United States Patent [19]

Farlow

[11] **3,906,512**

[45] **Sept. 16, 1975**

[54] **MECHANICAL DRUM POSITIONING AND SHEET-CLAMPING MECHANISM FOR FACSIMILE**

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[73] Assignee: **Minnesota Mining and Manufacturing Company**, St. Paul, Minn.

[22] Filed: **Apr. 29, 1974**

[21] Appl. No.: **465,284**

Related U.S. Application Data

[63] Continuation of Ser. No. 319,343, Dec. 29, 1972, abandoned.

[52] **U.S. Cl.** **346/138**; 271/277

[51] **Int. Cl.**[2] **G01D 15/28**; H04N 1/08

[58] **Field of Search** 346/138; 101/415.1; 29/118; 271/277, 82

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Attorney, Agent, or Firm—Alexander, Sell, Steldt & DeLaHunt

[57] **ABSTRACT**

Mechanical drum-positioning and sheet clamping mechanism for a facsimile machine. A drum for carrying a sheet of paper wrapped around the periphery of the drum is rotatably mounted in the facsimile machine. A mounting bar is radially movable within a radial slot defined in the drum. Gripping fingers are connected to the mounting bar for movement into and out of a sheet-clamping position. An overhanging lip extending parallel to the axis of rotation defines an undercut clamping surface located inside the drum. The gripping fingers clamp an edge of a sheet of paper to the clamping surface. The sheet is inserted adjacent the clamping surface through an opening in the outer surface of the drum. A detent engages a pin extending outwardly from one end of the mounting bar so that the rotatable drum can be located in a predetermined position and the gripping fingers can be moved out of the sheet-clamping position. A pressure transducer produces an image on the sheet by means of a stylus that exerts a variable force against the sheet. The stylus is biased against the sheet and the drum by means of a guide shoe. The guide shoe has a curved surface that matches the curvature of the drum and bridges the opening in the outer surface of the drum so that the stylus is protected as the opening is moved past the guide shoe.

