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[54] **FACSIMILE DRUM CONVEYOR**
2 Claims, 5 Drawing Figs.

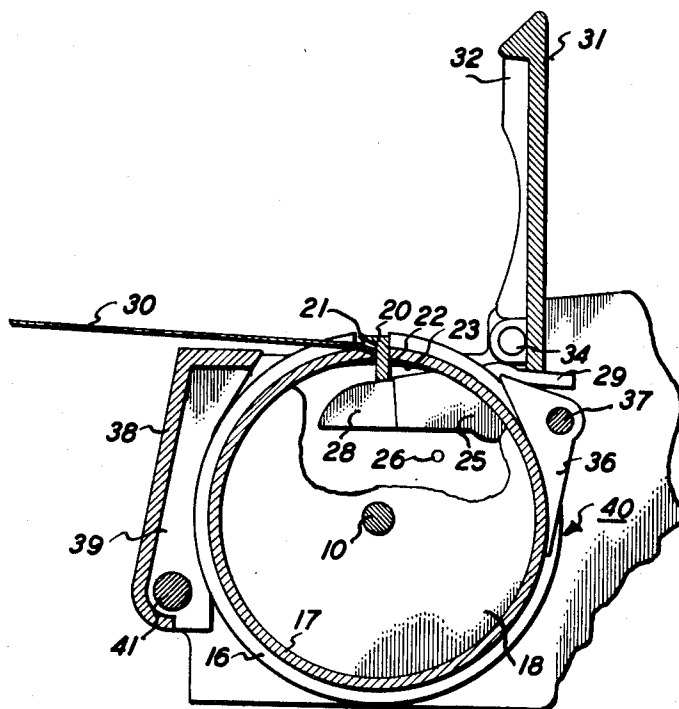
[52] U.S. Cl. 346/138,
 178/6.6, 101/415.1

[51] Int. Cl. G01d 15/28,
 H04n 1/08

[50] Field of Search 346/138,
 134; 101/415.1; 178/13, 6.6, 6.7

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ABSTRACT: Apparatus suitable for conveying sheets of various dimensions past a scanning station in a facsimile transceiver in which a longitudinally extending bar is resiliently biased radially inwardly of a rotatable drum member to a normal position engaging the leading edge of a sheet between a projecting lip on the bar and a portion of the drum periphery. A resiliently biased wiper bar extending longitudinally along the drum periphery holds a sheet tautly against the drum periphery at the scanning station as the drum is rotated. An access door over the drum when opened beyond a predetermined position permits attachment or removal of a sheet from the drum by pivoting a cam to engage the bar member as the drum is rotated to a predetermined position of rotation.



