(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 960 741 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.12.1999 Bulletin 1999/48

(51) Int. Cl.[6]: **B41J 15/00**, B65H 18/20

(21) Application number: **99100452.4**

(22) Date of filing: **11.01.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **28.05.1998 US 85934**

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(54) A rewinding mechanism for strip material and graphic product systems

(57) A rewinding mechanism 22,24 for rewinding strip material 14 fed through an apparatus 16 performing a work operation on the strip material 14 includes a housing 44 for supporting a drive shaft 50 with a drive roller 56 and an idler shaft 52 with an idler roller 62. The drive shaft 50 is driven by a drive motor 60 at a constant speed in take-up direction. A first rewinding mechanism 22 is placed at a supply end 32 of the apparatus 16 and supports a supply roll 40 of strip material, The first rewinding mechanism 22 allows the strip material 14 to be pulled from the supply roll 40. A second rewinding 24 mechanism is placed at a discharge end 34 of the apparatus 16 and supports a take-up roll 42 with strip material 14. The second rewinding mechanism 24 rewinds the strip material 14 onto the take-up roll 42. However, when the feed direction of the strip material 14 is reversed within the apparatus 16, the first rewinding mechanism 22 rewinds the strip material 14 onto the supply roll 40 and the second rewinding mechanism 24 allows the strip material 14 to be pulled from the take-up roll 42 by the apparatus 16. The roll 40,42 of the strip material 14 rests on the drive and idler rollers 56,62 under its own weight and is driven by friction.

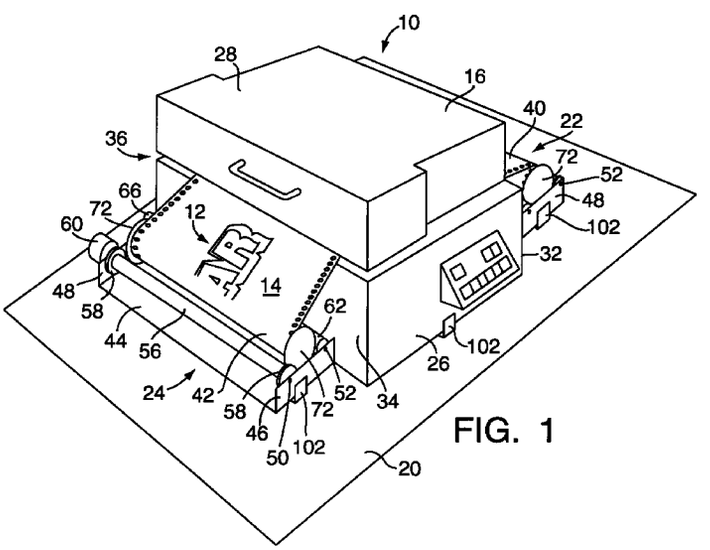

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to an apparatus for making graphic products and, more particularly, to the handling of supply and take-up rolls of strip material therefor.

2. Background Art

[0002] Apparatus such as printers, plotters, and/or cutters are typically used to make graphic products. First, a graphic image is printed or plotted on long strips of material. Then, the graphic image may be cut around its periphery from the strip material, The strip material is generally moved in a feed direction from a supply end of the apparatus in a longitudinal direction to a discharge end. A tool head, such as plotting head or a cutter blade, moves in a lateral direction to perform a work operation on the strip material while the strip material is driven back and forth under the tool head in the feed direction. A print head typically is stationary while the strip material is driven in the feed direction and applies separately printed coats on the strip material, one color at each pass. After each pass, the strip material is then driven back in the direction opposite the feed direction for additional color operations before the graphic image is completed. Similarly, during cutting or plotting operations, the strip material is driven back and forth between the supply end and the discharge end for the graphic image to be plotted or cut, respectively. Frequently, the speed with which the strip material is driven back and forth varies depending on the specific mode of operation of the apparatus. Also, as the strip material is driven back and forth during various operations producing graphic images, the strip material alternatingly overhangs from either the supply end or the discharge end of the apparatus. At the discharge end of the apparatus, the strip material overhangs until it falls onto a table under the apparatus or the floor, or some type of a bin. On the supply end, a roll with strip material is typically supported by a holder supporting the core of the roll. However, when the strip material is driven toward the supply end of the apparatus, the material overhangs the end of the apparatus.