4 Claims, 8 Drawing Figures

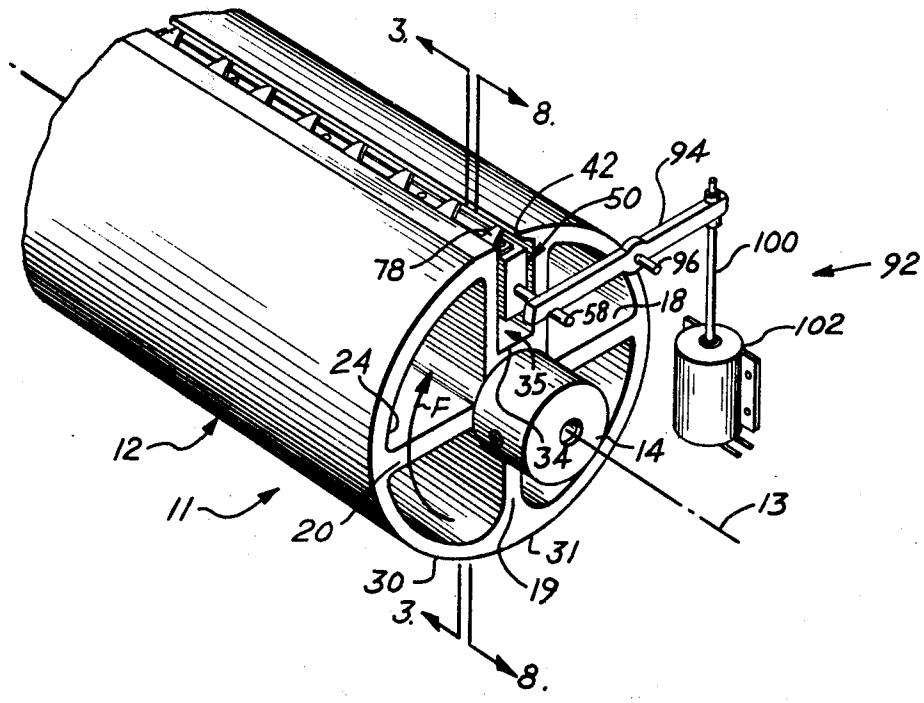


Fig. 1

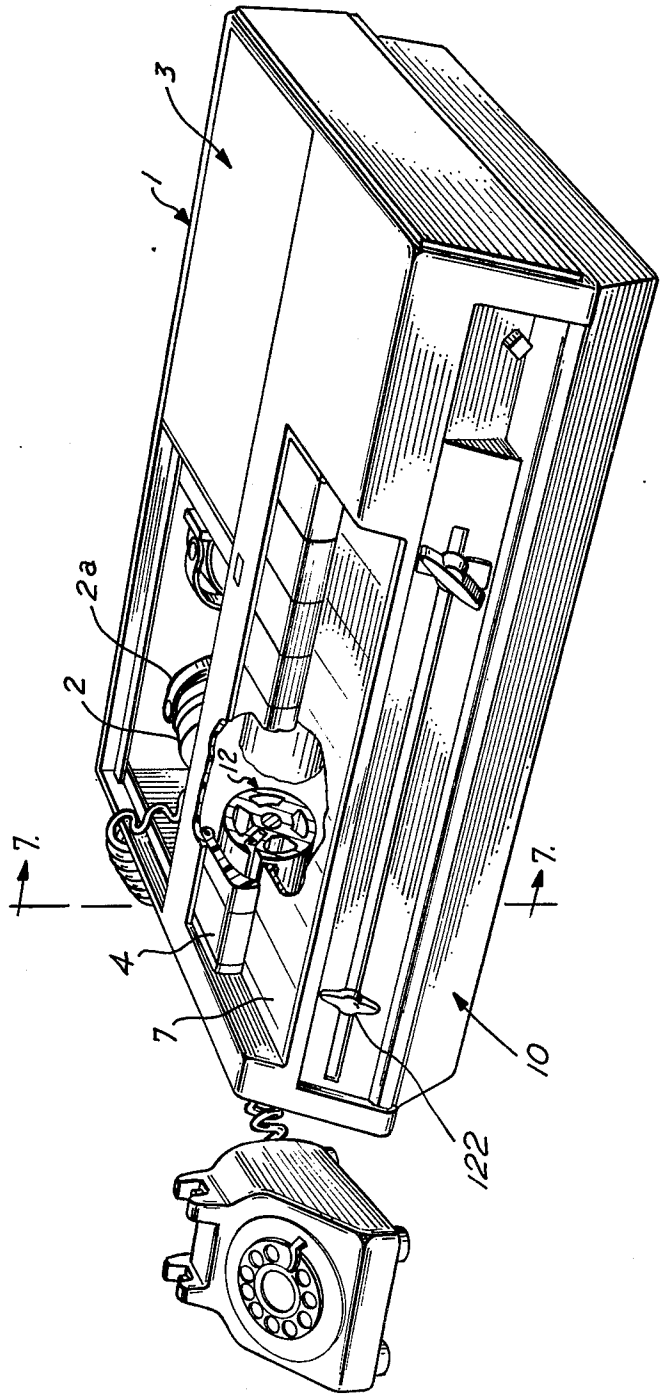


Fig. 2

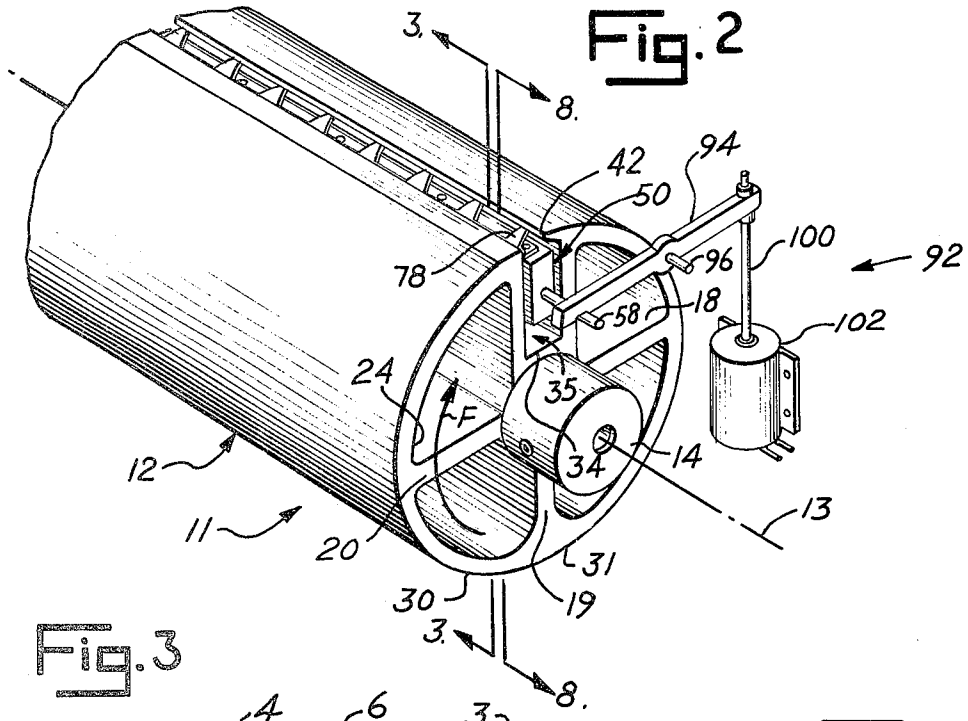


Fig. 3

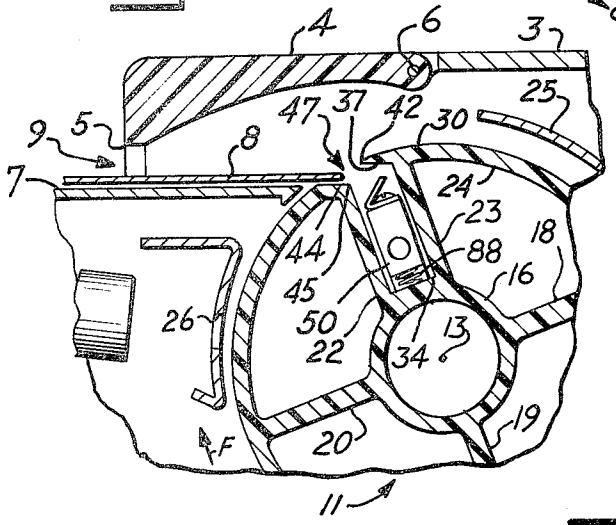


Fig. 4