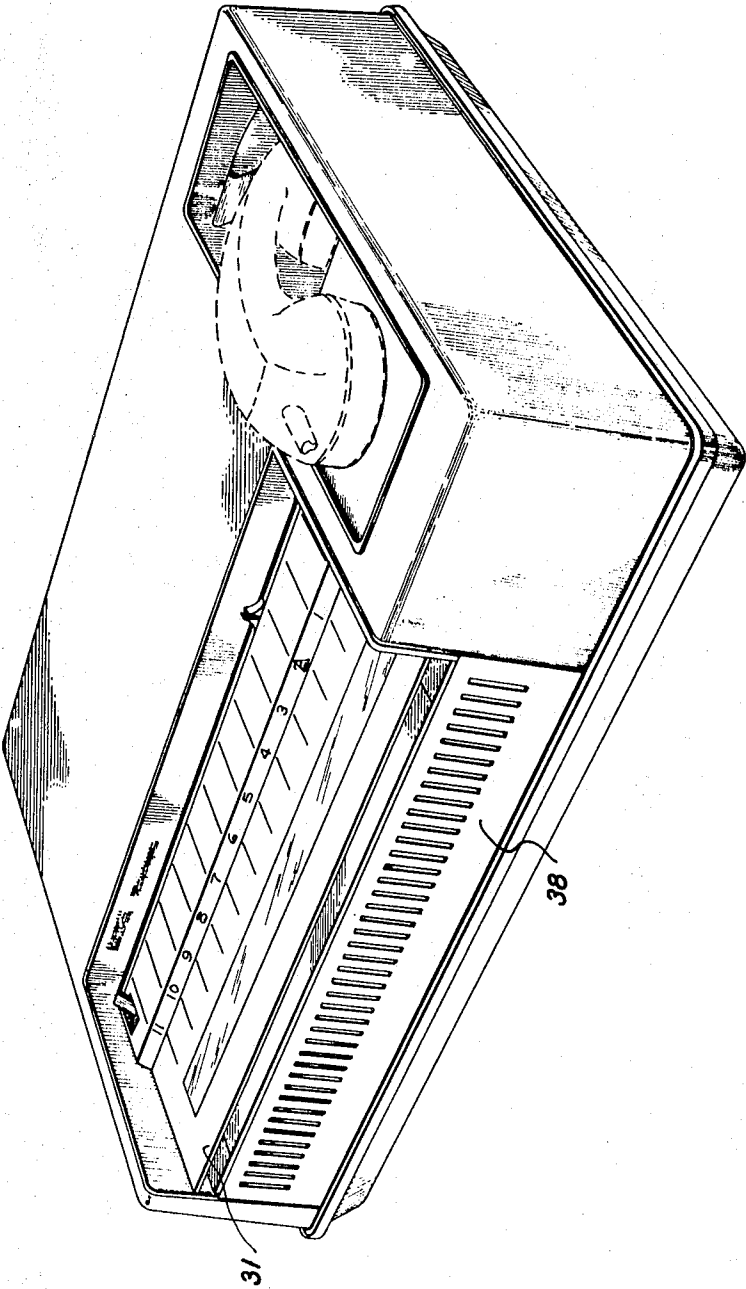
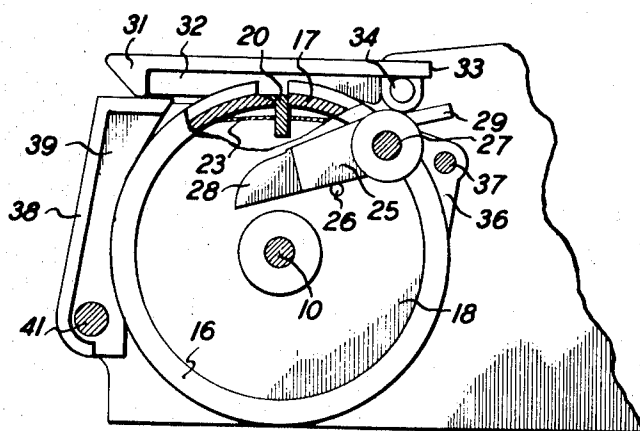
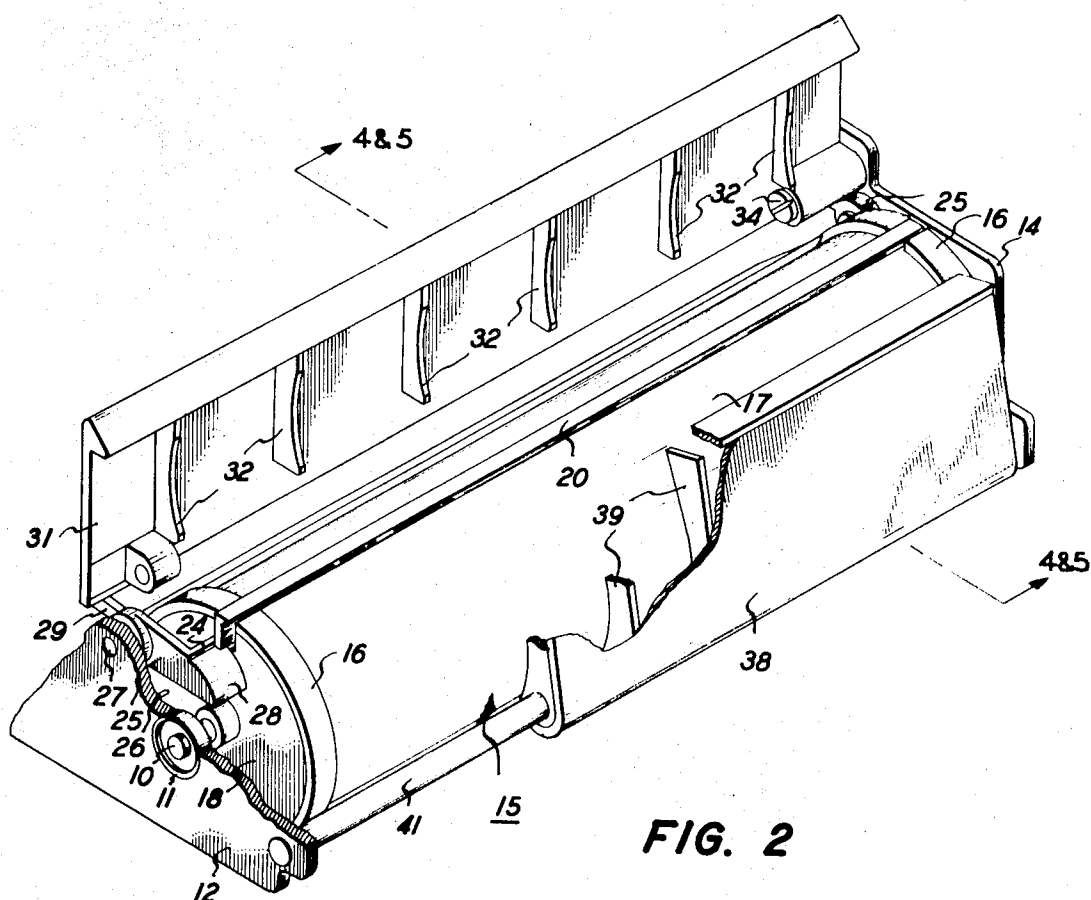


