positioned at the lower right quadrant of drum 9 as viewed in FIG. 3 so that counterclockwise rotation of drum 9 allows the trailing edge of the paper to travel in a direction indicated by arrows 61 instead of jamming against other components of the paper handling system when rotation of drum is reversed.

With the counterclockwise rotation of drum 9 for exiting the paper from the drum the exit clutch 21 engages to drive pulley 110 (FIG. 1), belt 22, pulley 111, and exit roller shaft 112 in counterclockwise rotation as viewed from the right end of FIG. 1. Referring to FIGS. 1—3, this rotation of the exit roller shaft 112 causes exit rollers 23 to engage the trailing edge of the paper unwrapping from drum 9 and transports the paper toward the stacking tray 47 of cartridge 40. As described above, the speed ratio of rollers 23 relative to drum 9 is such that rollers 23 pull the paper out of the paper clamps 51 of drum 9 without the necessity of reopening these spring loaded paper clamps for paper removal.

After a page of paper has been exited into the stacking tray as described immediately above, continued counterclockwise rotation of drum 9

eventually causes the load trip lever 27 to trip the load clutch latch lever 24 as described relative to FIG. 6 for loading another sheet of paper from paper cartridge 40 onto drum 9. It will be noted relative to FIG. 6 that on its way to the righthand position shown in FIG. 6 trip lever 28 rotates counterclockwise past the exit clutch latch lever 25 without tripping the latch lever.

It will also be noted that a single priority page of paper can be inserted into the rear of this paper handling system at any time immediately above the top sheet of paper in the cartridge 40 without clamping the leading edges of this page under the corner buckling clamps 44 of cartridge 40. When the next paper loading operation takes place, the page entered in this priority manner will be the page fed to drum 9 rather than the top sheet in the cartridge.

Referring to FIG. 10, at each instance of loading a sheet of paper onto drum 9, with counterclockwise rotation of the feed rollers 42 and shaft 43 (as viewed from this end of shaft 43 in FIG. 10) cam 120, pinned to shaft 43, causes a corresponding counterclockwise rotation in shaft 121 to which is connected a paper aligning gate 122. In FIG. 10, it will be noted that this counterclockwise rotation is caused by the engagement of pin 124 (on bell crank 123) with cam 120 during rotation of shaft 43. Bell crank 123 is pinned to shaft 121 and is normally biased to the position shown in FIG. 10 by spring 125. The initial position of the paper aligning gate 122 is down as shown in FIG. 10 and a plurality of tabs 127 along gate 122 are a gating surface for the front edge of a priority sheet of paper to be loaded. Tabs 127 position the leading edge of a priority sheet over the top sheet of the stack of pages retained in the cartridge 40. However, during paper loading the counterclockwise rotation of shaft 43 and the corresponding counterclockwise rotation of the paper aligning gate 122 (about one-fourth turn) removes the restraint provided by tabs 127 after their gating function has been provided, so that loading of the priority sheet can continue.

Claims

1. High speed printer or the like, comprising
 - a substantially cylindrical drum (9) rotatable about its longitudinal axis,
 - means (41, 51) to hold a substantially rectangular print medium (50) around said drum, in a skewed manner with respect to the generatrices of said drum,
 - a transducing head (17) mounted for movement along a rectilinear path extending parallel and close to a generatrix of said drum between a first and a second lateral limits, to print or scan characters on said medium, and
 - motor means (1) to simultaneously and continuously rotate said drum (9) and move said head in a first direction from a starting point corresponding to the starting point of a transducing operation, located in the vicinity of said first lateral limit, the relative movement of said drum

and said head being such that, for each revolution of said drum said head has moved a distance equal to the space between two consecutive print lines and has described one print line which is substantially parallel to one edge of said medium, in view of the skewed orientation of said medium on said drum,

clamping means (51) to hold said medium in the desired skewed manner on said drum, characterised in that said clamping means holds a lateral leading edge of said medium and extends in a skewed manner with respect to a generatrix of said drum, which corresponds to the desired skew of said medium on said drum, and in that said printer further comprises,

- unloading means for unloading said medium from said drum,

- loading means for loading a new medium onto said drum, and

- first and second means (28, 27) mechanically connected to said carrier movable with said carrier relative to said drum and along said path, said first means (28) being selectively connectable to said unloading means, for causing operation of said unloading means upon travel of said carrier substantially to said second lateral limit corresponding to the end of the printing or scanning operation, and said second means (27) being selectively connectable to said loading means for causing operation of said loading means upon travel of said carrier substantially to said first opposite, lateral limit.

2. Printer according to Claim 1, in which said head (17) is mounted on a lead screw follower (13) cooperating with a lead screw (12), said drum and said lead screw being driven by said motor means (1).

3. Printer according to Claims 1 or 2, comprising a support member (40) for holding a stack of print media, means for feeding an individual print medium from said support member onto said drum and means for withdrawing said print medium from said drum to a receiving tray (47) after completion of the transducing operation.

4. Printer according to Claims 1, 2 or 3, in which said support member (40) is so designed and mounted as to present the media in a skewed way corresponding substantially to the skew of the medium on the drum.

5. Printer according to any one of Claims 1 to 4 in which said unloading means comprise means for driving said drum in a second, reverse direction and exit means (23) for driving said medium into said receiving tray (47).

6. Printer according to any one of Claims 1 to 5 in which said loading means comprise means for driving first said drum in said second, reverse, direction, load means (42) for engaging the uppermost one of said media in said support member and driving a medium substantially tangentially towards said drum until the leading edge of said medium engages said clamping means, means (92-99) for actuating said clamping means (51), and means for driving said drum in said first direction once said leading edge has

been clamped on said drum to wind said medium around said drum.

7. Printer according to any one of Claims 1 to 6, in which said loading and unloading means comprise clutch means (18, 21) to connect said motor (1) to said load means (42) and to said exit means (23), respectively, said clutch means being selectively actuated by actuating means (27, 28) connected to said head (17), whereby actuation of said clutch means is responsive to the positioning of said head along said path.

8. Printer according to Claim 7, in which said actuating means (27, 28) are so mounted relative to said head (17) and said clutch means (18, 21) as to actuate said clutch means when said head is moved within a position of said path comprised between said starting point and said first lateral limit thus providing loading of another page before said head is moved back to said starting point, where it is ready for a transducing operation on said new page.