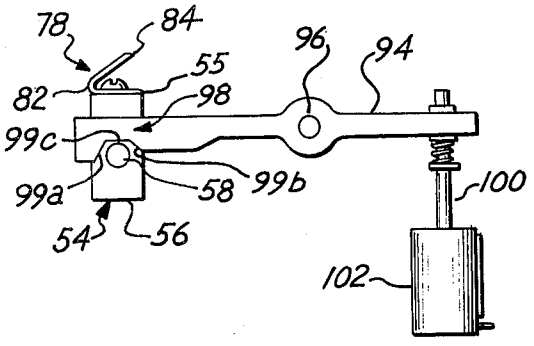


Fig. 5

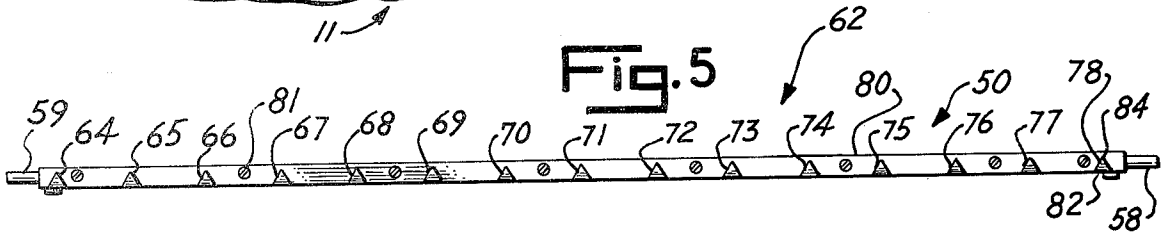


Fig. 6

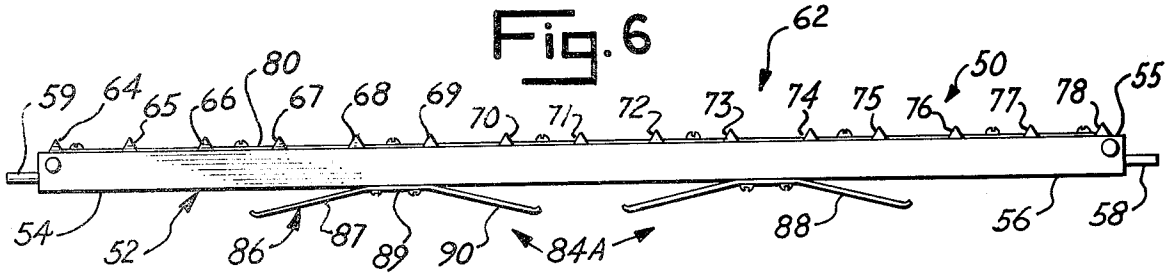


Fig. 8

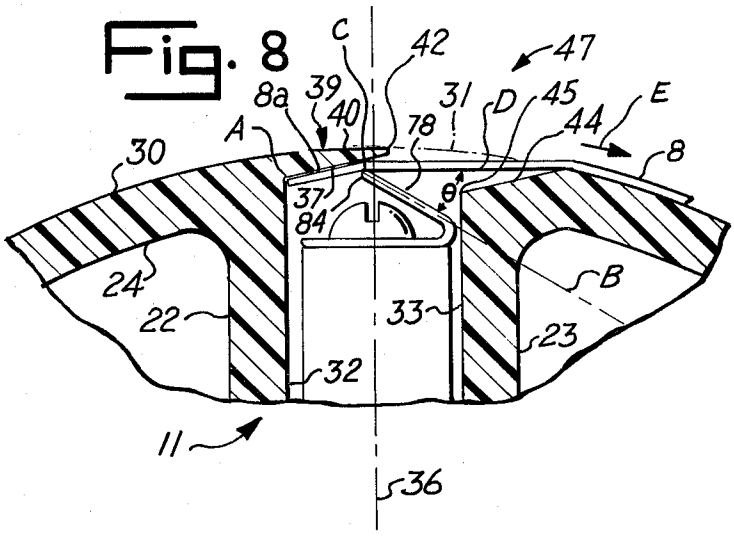
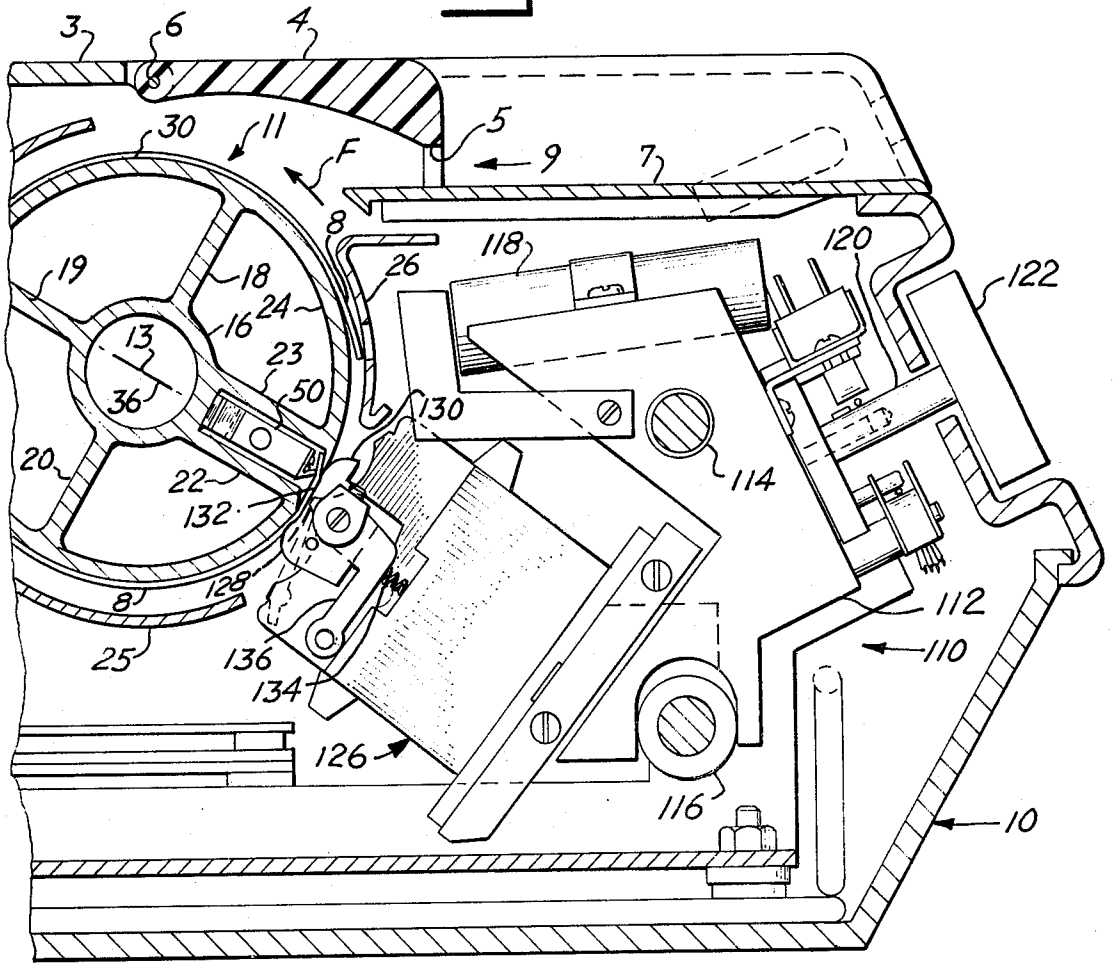