FIG. 1

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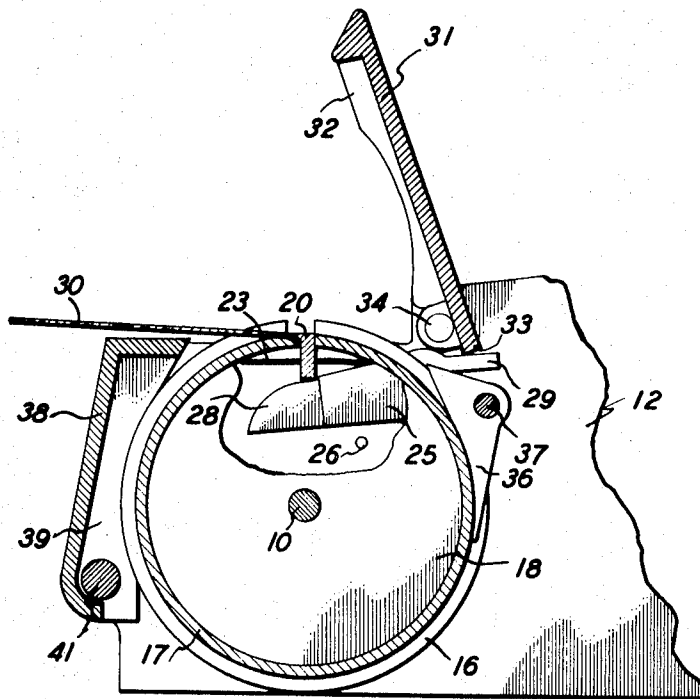


FIG. 4

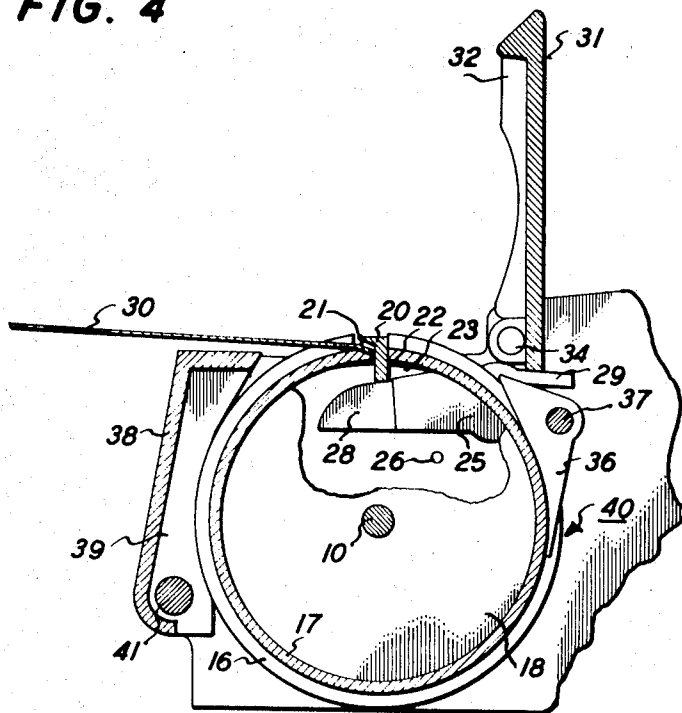


FIG. 5

FACSIMILE DRUM CONVEYOR

BACKGROUND OF THE INVENTION

This invention relates generally to facsimile apparatus and more particularly to apparatus for supporting sheets of flexible material such as documents and copy sheets on a rotatable drum member for scanning or recording.