[0003] One problem with strip material overhanging the ends of the printers, plotters and cutters is that the vinyl strip material collects dirt and dust particles. Although most graphic products apparatus include wipers to remove dirt and dust particles, even a small amount of dirt and dust remaining on the vinyl degrades the print quality. When dust and dirt particles remain between the printhead and the strip material, the ink does not get transferred to the vinyl, thereby leaving a blank spot instead of a colored imprint.

[0004] Another difficulty arises when the graphic images become very long. The long strip material is difficult to manage at both ends of the apparatus as the strip material is driven back and forth.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to improve the handling of strip material at the supply and discharge ends of printers, plotters, and cutters.

[0006] It is another object of the present invention to ensure that dirt and dust particles do not collect on the strip material.

[0007] According to the present invention, a mechanism for rewinding strip material from an apparatus performing a work operation on the strip material includes a housing for supporting a drive roller, rotated about a drive shaft by a drive motor, and an idler roller rotatable about an idler shaft. The strip material is wound about a core on a supply roll and is attached to a core of a take-up roll to be rewound at the discharge end of the apparatus. When the apparatus making graphic images drives the strip material from the supply end thereof to the discharge end thereof in a feed direction along a feed path, the strip material is pulled from the supply roll, supported by the first rewinding mechanism, and is rewound onto the take-up roll driven by the second rewinding mechanism. When the feed direction of the strip material is reversed, the strip material is pulled from the take-up roll of the second rewinding mechanism and rewound onto the supply roll of the first rewinding mechanism. Thus, the rewinding mechanism of the present invention can be placed at both, the supply and discharge, ends of the graphic image making apparatus either to rewind the strip material or to allow the strip material to be pulled from the roll by the apparatus, depending on the feed direction of the apparatus.

[0008] In the preferred embodiment of the present invention, a pair of flange assemblies is secured onto each end of the core of the strip material roll such that each flange of the flange assembly protrudes past the thickness of the strip material and makes contact with the drive roller and the idler roller. The flange assembly includes a cam having a plurality of cam surfaces and a plurality of rollers traveling along the corresponding cam surface. The flange assembly ensures that the flange is securely attached unto the core of the roll with strip material. Several advantages of this feature of the present invention are that the flange assembly does not require tools to be placed on the core, locks onto place with a fraction of a turn, and is self-tightening and self-locking.

[0009] According to one feature of the present invention, the rewinding mechanism includes an encoder that detects movement of the idler roller and turns the drive motor on and off. The rewinding mechanism is activated only when the apparatus begins to perform a work operation on the strip material and is turned off when the

encoder indicates a predetermined amount of idle time has elapsed. This feature saves energy and wear on equipment.

[0010] Another embodiment of the present invention includes a pair of drive rollers, the position of which can be adjusted along the drive shaft to accommodate various widths of the strip material.

[0011] One advantage of the present invention is that it improves the quality of the final product by minimizing the amount of dirt and dust settling on the strip material, Another advantage of the present invention is its ability to manage long graphic images. A further advantage of the present invention is that the drive motor is a constant speed motor and the rewinding mechanism of the present invention does not require complex and expensive equipment, such as variable speed motors. An additional advantage of the present invention is that the same rewinding mechanism of the present invention can be placed at both ends of the graphic image apparatus - the supply end and the discharge end. A further advantage of the present invention is easy loading and unloading of the rolls of strip material onto the rewinding mechanism.

[0012] The foregoing and other advantages of the present invention become more apparent in light of the following detailed description of the exemplary embodiments thereof, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a perspective view of an apparatus for making a graphic product on a strip material with rewinding mechanisms disposed on a supply end and a discharge end thereof, according to the present invention;

FIG. 2 is a perspective view of one rewinding mechanism of FIG. 1 with a roll of strip material shown in phantom;

FIG. 3 is an enlarged cross-sectional side view of the roll of strip material of FIG. 2 showing a flange assembly, taken along line 3-3 of FIG. 2;

FIG. 4 is a schematic view of a cam and cam roller traveling on a cam surface in the flange assembly of FIG. 3;

FIG. 5 is a partial, schematic representation of the apparatus of FIG. 1 with the strip material being driven by the apparatus in a feed direction and being pulled from a supply roll supported by the rewinding mechanism;

FIG. 6 is a schematic representation of the apparatus of FIG. 5 with the strip material being driven by the apparatus in the feed direction and being pulled from the supply roll and rewound onto the take-up roll;