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Fig. 7


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MECHANICAL DRUM POSITIONING AND SHEET-CLAMPING MECHANISM FOR FACSIMILE

This is a continuation of application Ser. No. 319,343 filed Dec. 29, 1972 now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to facsimile apparatus employing a rotating drum, and more particularly relates to apparatus for positioning the drum and for clamping to the drum a sheet of material, such as paper.

Most facsimile systems utilize both a transmitting machine and a corresponding receiving machine for sending information between remote locations. Typically, a transmitting machine scans the contents of a document at a send location and transmits signals representative of the contents to a receiving machine at a receive location. The receiving machine receives the transmitted signals and produces an image of the document on a sheet of material, such as paper, at the receive location. In order to scan the document at the send location and in order to produce an image at the receive location, the document or paper is rotated relative to the scanning or image-producing components of the machines. In facsimile equipment of the type for which the present invention is adapted, the paper is wrapped about the outer surface of a drum, and the drum is then rotated relative to the scanning or image-producing components. During operation, the paper or document is secured to the drum. Devices for securing a sheet of paper to a drum in a facsimile machine have been developed prior to this invention and some of the devices are described below.

Perhaps the most primitive method of positioning paper on a drum is illustrated by a device in which the paper must first be manually wrapped about the drum. After the paper is wrapped, spring devices colloquially referred to as "garter springs" are placed over the ends of the paper. This method of securing the paper is very time-consuming and requires extensive care in positioning the paper. Since the garter springs are placed only over the ends of the paper, a substantial portion of the leading edge of the paper cannot be secured flat against the drum.

Accordingly, one object of the present invention is to provide a clamping and loading device which holds a sheet of material flat against the outer surface of a drum and which simplifies the loading and unloading of the sheet.

Another method of paper-loading and unloading is set forth in U.S. letters Pat. No. 3,578,909, issued May 18, 1971. The facsimile machine described in this patent utilizes a drawer which is movable outwardly from the facsimile machine into a loading position and is movable inwardly toward the facsimile machine into a loaded position. When the drawer is extended into its loading position, two cables, normally wound about the edges of the cylindrical periphery of a drum, are unwound from the drum and are held in the drawer. Crossbands are bridged across the two cables, and when the drawer is inserted into the machine, the cables are wound about the ends of the drum and the crossbands are extended longitudinally across the drum substantially parallel with the axis of rotation of the drum. Paper is loaded on top of the crossbands with the drawer extended into its loading position. When the drawer is inserted into the machine, the paper is

wrapped about the drum and is held against the drum by the crossbands.

In another device known in the prior art but not disclosed in the above patent, the crossbands are magnetically attracted to the drum to improve the paper-holding capability of the device.

Another paper-loading device in the prior art utilizes pre-stressed straps or bands which cooperate with the opening and closing of a drawer into a facsimile machine. When the drawer is extended from the machine, the paper is loaded on top of the extended straps. When the drawer is closed, the straps are wound about the drum so that the paper is wrapped around the periphery of the drum. This particular device utilizes a single crossband or connecting strip running longitudinally across the drum which functions as a paper stop. Opposed edges of the paper are positioned under this connecting strip which projects somewhat above the cylindrically-shaped periphery of the drum.