In facsimile apparatus in which sheet material is supported on a rotatable drum conveyor for scanning or recording, there has existed the problem of providing a means for efficiently and reliably attaching the sheet material to the drum conveyor. Previous attempts in solving this problem have not produced workable arrangements which effectively permit the use of sheet material of various dimensions. Many of these prior systems require a precise positioning of the sheet material in relation to the drum member in order to insure proper support. These systems are therefore time consuming to the machine operator in insuring that a sheet is properly positioned and supported on the drum member.

In one previous system, the sheets to be used therein are precut to a predetermined dimension. The opposite edges of the sheet are then turned back at acute angles and creased. One of the creased edges is then inserted into one gripper slot of the cylindrical drum and the sheet wrapped tightly about the drum periphery. The other creased portion is then inserted into a second gripper slot of the drum. The gripper mechanism is then adjusted to wrap and hold the sheet tightly about the periphery of the cylindrical surface.

In another prior system, one edge of the sheet material is inserted into the lip of a gripper member supported on the drum periphery. The trailing portion of the sheet is then wound tightly about the drum periphery by a wiping bar, which is supported externally of the drum. The wiping bar is utilized to provide a tension on the sheet as it is wrapped about the drum. The sheet is then held tightly about the drum periphery by securing the trailing edge of the sheet on the drum with the wiping bar.

While these devices have proven satisfactory in some applications, they have not been found suitable in applications necessitating the use of sheet material of varying dimensions. Moreover, such devices to be effective at all dictate the accurate painstaking positioning of a sheet on the drum member before being locked into place. These systems therefore lack the desirable attribute of ease to the operator in loading and unloading.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to support a flexible sheet on a rotatable drum member.

It is another object of the present invention to provide apparatus for efficiently and reliably supporting a flexible sheet on a rotatable drum member.

It is still another object of the present invention to provide apparatus for supporting a flexible sheet on a rotatable drum member in which the sheet may be attached and removed therefrom at a predetermined rotative positioning of the drum member.

It is a further object of the present invention to provide apparatus for attaching a flexible sheet to a rotatable drum member without positively engaging the trailing edge of the sheet to the drum member.

It is still a further object of the present invention to provide apparatus for easily loading and unloading sheet material on a rotatable drum member.

It is still a further object of the present invention to provide apparatus for attaching a flexible sheet to a rotatable drum member with a maximum of operator ease and which requires a minimum of operator skill.

It is yet a further object of the present invention to provide apparatus which permits the engaging or disengaging of a sheet on a rotatable drum member at a predetermined rotative positioning of the drum member in response to the opening of a closure member surrounding the drum member.

These and other objects of the invention are obtained by means of a longitudinal bar member resiliently biased radially inwardly of a rotatable drum member to a normal position engaging the leading edge of a sheet between a projecting lip and a portion of the drum periphery. An access door over the drum when opened beyond a predetermined position pivots a cam member to engage the bar as the drum is rotated to a predetermined rotative position, camming the bar radially outwardly to permit the attachment or removal of a sheet from the drum. At the scanning station which extends longitudinally along the drum periphery a resiliently biased wiper bar holds a sheet tautly against the drum periphery as the drum is rotated.

Other objects of the invention will become readily apparent to those skilled in the art in view of the following detailed disclosure and description thereof, especially when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a facsimile machine in which the apparatus according to the present invention is particularly adapted for use.

FIG. 2 is a partly broken away perspective view showing the sheet-attaching mechanism according to the present invention.

FIG. 3 is a right-hand end elevation partly broken away with the frame plate removed showing the sheet-attaching apparatus according to the present invention. FIG. 4 is a cross-sectional view partly broken away taken along the lines 4—4 of FIG. 2 showing the sheet-attaching apparatus in partly opened position.

FIG. 5 is a cross-sectional view partly broken away taken along the lines 5—5 of FIG. 2 showing the sheet attaching apparatus in the opened position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, the drum member generally designated 15, on which copy sheets 30 are to be supported, may comprise a hollow cylindrical member, which is suitably journaled for rotation. Drum 15 is preferably formed from a material which is particularly light in weight, yet which is of a rugged durable construction. The drum 15 thus may be fabricated from either lightweight metals or plastics or other suitable materials. Drum 15 includes a cylindrical sleeve member 17 and annular rings 16 supported at either end thereof which have a greater outside diameter than the outside diameter of cylindrical sleeve 17. Drum 15 is closed at the ends by means of discs 18 which are recessed within annular rings 16.