9. Printer according to Claim 8 in which said motor means (1) are an electrical reversible motor which is cyclically controlled first in said first direction, during which time said head is moved from said first lateral limit to said second lateral limit, then in said second direction during which time said head (17) is moved from said second lateral limit to said first lateral limit, whereby a complete back and forth cycle of rotation provides successively a medium loading operation, a transducing operation and a medium unloading operation.

10. Printer according to any one of Claims 3 to 9 in which said receiving tray (47) is a part of said support member (40).

Patentansprüche

1. Schnelldrucker oder ähnliche Vorrichtung, bestehend aus:

- einer im wesentlichen zylindrischen, sich um ihre Längsachse drehenden Trommel,

- Mitteln (41, 51), um ein im wesentlichen rechteckiges Druckaufnahmemittel (50) schräg im Verhältnis zu den Mantellinien der genannten Trommel darum zu halten,

- einem Signalumformerkopf (17), so angeordnet, dass er sich längs eines geraden Weges bewegt, der parallel zu und nahe einer Mantellinie der genannten Trommel innerhalb einer ersten und einer zweiten seitlichen Grenze läuft, um Zeichen auf das genannte Druckaufnahmemittel zu drucken oder dort zu erkennen, und

- einem Antriebsmittel (1), um gleichzeitig und kontinuierlich die genannte Trommel (9) zu drehen und den genannten Signalumformerkopf, von einem Anfangspunkt ausgehend, der dem Anfangspunkt des Signalumformvorgangs entspricht und sich in der Nähe der ersten seitlichen Grenze befindet, in eine erste Richtung zu bewegen, wobei die relative Bewegung zwischen der genannten Trommel und dem genannten Kopf derart verläuft, dass dieser Kopf für jede Drehung der Trommel um eine Strecke bewegt wird, die

dem Abstand zwischen zwei Druckzeilen entspricht, und eine Druckzeile beschrieben hat, die im Hinblick auf die schräge Anordnung der genannten Trommel im wesentlichen parallel zu einer Seite des genannten Druckaufnahmemittels verläuft,

- Klemmitteln (51), um das genannte Druckaufnahmemittel in der gewünschten schrägen Lage auf der genannten Trommel zu halten, dadurch gekennzeichnet, dass die genannten Klemmittel die Stirnseite des genannten Druckaufnahmemittels festhalten und schräg ausgerichtet sind im Verhältnis zu einer Trommelmantellinie, wodurch die gewünschte Schräglage des Druckaufnahmemittels auf der Trommel erhalten wird sowie dadurch, dass der genannte Drucker des weiteren umfasst:

- Entlademittel, um das genannte Druckaufnahmemittel von der genannten Trommel zu entfernen,

- Lademittel, um ein neues Druckaufnahmemittel auf der genannten Trommel aufzubringen, und

- ein erstes und ein zweites Mittel (28, 27), die mechanisch mit dem Träger verbunden sind und mit diesem im Verhältnis zur genannten Trommel und längs des genannten Weges verschoben werden, wobei das genannte erste Mittel (28), wenn gewünscht, mit dem genannten Entlademittel verbunden werden kann, um ein Funktionieren dieses Entlademittels zu bewirken, nachdem der genannte Träger sich im wesentlichen bis zur genannten zweiten seitlichen Grenze bewegte, was dem Ende des Druck- oder Erkennungsvorgangs entspricht, und das genannte Zweite Mittel (27), das wenn gewünscht mit dem genannten Lademittel verbunden werden kann, um dessen Funktionieren zu bewirken, nachdem der genannte Träger sich im wesentlichen bis zur genannten ersten, entgegengesetzten seitlichen Grenze bewegte.

2. Drucker nach Anspruch 1, bei dem der genannte Kopf (17) auf einem Läufer (13) angeordnet ist, der sich auf der Verstellerschraubenspinde (12) bewegt, wobei die genannte Trommel und die genannte Verstellerschraubenspinde vom genannten Antriebsmittel (1) betätigt werden.

3. Drucker nach Anspruch 1 oder 2, zu dem ein Lagerelement (40) gehört, in dem ein Stapel von Druckaufnahmemitteln angeordnet ist, sowie Mittel, um ein einzelnes Druckaufnahmemittel aus dem genannten Lagerelement zu nehmen und auf der genannten Trommel anzuordnen, und Mittel, um dieses Druckaufnahmemittel von der genannten Trommel abzunehmen und nach Durchführung des Umformvorgangs in einer Empfangschale (47) abzulegen.

4. Drucker nach Anspruch 1, 2 oder 3, bei dem das genannte Lagerelement (40) so ausgelegt und angeordnet ist, dass das Druckaufnahmemittel in einer Schräglage vorgebracht wird, die im wesentlichen der Schräglage des Druckaufnahmemittels auf der Trommel entspricht.

5. Drucker nach jedem der Ansprüche 1 bis 4, bei dem das genannte Entlademittel eine Vorrichtung umfasst, um die genannte Trommel in einer

zweiten, entgegengesetzten Richtung zu drehen und Ausziehmittel (23), um das genannte Druckaufnahmemittel in die genannte Empfangsschale (47) zu transportieren.

6. Drucker nach allen der Ansprüche 1 bis 5, bei dem das genannte Ladeelement Mittel aufweist, um die genannte Trommel zuerst in der genannten zweiten entgegengesetzten Richtung zu drehen, eine Ladevorrichtung (42), um das oberste der Druckaufnahmemittel in das genannte Lagerlement zu bringen und ein Druckaufnahmemittel im wesentlichen tangential in Richtung der genannten Trommel zu fördern, bis die Stirnseite dieses Druckaufnahmemittels in das genannte Klemmmittel geführt wird, Mittel (92—99), um das genannte Klemmmittel (51) zu betätigen, und Mittel, um die genannte Trommel in der genannten ersten Richtung zu drehen, sobald die Stirnseite festgeklemt ist, wodurch das genannte Druckaufnahmemittel auf die Trommel gebracht und auf dieser aufgewickelt wird.

7. Drucker nach allen der Ansprüche 1 bis 6, bei dem die genannten Lade- und Entlademittel Kupplungsmittel (18, 21) aufweisen, um den genannten Motor (1) jeweils mit dem genannten Lagermittel (42) und dem genannten Ausziehmittel (23) zu verbinden, wobei das genannte Kupplungsmittel gezielt von den mit dem genannten Kopf (17) verbundenen Mitteln (27, 28) betätigt werden und die Betätigung der genannten Kupplungsmittel auf die Positionierung des genannten Kopfes längs des genannten Weges anspricht.