Disadvantages of the above devices are numerous. The existence of the crossbands, running longitudinally along the outer portion of the drum, decreases the amount of space on the paper or document utilizable for printing or scanning. When the paper has been loaded and the drum rotated for printing or scanning, the crossbands extend above the outer surface of the drum. If a pressure-type print-out transducer were used in such a machine, each crossband would contact the transducer during each drum revolution. Such contact could destroy or severely damage the transducer. Of course, the transducer could be mechanically withdrawn as it passes adjacent the strip. However, such withdrawing apparatus adds significantly to the expense and complexity of the resulting machine. Also, the use of a drawer increases the physical size of a facsimile device and does not prevent the mispositioning of the paper on the drum during the loading process. Since the crossband system biases the paper to the drum with only a limited force, it is not well adapted for use with a pressuure-type print-out transducer. The contact of such a transducer against the paper creates a force which tends to move the paper relative to the drum.

Accordingly, another object of the present invention is to provide an improved clamp member for use on a facsimile drum which is simple and economical to construct and which provides an increased holding power over prior art clamps.

A further object of the invention is to provide a clamping device which operates entirely within the periphery of a drum surface so that there is no danger of damaging an associated transducer even if the transducer is not mechanically withdrawn as it passes the clamping device.

Still another object of the present invention is to provide a clamping device of the foregoing type in combination with a transducer that comates with the drum so that the transducer can remain continuously biased against the drum as it passes adjacent the clamping device.

In another prior art device, the base of an L-shaped member is used as a paper clamp. The base extends outside of the periphery of the drum and is oriented tangentially to the drum. The "upright" or long side of the L-shaped member is mounted for radial movement within the drum and is normally biased toward the center of the drum in a paper-clamping position in which

a sheet of paper is held between the base of the member and the periphery of the drum. In this device, the drum is manually rotated into the load position. The upright portion of the L-shaped clamp member rides into a cam detent which positions the drum and biases the clamp member into an unclamped (i.e., paper-loading and unloading) position in which the base of the clamp member is positioned somewhat above the drum periphery. The leading edge of the paper is placed between the clamp base and the periphery of the drum immediately below the clamp base. The drum is then manually rotated until the clamp member rides out of its detent position so that the clamp member is biased into its paper-clamping position in which the leading edge of the paper is clamped between the base of the clamp member and the drum periphery. This particular device, while generally useful for the purpose intended, suffers from the following limitations: (1) The normal rotation of the drum tends to move the clamp member away from the axis of rotation of the drum, into the unclamped position, due to the centrifugal force exerted on the clamp member. This problem increases with increasing rotational speed of the drum. (2) The base of the clamp member rides above the periphery of the drum in both the clamped and unclamped positions, thus creating the possibility of undesirable wear when used with a pressure-type print-out transducer. (3) To clamp the paper, the drum must be rotated away from the leading edge of the paper until the clamp member rides out of the cam detent. This necessitates the continuous feeding of the leading edge of the paper into the clamp member while the drum is manually moved into paper-clamping position. (4) This device utilizes a uniform metal strip as the base portion of the L-shaped clamp member, and, because of natural variations in the manufacturing tolerances of this strip, portions of the leading edge of the paper may not be clamped with sufficient force to prevent slippage. (5) The clamp is not well suited to operation with a pressure-type print-out transducer because friction exerted on the paper by the transducer could tend to slip the leading edge of the paper out of the clamped position beneath the base of the clamp member. As this "slip" occurs, the gripped area of paper beneath the clamp decreases, causing a decrease in the gripping force. This could result in a spiraling effect in which the paper unravels from the drum and jams in the machine.

Accordingly, another object of the present invention is to provide a reliable means for operating a clamp member and for simultaneously locating a drum in paper-loading and unloading positions.

A further object of the present invention is to provide a clamping device which increases in clamping force with increased rotational speed of an associated drum and which also increases in clamping force with increased tangential pressure exerted on the material being clamped.

Another object of the present invention is to provide a clampind device capable of clamping several thicknesses of copy material without extending beyond the periphery of an associated drum surface.

Still another object of the present invention is to provide a sheet-clamping member having several resilient gripping fingers so that an adequate clamping force can be maintained across a major portion of one edge of the sheet.

SUMMARY OF THE INVENTION

The present invention is related to an improvement in a facsimile device of the type comprising a rotatable drum that has an axis of rotation and an outer surface which defines a cylinder. Applicant has invented improved apparatus for clamping a sheet of material to the drum so that the drum remains free of obstructions which would interfere with its movement past a transducer adapted to produce an image on the sheet. When this invention is employed, the transducer can remain continuously biased against the drum, thereby obviating the need of any mechanism for periodically withdrawing the transducer to avoid contact with portions of the clamping apparatus.

According to this feature of the invention, an undercut clamping surface is formed on the drum within the cylinder defined by the outer surface of the drum. The clamping surface extends substantially parallel to the axis of rotation and is accessible from outside the drum. For example, an opening can be fabricated in the outer surface so that the sheet can be inserted adjacent the clamping surface. A clamp member movably located inside the drum clamps the sheet to the clamping surface so that the sheet is wrapped around the outer surface of the drum as it is rotated. The clamp member is mounted within the drum so that all of its portions remain within the cylinder defined by the outer surface at least while the sheet is being clamped.