The apparatus according to the present invention is particularly adapted for use in facsimile machines such as that illustrated in FIG. 1. Drum 15 may be supported within the facsimile machine by means of a shaft 10 which is rotatably journaled in suitable bearing arrangements such as bearings 11 in frame plates 12 and 14. Drum 15 is drivingly connected to shaft 10 and thus may be driven about the axis thereof by any suitable driving arrangement. In a preferred arrangement, the drum 15 is driven in the clockwise direction as viewed in FIGS. 3 to 5 by means of a synchronous motor and a gear reduction drive arrangement not shown.

Drum 15 includes a slot which extends axially in cylindrical sleeve 17 and annular rings 16 to receive a bar member 20. Bar member 20 includes a tang or lip portion 21 for engaging the leading edge of a sheet 30 to be supported on drum member 15. Bar member 20 is positioned in drum member 15 such that lip portion 21 projects in the direction opposite the direction of drum rotation. Bar member 20 is normally biased radially inwardly of drum member 15 by means of a plurality of spring members 23 which are supported through apertures 22 in bar member 20 and which engage the inner surface of cylindrical sleeve 17. Thus, lip portion 21 is normally biased into engagement with a mating surface adjacent the slot which

extends axially along the drum surface. The leading edge of a sheet 30 may be thus supported between the lip portion 21 of bar member 20 and the mating surface on drum 15 under the biasing action of spring members 23.

A pair of lever arms 25 are pivotally supported on frame plates 12 and 14 adjacent the respective ends of drum member 15 by means of pivot shafts 27. Lever arms 25 include cam surfaces 28 which extend toward drum member 15 within the recess of annular rings 16 to operatively engage the lower surface of bar member 20 when lever arms 25 are pivoted clockwise about pivot shaft 27 to the raised position as viewed in FIG. 5. A raised ridge or abutment 24 is located at the upper portion of cam surfaces to provide a stop for drum member 15 when the lever arms 25 are pivoted to the raised position.

A door or closure member 31 is pivotally supported above drum member 15 by means of pivot shafts 34 or other suitable fastening means connected to frame plates 12 and 14. Door 31 includes along one edge thereof, cam surfaces 33 which are utilized in pivoting lever arms 25 and cam surfaces 28 to the raised position as seen in FIG. 5. For this purpose lever arms 25 include surfaces 29 which extend rearwardly to a point to be engageable by cam surfaces 33 on door 31. Thus upon pivoting door member 31 from the closed position of FIG. 3, to the open position of FIG. 5, cam surfaces 33 engage lever arms 25 along surfaces 29, pivoting lever arms 25 in the clockwise direction as seen in FIGS. 3-5 about shaft 27. As lever arms 25 are thus pivoted, cam surfaces 28 are pivoted to the raised position engageable with the lower surface of bar member 20. In the preferred arrangement, cam surfaces 28 are arranged to engage bar member 20 at approximately the top dead center position as bar member 20 rotates with drum member 15. Thus the sheet-gripping bar 20 will be positioned to receive and release sheets only at a predetermined rotative position of drum member 15.

In the particular embodiment illustrated in FIGS. 1-5 it is desired to be able to position door member 31 to a partially open position without releasing bar member 20 from the sheet-engaging position. To this end lever arm 25, cam surfaces 33, and surfaces 29 are arranged to permit door 31 to be opened approximately 70° from the position of FIG. 3 to that shown in FIG. 4 without releasing bar member 20 from the sheet-engaging position. When the bar member 20 is to be extended to receive or release a sheet 30, door 31 may be opened from the position shown in FIG. 4 to the vertical position of FIG. 5 to pivot cam surfaces 28 into position to engage bar member 20.

Inasmuch as the instant arrangement provides for a free trailing edge of the document or copy sheet supported on the drum 15, a plurality of guide members may be operatively located about the drum periphery to maintain an engaged sheet in close proximity to the drum surface. For this purpose, a plurality of ribs 39 may be attached to the front closure 38 of the machine and supported by means of a rod 41 connected to frame plates 12 and 14. A plurality of similarly spaced ribs 32 may also be supported on the inner surface of door member 31 which when in the closed position provide a guideway encircling at least a portion of the periphery of drum 15. Adjacent the scanning station 40 a wiper bar 36 may be supported on shaft 37 between frame plates 12 and 14 to provide support for holding a sheet tautly on drum member 15 as the drum is rotated about the axis of shaft 10. Wiper bar 36 may be resiliently biased in the clockwise direction as viewed in FIGS. 3-5 so that a sheet at the scanning station 40 is held uniformly against the drum surface 15.