8. Druck nach Anspruch 7, bei dem die Betätigungsmittel (27, 28) im Verhältnis zum genannten Kopf (17) und den genannten Kupplungsmitteln (18, 21) so angeordnet sind, dass sie diese Kupplungsmittel betätigen, wenn der genannte Kopf zu einer Stellung auf dem genannten Weg geführt wird, die sich zwischen dem genannten Anfangspunkt und der genannten ersten seitlichen Grenze befindet, wodurch das Laden eines anderen Blatts bewirkt wird, bevor der genannte Kopf auf den genannten Anfangspunkt zurückgebracht wird, wo er bereitsteht für einen neuen Umformvorgang mit dem genannten neuen Blatt.

9. Drucker nach Anspruch 8, bei dem das genannte Antriebsmittel (1) ein elektrischer Reversiermotor ist, der zyklisch gesteuert zuerst in der genannten ersten Richtung dreht, während der genannte Kopf (17) von der genannten ersten zur genannten zweiten seitlichen Grenze gebracht wird, und dann in der genannten zweiten Richtung, während der genannte Kopf (17) von der genannten zweiten zur genannten ersten seitlichen Grenze gebracht wird, wodurch ein vollständiger Hin- und Herlauf-Drehzyklus nacheinander einen Ladevorgang des Druckaufnahmemittels, einen Umformvorgang und einen Entladevorgang des Druckaufnahmemittels bewirkt.

10. Drucker nach allen der Ansprüche 3 bis 9, bei dem die genannte Empfangsschale (47) ein Teil des genannten Lagerlements (40) ist.

Revendications

1. Imprimante à grande vitesse ou machine similaire comprenant:

- un tambour pratiquement cylindrique (9) pouvant tourner autour de son axe longitudinal,
- des moyens (41, 51) pour maintenir un milieu d'impression pratiquement rectangulaire (50) autour dudit tambour, en biais par rapport aux génératrices dudit tambour,

- une tête de transduction (17) montée mobile sur un chemin rectiligne disposé parallèlement à et proche d'une génératrice dudit tambour entre une première et une seconde limites latérales, pour imprimer ou balayer des caractères sur ledit milieu, et

- des moyens à moteur (1) pour entraîner ledit tambour (9) en rotation de manière simultanée et continue et entraîner ladite tête dans une première direction depuis un point de départ correspondant au point de départ d'une opération de transduction, situé au voisinage de ladite première limite latérale, le mouvement relatif dudit tambour et de ladite tête étant tel que, pour chaque révolution dudit tambour, ladite tête se déplace sur une distance égale à l'espace compris entre deux lignes d'impression consécutives, en décrivant une ligne d'impression qui est pratiquement parallèle à un bord dudit milieu, au vu du biais dudit milieu sur ledit tambour,

- des moyens de maintien (51) pour maintenir ledit milieu avec le biais désiré sur ledit tambour, caractérisée en ce que lesdits moyens de maintien maintiennent un bord avant latéral dudit milieu et sont disposés en biais par rapport à une génératrice dudit tambour, ce qui correspond au biais désiré dudit milieu sur ledit tambour,

- et en ce que ladite imprimante comprend en outre:

- des moyens de déchargement pour décharger ledit milieu dudit tambour,

- des moyens de chargement pour charger un nouveau milieu sur ledit tambour, et

- des premier et second moyens (28, 27) mécaniquement raccordés audit chariot, mobiles avec ledit chariot par rapport audit tambour et sur ledit chemin, ledit premier moyen (28) pouvant être sélectivement raccordé auxdits moyens de déchargement pour provoquer le fonctionnement desdits moyens de déchargement lors de la course dudit chariot pratiquement jusqu'à ladite seconde limite latérale correspondant à la fin de l'opération d'impression ou de balayage, et ledit second moyen (27) pouvant être sélectivement raccordé auxdits moyens de chargement pour provoquer le fonctionnement desdits moyens de chargement lors de la course dudit chariot pratiquement jusqu'à ladite première limite latérale opposée.

2. Imprimante selon la revendication 1 dans laquelle ladite tête (17) est montée sur un suiveur à vis sans fin (13) coopérant avec une vis sans fin (12), ledit tambour et ladite vis sans fin étant entraînés par lesdits moyens à moteur (1).

3. Imprimante selon les revendications 1 ou 2,

comprenant un élément de support (40) pour retenir une pile de milieux d'impression, des moyens pour alimenter un milieu d'impression individuel dudit élément de support audit tambour et des moyens pour retirer ledit milieu d'impression dudit tambour et l'amener dans un bac de réception (47) après l'achèvement de l'opération de transduction.

4. Imprimante selon les revendications 1, 2 ou 3 dans laquelle ledit élément de support (40) est conçu et monté de façon à présenter le milieu avec un biais correspondant pratiquement au biais du milieu sur le tambour.

5. Imprimante selon l'une quelconque des revendications 1 à 4 dans laquelle lesdits moyens de déchargement comprennent des moyens pour entraîner ledit tambour dans une seconde direction inverse et des moyens de sortie (23) pour entraîner ledit milieu dans ledit bac de réception (47).

6. Imprimante selon l'une quelconque des revendications 1 à 5 dans laquelle lesdits moyens de chargement comprennent des moyens pour entraîner tout d'abord ledit tambour dans ladite seconde direction inverse, des moyens de chargement (42) pour solliciter le milieu supérieur desdits milieux dans ledit élément de support et pour entraîner un milieu pratiquement tangentielle-ment vers ledit tambour jusqu'à ce que le bord avant dudit milieu entre en contact avec lesdits moyens de retenue, des moyens (92, 99) pour actionner lesdits moyens de retenue (51), et des moyens pour entraîner ledit tambour dans ladite première direction une fois que ledit bord avant a été bloqué sur ledit tambour afin d'enrouler ledit milieu autour dudit tambour.

7. Imprimante selon l'une quelconque des revendications 1 à 6, dans laquelle lesdits moyens de chargement et de déchargement comprennent

des moyens d'embrayage (18, 21) pour raccorder ledit moteur (1) auxdits moyens de chargement (42) et auxdits moyens de sortie (23), respectivement, lesdits moyens d'embrayage étant sélectivement actionnés par des moyens d'actionnement (27, 28) raccordés à ladite tête (17), ce qui fait que l'actionnement desdits moyens d'embrayage est sensible au positionnement de ladite tête sur ledit chemin.