According to another feature of the invention, a facsimile device of the above-described type is provided with a pressure transducer comprising a stylus for applying variable pressure to the sheet. The transducer comprises a guide shoe for positioning the stylus in relationship to the drum. The guide shoe has a concave surface that mates with the outer surface of the drum in order to hold the sheet flat against the outer surface in the area of the stylus. In addition, the concave surface of the guide shoe is long enough to bridge or gap the opening in the outer surface of the drum so that the stylus is protected from damage as the opening moves under the stylus. This is an important feature which further obviates any need for a stylus withdrawing mechanism which is ordinarily necessary to retract the transducer to prevent it from coming in contact with the sheet clamping device. By using the principle taught herein, the necessity for such expensive and unreliable apparatus is completely eliminated, thereby increasing the reliability of the overall facsimile device.

According to another feature of the invention, the clamp member is mounted within the drum between the axis of rotation and the clamping surface so that the clamp member is urged against the sheet and the clamping surface by centrifugal force as the drum is rotated. By using this unique arrangement of parts, any increase in drum rotation speed actually increases the clamping force with which the sheet is held to the drum, thereby making it possible to clamp multiple sheets or thick sheets at high drum rotation speeds.

According to still another feature of the invention, the clamp member comprises a plurality of the resilient gripping fingers so that adequate clamping force can be maintained across a substantial portion of one edge of the sheet.

According to another feature of the invention, the resilient gripping fingers are arranged so that any force tending to withdraw the sheet from its clamped position

urges the gripping fingers toward the clamping surface so that the clamping force against the sheet is increased. This is another aspect of the invention which enables multiple sheets and relatively thick sheets to be successfully clamped at high drum rotation speeds.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, advantages and features of the present invention will hereafter appear in connection with the accompanying drawings wherein like numerals refer to like elements and wherein:

FIG. 1 is an isometric view of a facsimile device which may be used in connection with the present invention, and which is partially broken away to reveal a rotatable drum mounted inside the device;

FIG. 2 is an enlarged, fragmentary, isometric view of the right hand end of the drum shown in FIG. 1, together with a preferred form of clamping and drum-locating apparatus made in accordance with the present invention;

FIG. 3 is an enlarged, fragmentary, cross-sectional view taken substantially along the line 3—3 of FIG. 2, and also showing adjacent portions of the facsimile device illustrated in FIG. 1;

FIG. 4 is a right-hand side elevational view of a preferred form of clamp member and clamp member operating means made in accordance with the present invention;

FIG. 5 is a top plan view of the clamp member shown in FIG. 4;

FIG. 6 is a front elevational view of the clamp member shown in FIG. 5, together with a biasing assembly;

FIG. 7 is an enlarged, fragmentary, left-hand end cross-sectional view taken substantially along line 7—7 of FIG. 1 which shows a preferred form of a pressure transducer made in accordance with the present invention; and

FIG. 8 is an enlarged, fragmentary, cross-sectional view of one portion of the drum and clamp member taken substantially along line 8—8 in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a facsimile transceiver 1 which is capable of scanning a document and generating signals representative of the contents of the document. The signals are then transmitted to a telephone in the form of acoustical energy. Facsimile transceiver 1 is also capable of receiving acoustical energy signals through a telephone handset 2. The acoustical energy signals are transforced into electrical signals by an acoustic coupler 2*a* so that the transceiver produces on a sheet of paper an image of the document being scanned by a like transceiver. Referring to FIGS. 1, 3 and 8, transceiver 1 also comprises a case 3 that rotatably supports on a hinge 6 an access door 4 having a lower edge 5. Case 3 also forms a shelf 7 that supports a sheet of paper 8 as it is being loaded into the transceiver. The sheet is moved into the transceiver through an opening 9 extending between lower edge 5 and shelf 7. The case also comprises a front panel 10.

Referring to FIGS. 2, 3 and 8, a drum assembly 11 is positioned within case 3. The assembly comprises a metal drum 12 that is mounted to rotate around an axis of rotation 13. The right-hand end of the drum is fitted to a metal cylinder 14 that is adapted to receive a shaft suitable for mounting in a bearing. A similar cylinder is fitted to the left-handed end of the drum. The drum comprises an inner right cylindrical tube 16 that supports radial planar support members 18, 19, 20 and an additional pair of planar support members 22 and 23. Members 18, 19, 20, 22 and 23 support an outer right cylindrical tube 24. The drum is partially surrounded by shroud members 25 and 26 that help to confine a sheet of paper to the outer surface of the drum. The shroud members extend parallel to axis 13 along the entire length of the drum. The drum has a cylindrical outer surface 30 that defines a cylinder 31. The outer surface is colinear with the cylinder throughout its surface area.

Referring to FIGS. 2, 3, and 8, support members 22 and 23 define parallel, flat sidewalls 32 and 33, respectively, that extend parallel to axis of rotation 13. Sidewalls 32 and 33, as well as a basewall 34, extend through the entire length of drum 12, and they define a slot 35 having a center plane 36 that passes through the axis 13 and is equidistant from sidewalls 32 and 33.