Thus, it may be seen that to attach a sheet 30 to drum member 15, door 31 covering drum 15 is positioned to the full open position as illustrated in FIG. 5. In opening door member 31 from the position shown in FIG. 4 to that of FIG. 5, or approximately through the last 20 degrees of rotation, cam surfaces 33 on door 31 engage surfaces 29 on lever arms 25. Thus, as door 31 is pivoted to the fully opened position of FIG. 5, lever arms 25 are pivoted from the normal lowered position

resting on support pins 26, in the clockwise direction about pivot shafts 27, pivoting cam surfaces 28 to the raised position engageable with the lower surface of bar member 20.

In the event that drum 15 is positioned with bar member 20 at approximately the top dead center position when door 31 is moved to full open position, cam surfaces 28 upon being raised will engage the lower surface of bar member 20 thus driving bar member 20 radially outwardly of drum member 15 to receive sheet 30 between the lip portion 21 and the mating surface along drum 15. However, one of the desirable and essential features of the present invention is to insure that bar member 20 will not be positioned to receive or release a sheet 30 at any rotative position of the drum member other than the predetermined position of rotation. Namely, in the embodiment illustrated, the position whereat bar member 20 is at approximately the top dead center position. Thus, for example, if bar member 20 is positioned adjacent scanning station 40 at the time cam surfaces 28 are pivoted to the raised position, cam surfaces 28 will be ineffective to contact bar member 20 to drive it radially outwardly of drum member 15 at that particular rotative position. However, with cam surfaces 28 in the raised position, drum member 15 may then be rotated to advance bar member 20 from adjacent the scanning station 40 for example, to the top dead center position as shown in FIG. 5. As drum member 15 is thus rotated, bar member 20 engages the raised cam surfaces 28, driving bar member 20 radially outwardly of drum member 15 in opposition to spring members 23. At approximately the top dead center position, bar member 20 engages the stop or abutment 24 on cam surfaces 28 to stop rotation of drum member 15 at the predetermined position of rotation at which sheets 30 are to be attached or removed from drum member 15.

With bar member 20 thus positioned to receive a sheet 30, the leading edge of the sheet may be inserted between the lip portion 21 of bar member 20 and the mating surface along drum 15. With the sheet 30 thus positioned, door 31 may be closed from the position of FIG. 5 to that shown in FIG. 4 allowing lever arms 25 to pivot counterclockwise about pivot shafts 27 thus lowering cam surfaces 28 from the raised position of FIG. 5 to the position of FIG. 4. In this position, cam surfaces 28 will be released from engagement with bar member 20 thus permitting bar member 20 to engage the inserted sheet between lip portion 21 and the mating portion of the drum 15, under the action of springs 23. Thus, the leading edge of the sheet 30 may be attached to the drum 15 while door 31 is still at a partially opened position. This permits the operator to visually check to insure that the sheet has been properly attached before completely closing door 31. With sheet 30 thus attached to the drum member 15, drum 15 is rotated about shaft 10 to advance the sheet past the scanning station 40 whereat the recording and scanning process are respectively accomplished. Upon completion of the recording or scanning processes, the sheet 30 may be removed from drum member 15 by opening door 31 and positioning drum member 15 in a manner similar to that as described in connection with the attachment of a sheet 30 to drum member 15.

While the invention has been described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the true spirit and scope of the invention.

What is claimed is:

1. In a facsimile transceiver, apparatus for conveying sheet material past a scanning station comprising:
 - a housing,
 - a drum member supported within said housing,
 - means for covering said drum member supported within said housing,
 - means for rotating said drum member about the central axis thereof to present successive areas of said drum member proximate to said scanning station,
 - a longitudinal bar member supported through said drum member and having a lip portion extending generally tan-

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gentially in the direction opposite the direction of drum rotation,
 means for biasing said bar member radially inwardly of said drum member for engaging an edge of sheet material between said lip portion and said drum in a first mode of operation, and
 means for operatively coupling said longitudinal bar member and said covering means, said coupling means driving said longitudinal bar member radially outward of said drum member when said drum member and said

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covering means are at predetermined positions in a second mode of operation, whereby an engaged sheet is released from said drum member.

2. The apparatus as defined in claim 1 wherein said coupling means comprises a lever arm including a first cam surface and a second surface, said first cam surface being arranged to operatively engage a lower surface of said bar member and said second surface being arranged to engage an edge of said covering means.

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