8. Imprimante selon la revendication 7 dans laquelle lesdits moyens d'actionnement (27, 28) sont montés de telle façon par rapport à ladite tête (17) et auxdits moyens d'embrayage (18, 21), qu'ils actionnent lesdits moyens d'embrayage lorsque ladite tête est entraînée dans une position sur ledit chemin comprise entre ledit point de départ et ladite première limite latérale, ce qui assure ainsi le chargement d'une autre page avant le retour de ladite tête audit point de départ où elle est prête pour une opération de transduction sur ladite nouvelle page.

9. Imprimante selon la revendication 8 dans laquelle lesdits moyens à moteur (1) sont constitués par un moteur électrique inversible qui est commandé cycliquement tout d'abord dans ladite première direction, temps pendant lequel ladite tête est entraînée de ladite première limite latérale à ladite seconde limite latérale, puis dans ladite seconde direction, temps pendant lequel ladite tête (17) est entraînée de ladite seconde limite latérale à ladite première limite latérale, ce qui fait qu'un cycle complet de rotation à va et vient assure l'exécution réussie d'une opération de chargement du milieu, de transduction et de déchargement du milieu.

10. Imprimante selon l'une quelconque des revendications 3 à 9 dans laquelle ledit bac de réception (47) constitue une partie dudit élément de support (40).

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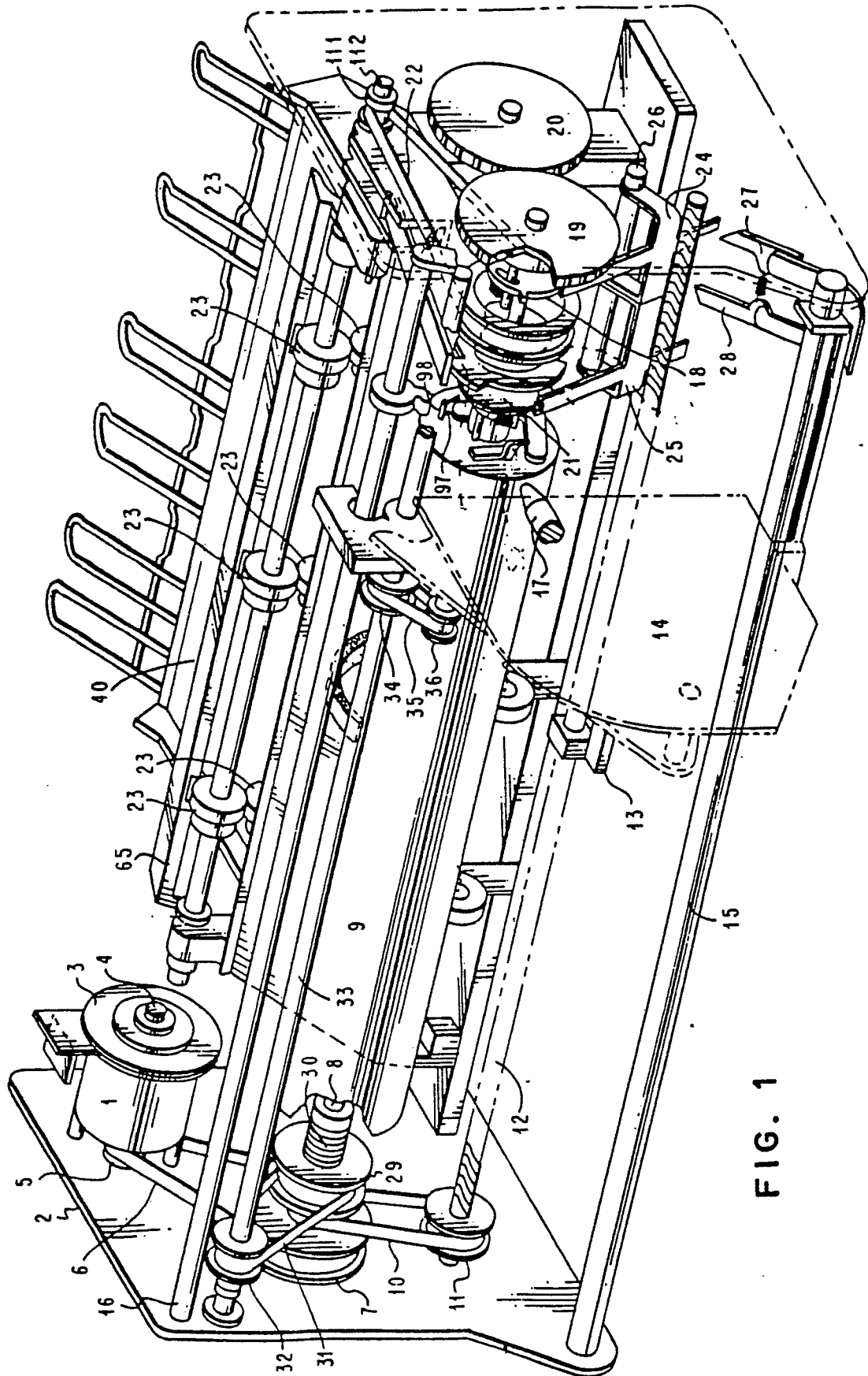