A portion of the drum adjacent outer surface 30 is undercut to form a flat undercut clamping surface 37 that is parallel to axis 13 and extends along the entire length of drum 12. The undercut also forms a lip member 39 that is supported cantilever fashion from outer tube 24. As shown in FIG. 8, the lip member defines an upper surface 40 that is colinear with cylinder 31, an unsupported overhanging edge 42 that extends parallel to axis 13, and clamping surface 37 that is displaced radially inward from upper surface 40. Clamping surface 37 is flat and forms an angle of about 12 degrees with a plane perpendicular to plane 36 that passes through line A, the line of intersection of surface 37 with sidewall 32. Applicant has discovered that an angle of 12 degrees, plus-or-minus 2°, is the angle which maximizes the ease of placement of sheet 8 adjacent surface 37. Opposite lip member 39, a portion of tube 24 is sheared off to form a flat surface 44 having an inner edge 45. The area between edge 42 and edge 45 along the length of the drum defines an opening 47 in outer surface 30 which allows access to clamping surface 37 from outside the drum.

A clamp member 50 is slidably mounted in slot 35. The gap between clamp member 50 and sidewalls 32, 33 is exaggerated in the drawings for purposes of explanation. The clamp member comprises a mounting member 52 and a gripping finger assembly 62:

Referring to FIGS. 4–6, mounting member 52 comprises a bar 54 formed in the shape of a rectangular parallelepiped having an upper surface 55 and a lower surface 56. Member 52 also comprises cylindrical pins 58, 59 that extend beyond the left hand and right hand edges of drum 12.

Gripping finger assembly 62 comprises individual spaced gripping fingers 64–78 that are integrally formed with a base strip 80. Strip 80 is attached to upper surface 55 by screws, such as screw 81. Each of the gripping fingers is identical and can be understood with reference to finger 78 shown in FIGS. 4–6 and 8. Finger 78 is fabricated from a resilient metal that is formed in the shape of a triangle having a base end portion 82 and a pointed gripping end portion 84. It is the pointed ends of the fingers which actually grip sheet 8. Referring to FIG. 8, finger 78 is arranged so that a line drawn between portions 82 and 84, such as line B, makes an acute angle with a line segment C-D originating at point C, the point of intersection of portion 84

with sheet 8, and extending to point D on the sheet in the direction of arrow E. Sheet 8 is moved in the direction of arrow E in order to be withdrawn from drum 12. Applicant has discovered that this arrangement is important for retaining sheet 8 clamped to clamping surface 37. Any force tending to withdraw sheet 8 in the direction of arrow E urges the end portion 84 of finger 78 toward clamping surface 37 so that the clamping force on sheet 8 is increased.

Referring to FIGS. 3 and 6, clamp member 50 is normally biased in a direction radially outward from axis 13 by a biasing assembly 84*a*. Assembly 84*a* comprises leaf springs 86 and 88 attached to lower surface 56 by screws. Spring 86 comprises leaves 87, 90 that are integrally formed with a mid section 89 and form acute angles with lower surface 56. Spring 88 is made in the same manner. As shown in FIG. 3, clamp member 50 is inserted in slot 35 so that leaf springs 86 and 88 lie against basewall 34. Assembly 84*a* normally biases clamp member 50 into a clamped position shown in FIG. 8 in which sheet 8 is clamped between fingers 64–78 and clamping surface 37.

Referring to FIGS. 2 and 4, a counterbiasing and positioning assembly 92 holds drum 24 in a load position and simultaneously counterbiases clamp member 50 out of the clamped position and into an unclamped position shown in FIG. 3. Assembly 92 includes a lever arm 94 supported for pivotal movement by a rod 96. The rod is supported by a frame not shown. One end of lever arm 94 includes a V-shaped detent 98 engageable over pin 58. Detent 98 comprises flat surfaces 99*a*-99*c*. The other end of the lever arm 94 is connected to an armature 100 of a solenoid 102. Solenoid 102 is a means for operating assembly 92. When the solenoid 102 is energized, armature 100 is raised, causing detent surface 98 to engage over pin 58 and to depress clamp member 50 radially inward into the unclamped position (shown in FIG. 3) out of contact with sheet 8.

FIG. 7 illustrates a preferred form of transducer assembly 110 made in accordance with the present invention. The assembly comprises a carriage 112 that is slidably mounted on rods 114, 116 which are mounted on a frame (not shown). The rods extend parallel to axis 13 along the entire length of drum 12. The carriage supports a light source 118 that can be used to scan a document if transceiver 1 is used to transmit data. The carriage can be manually moved along the drum by means of a rod 120 that is attached to a knob 122. The carriage also supports a pressure transducer 126 that includes a stylus 128 which physically contacts and applies a variable force to sheet 8 in order to produce an image. In one example, sheet 8 is carbon-type paper and the physical contacting of stylus 128 against the paper prints out information. Transducer 126 also includes a guide shoe 130 having a smooth, concave surface 132 with a radius of curvature equal to the radius of curvature of outer surface 30. Surface 132 is sufficiently long to bridge opening 47 in the manner shown in FIG. 8. Shoe 130 is biased toward surface 30 by a coil spring 134 which applies force to the shoe through a linkage arm 136. By using this unique arrangement, the stylus is protected as it traverses opening 47, and sheet 8 is smoothed against surface 30 in an area adjacent the stylus.

In order to operate the apparatus, drum 12 is moved to the load position illustrated in FIG. 3 by means not shown. Solenoid 102 then is energized, so that detent 98 is lowered over the pin 58 and clamp member 50 is moved radially inward to the unclamped position shown in FIG. 3. During this operation, pin 58 is moved toward the center of the detent, thereby precisely locating the drum in the load position. While solenoid 102 remains energized, drum 12 is positively held in the load position, and clamp member 50 is positively held in the unclamped position. While solenoid 102 is energized, sheet 8 is inserted through opening 9 and opening 47. Opening 47 is of sufficient width to accomodate several thicknesses of paper so that carbon copies, mimeographed copies and the like may be wrapped about the drum 12 if desired, during print-out. When the solenoid is deenergized, biasing assembly 84*a* moves clamp member 50 radially outward into the clamped position shown in FIG. 8 and detent 98 moves upward out of the path of pin 58. In this position, one edge portion 8a of the sheet 8 is clamped between gripping fingers 64-78 and clamping surface 37 without any rotation of drum 12.

During the operation of the apparatus between the clamped and unclamped positions, all portions of the clamp member remain within cylinder 31. Because the clamp member remains entirely within cylinder 31, a continuous and uniform surface is provided around drum 12. This is of particular importance when the facsimile unit utilizes a transducer which makes contact with sheet 8, such as pressure transducer 126 shown in FIG. 7.

After sheet 8 is clamped to clamping surface 37, drum 12 is rotated in the direction of arrow F so that sheet 8 is wrapped around the drum as shown in FIG. 7. As the drum rotates, centrifugal force urges clamp member 50 radially outward toward clamping surface 37. This is an important feature achieved by the placement of clamp member 50 between axis 13 and clamping surface 37. In addition, by using this arrangement, the centrifugal force acts in the same direction as the force exerted on clamp member 50 by bias assembly 84*a*.

As opening 47 moves past stylus 128, guide shoe 130 bridges opening 47 to prevent the stylus from slipping into the opening. This arrangement obviates the need for withdrawing the stylus during each rotation of drum 12, thereby simplifying the transceiver.

As drum 12 is rotated in the direction of arrow F, a drag force may be exerted on sheet 8 due to the pressure of stylus 128 against the sheet. This drag force tends to urge the paper out of opening 47 in the direction of arrow E (FIG. 8). Because of the barb-like configuration and orientation of the gripping fingers, the pointed ends in contact with sheet 8 are urged toward clamping surface 47. As a result, sheet 8 is even more firmly clamped between the gripping fingers and surface 37.

While there has been described a preferred embodiment illustrating the principles of the present invention, it is to be understood that other embodiments may be made without departing from the true spirit and scope of this invention:

I claim:

1. In a facsimile device comprising a rotatable drum having an axis of rotation and an outer surface that defines a cylinder, improved apparatus for clamping at least one edge portion of a sheet of matrial to the drum so that the sheet is wrapped around the outer surface as the drum is rotated comprising in combination:

means on the drum inside the cylinder for forming an undercut clamping surface accessible from outside the drum and extending substantially parallel to the axis of rotation;

a transducer positioned adjacent the outer surface of the drum for producing an image on the sheet; and

a clamp member movable between a clamped position in which the clamp member clamps the sheet to the clamping surface and an unclamped position in which the clamp member is spaced from the clamping surface to release the sheet, said clamp member being mounted within the drum so that all portions of the clamp member remain within the cylinder in at least the clamped position, said clamp member comprising a mounting member movably mounted within said drum, and a plurality of gripping fingers, each of said gripping fingers having a first end portion connected to the mounting member and a second unsupported end portion adapted to engage the sheet in the clamped position such that a force tending to withdraw the sheet from the clamped position urges the second end portion of each gripping finger toward the clamping surface, whereby the force exerted by the gripping fingers on the sheet is increased.

2. The invention, as set forth in claim **1**, wherein each gripping finger in the clamped position is arranged so that a first line drawn between the first end portion and the second end portion forms an acute angle with respect to a line segment originating at the point of intersection of the second end portion and the sheet and extending on the sheet in a direction which enables the sheet to be withdrawn from the drum.

3. The invention, as set forth in claim **1**, wherein the mounting member and gripping fingers ane arranged between the axis of rotation and the clamping surface so that the gripping fingers are urged into the clamped position by centrifugal force as the drum is rotated.

4. In a facsimile device comprising a rotatable drum having an axis of rotation and an outer surface that defines a cylinder, improved apparatus for clamping a sheet of material to the drum so that the sheet is wrapped around the outer surface as the drum is rotated comprising in combination:

means on the drum inside the cylinder for forming an undercut clamping surface accessible from outside the drum and extending substantially parallel to the axis of rotation;

a transducer positioned adjacent the outer surface of the drum for producing an image on the sheet;

a clamp member movable between a clamped position in which the clamp member clamps the sheet to the clamping surface and an unclamped position in which the clamp member is spaced from the clamping surface to release the sheet, said clamp member mounted within the drum so that all portions of the clamp member remain within the cylinder in at least the clamped position;

a rigid member extending from one end of said clamp member;

means for continually providing a biasing force acting on said clamp member urging it toward the clamped position;

a pivotally mounted lever including a first end portion and a second end portion, said first end portion engagable with said rigid member;

an electrically controlled means for selectively providing and terminating a counterbiased force; and

means coupling said electrically controlled means to said second end portion for applying said counterbiasing force to said second end portion of said lever, said counterbiasing force when provided being large enough to overcome said biasing force to cause said first end portion of said lever when engaged with said rigid member to move said clamp member to said unclamped position and hold said clamp member in said unclamped position until said counterbiasing force is terminated, said clamp member returning under the action of said biasing force to said clamped position upon termination of said counterbiasing force.

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