FIG. 1

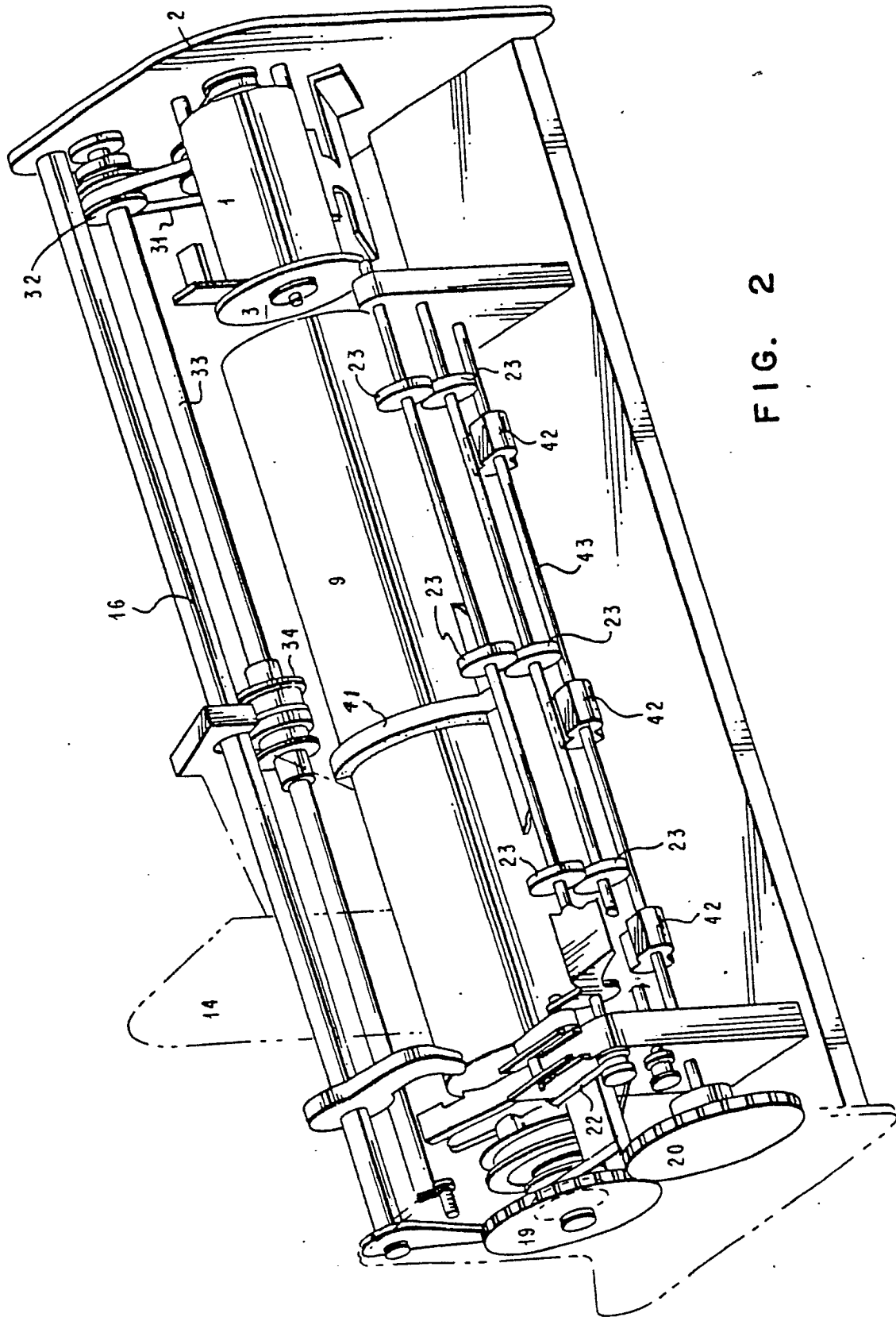


FIG. 2

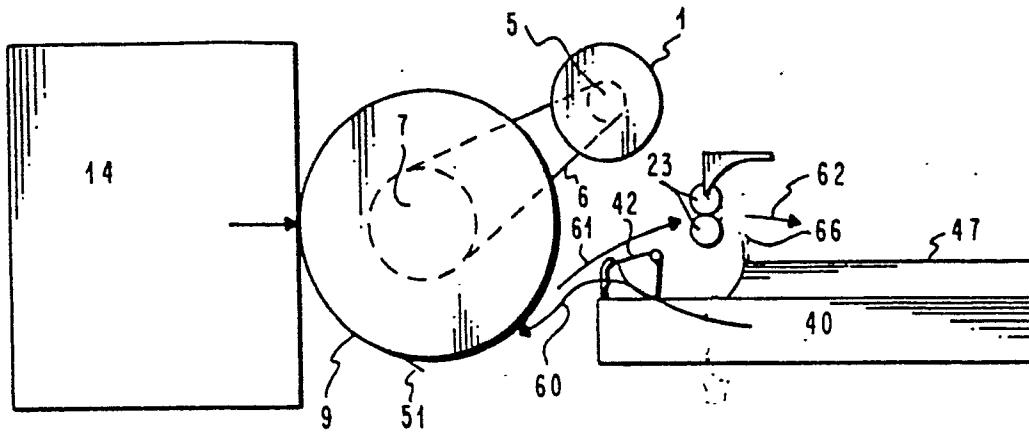


FIG. 3

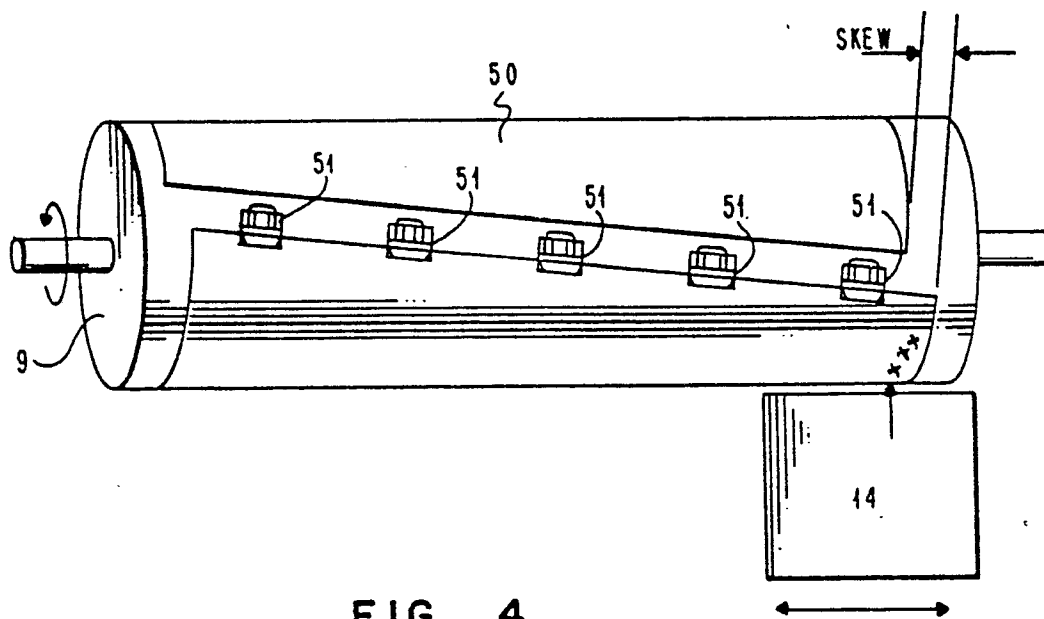


FIG. 4

FIG. 5

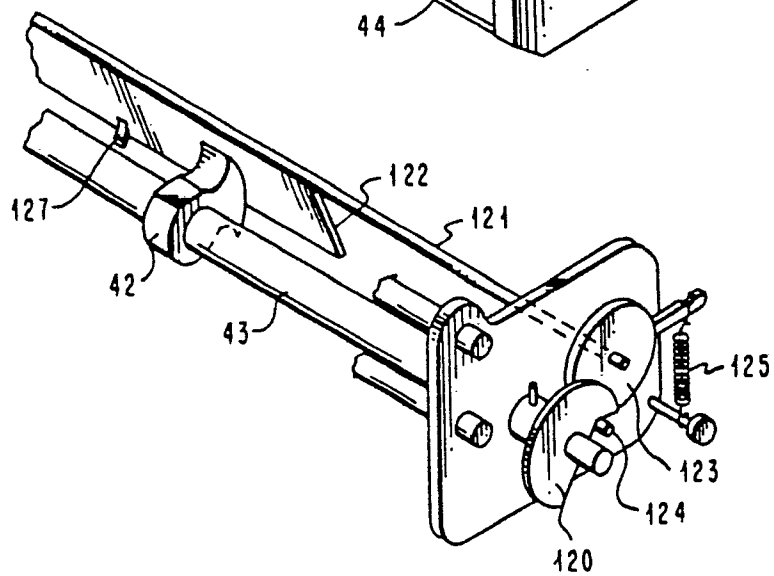
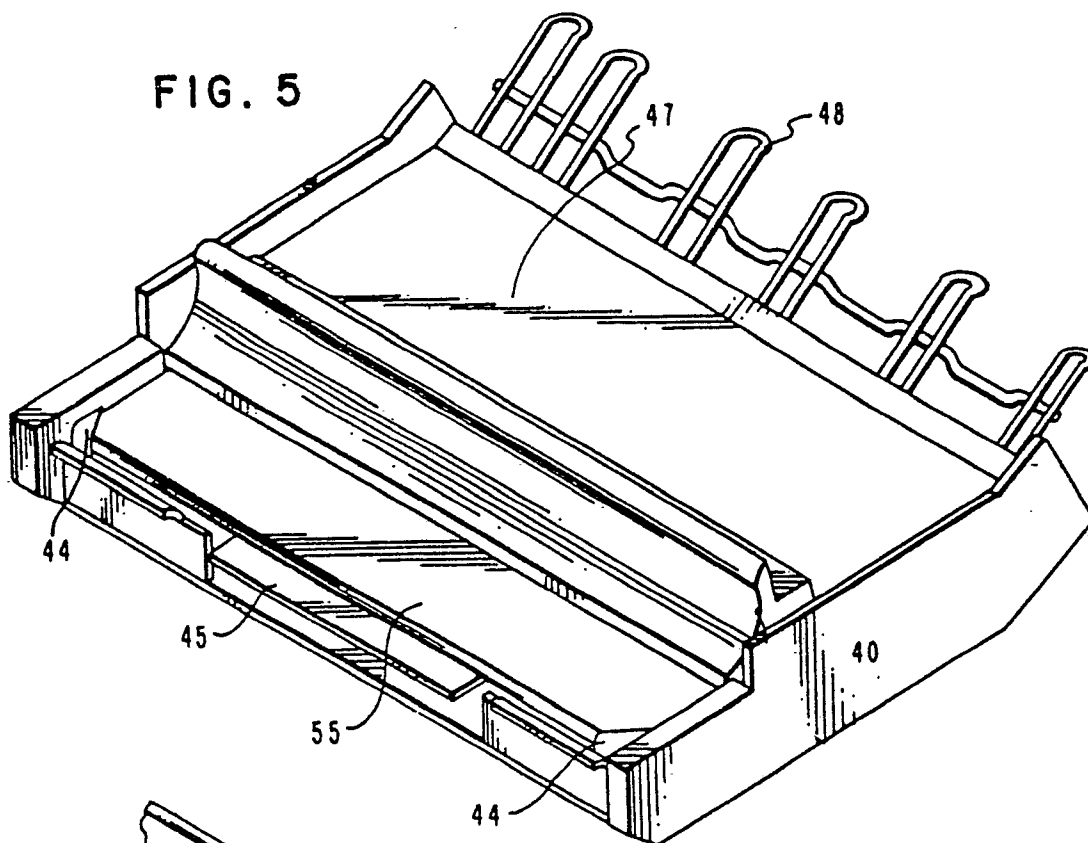


FIG. 10

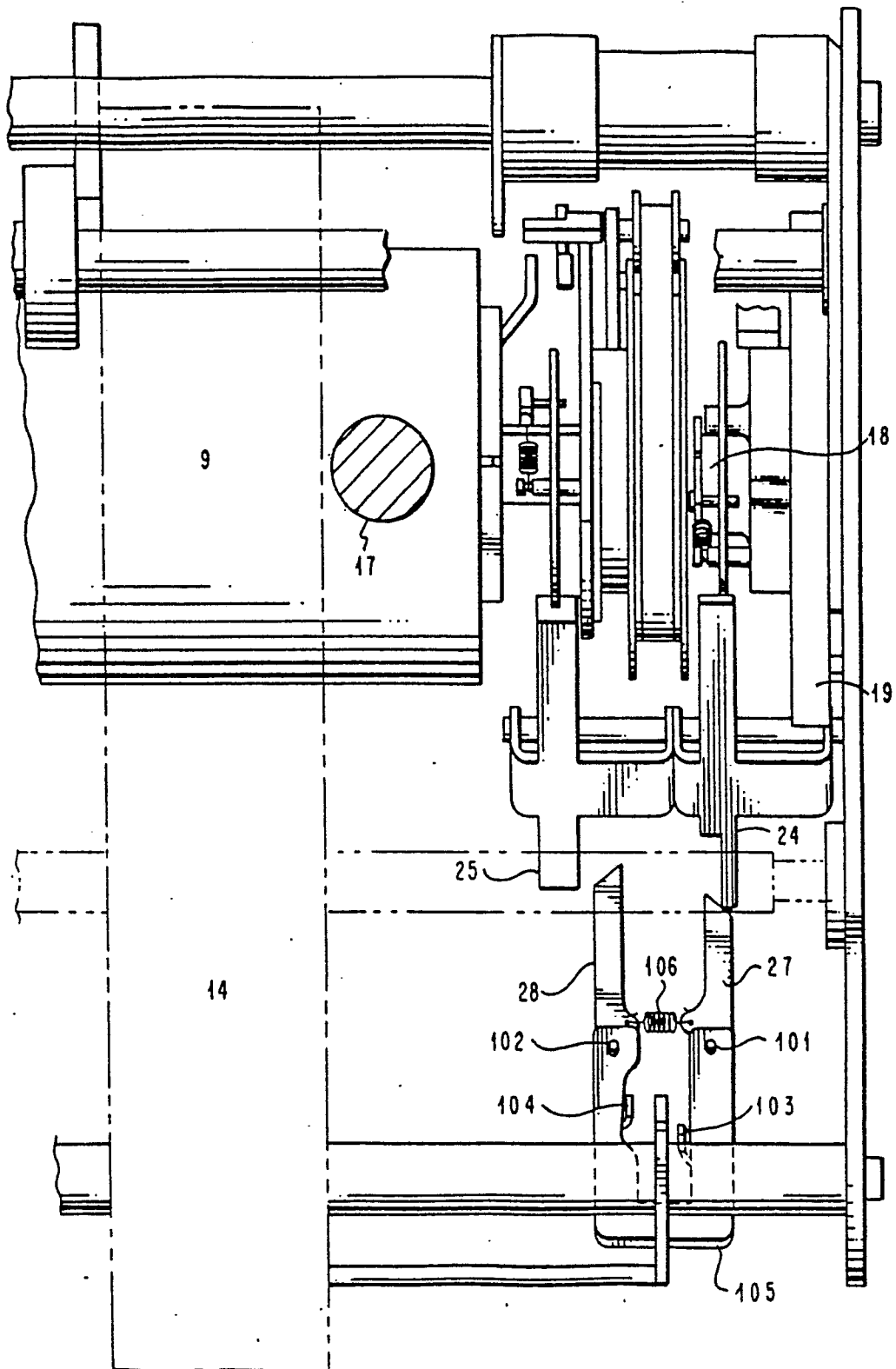
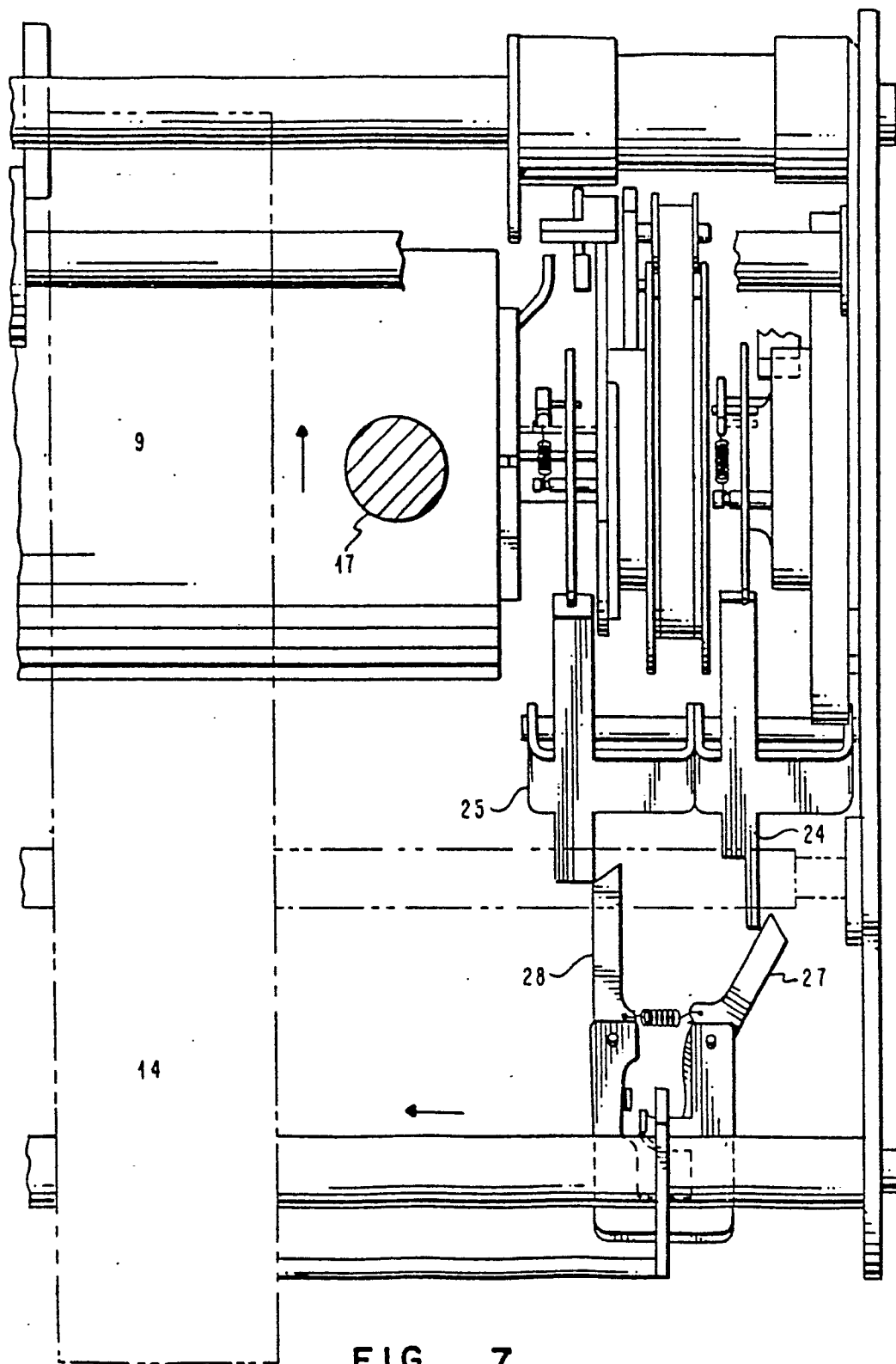


FIG. 6



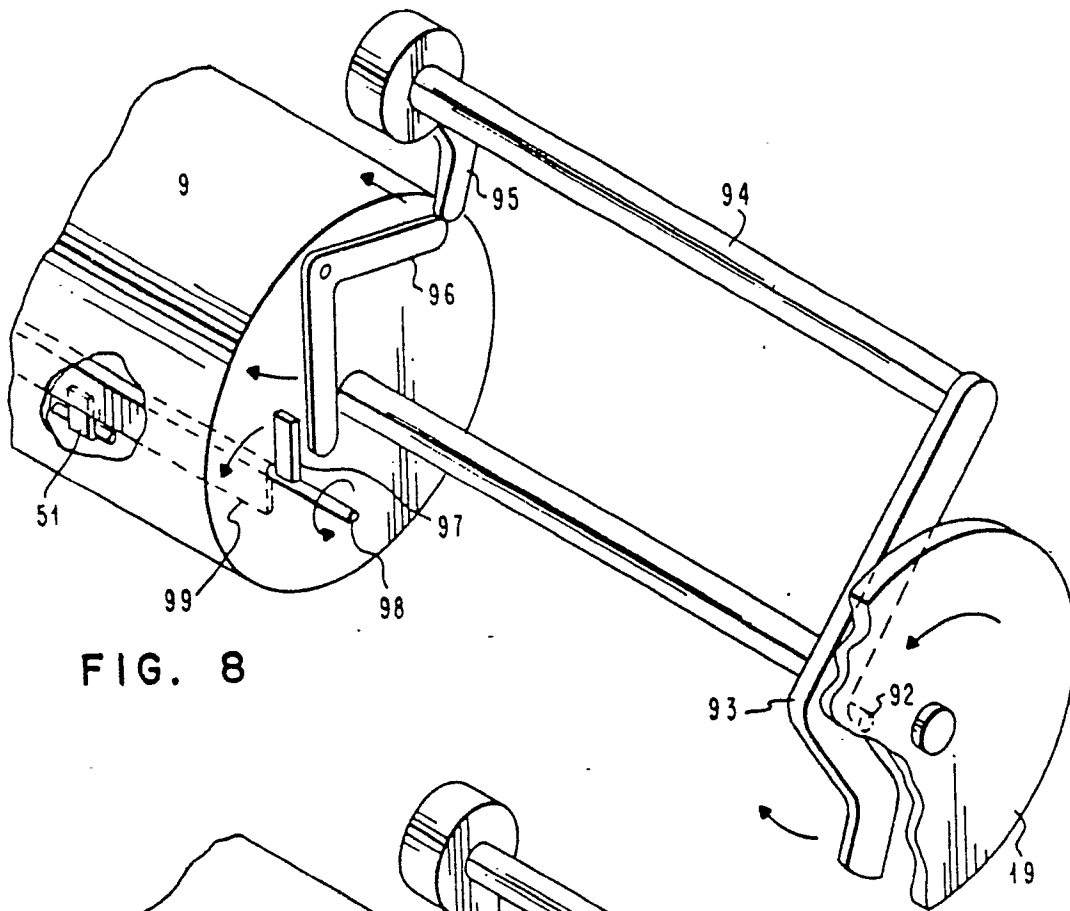


FIG. 8

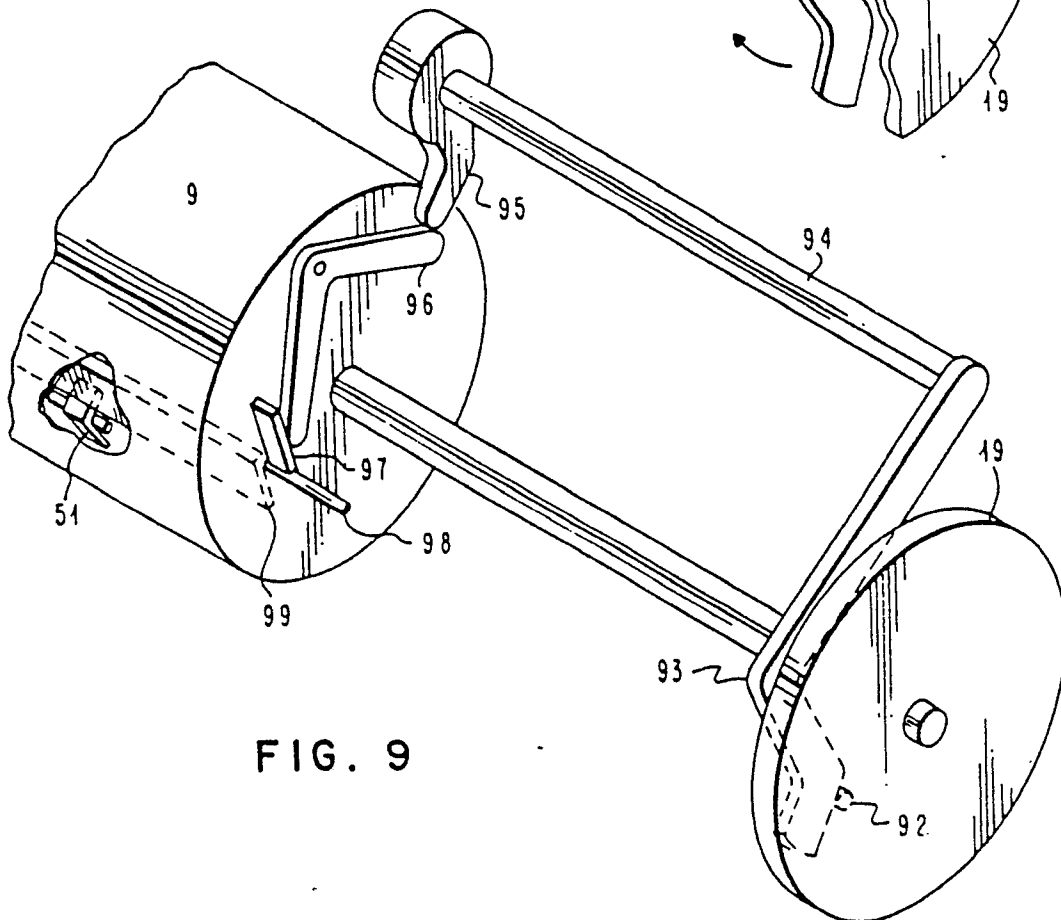


FIG. 9