FIG. 7 is a schematic representation of the apparatus of FIG. 6 with the strip material being driven by the apparatus in the direction opposite the feed direction and being pulled from the take-up roll and rewound on the supply roll;

FIG. 8 is a perspective view of the rewinding mechanism of FIG. 1 with a roll of strip material shown in phantom, according to another embodiment of the present invention; and

FIG. 9 is a perspective view of the rewinding mechanism of FIG. 1 with a roll of strip material shown in phantom, according to a further embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring to FIG. 1, a system 10 for making a graphic product 12 on a strip material 14 includes an apparatus 16 placed on a base 20 and two material rewinding mechanisms 22,24. The apparatus 16, which can be a printer, plotter and/or cutter, includes a bottom portion 26 and a top portion 28 and has a supply end 32 and a discharge end 34. The apparatus also includes a feed path 36 defined between the top and bottom portions 26,28 and extending in a longitudinal direction from the supply end 32 to the discharge end 34 of the apparatus 16. The apparatus 16 also includes a driving mechanism (not shown) that drives the strip material 14 longitudinally back and forth along the feed path 36. The driving mechanism of the apparatus has several modes of operation that result in the strip material 14 being driven back and forth at different speeds. For example, the speed of the strip material when being printed on is much slower than the speed of the strip material when being merely advanced for repositioning. A tool head (not shown) is disposed in the top portion 28 of the apparatus 16 and may be stationary or move in a lateral direction for performing work operations on the strip material 14.

[0015] The rewinding mechanism 22 disposed at the supply end 32 of the apparatus 16 supports a supply roll 40 of the strip material and the rewinding mechanism 24 disposed at the discharge end 34 of the apparatus 16 supports a take-up roll 42 of the strip material. Each rewinding medianism 22,24 includes a housing 44 having a first side bracket 46 and a second side bracket 48 for supporting a drive shaft 50 and an idler shaft 52. The drive shaft is spaced apart from the idler shaft and supports a drive roller 56. The drive roller 56 has a drive roller diameter and includes a lip 58 on each end of thereof. Each lip 58 is adjacent to side brackets 46, 48 of the housing 44 and has a lip diameter which is greater than the drive roller diameter. The drive roller shaft 50 is driven by a drive motor 60. The idler shaft 52 supports an idler roller 62.

[0016] Referring to FIG. 2, the idler roller 62 extends the width of the housing 44 and freely rotates in either direction about the idler shaft 52. An encoder 66 is secured to the bracket 48 of the housing 44 for monitor-

ing the motion of the idler roller 62. The encoder 66 generates a signal and, through a control circuit 68, communicates with the drive motor 60.

[0017] Referring to FIGs. 2 and 3, the supply and take-up rolls 40,42 with strip material 14 include a core 70 about which the strip material is wound and a pair of flange assemblies 72 on each side of the core 70. The core, shaped as a hollow cylinder, has an inside core surface 74, as best seen in FIG. 3. Each flange assembly 72 includes a round flange 76 and a cam assembly 78 centrally disposed on the flange 76. The cam assembly 78 includes a cam 82 securely attached to the center of the flange 76 and a plurality of cam rollers 84 interconnected by a roller yoke 86. The roller yoke 86 is pivoted about the center of the flange 76 and includes a plurality of slots 88 for allowing radial movement of the cam rollers 84. The cam 82 has a plurality of cam surfaces 90 and a plurality of stops 92 separating each cam surface 90 from another. Each cam surface 90 has a central cam portion 94 and two side cam portions 96, separated from the central cam portion by two bumps 98. Each central cam portion 94 defines a minimum cam diameter 100 and the side cam portions 96 have a diameter gradually increasing towards the stops 92, as shown in FIG. 4. The number of cam rollers 84 corresponds to the number of cam surfaces 90. Each roller 84 makes contact with the cam surface 90 and moves rotatably along the corresponding cam surface.

[0018] In operation, the supply roll 40 is formed by attaching two flange assemblies 72 to open ends of the core 70. Each flange assembly 72 is placed on the end of the core with the cam assembly fitting inside the core. Once the cam assembly 78 fits inside the core 70, at least one of the cam rollers 84 is positioned to make contact with the inside surface 74 of the core. Then, the flange 76 is twisted and the cam rollers 84 roll on the cam surface 90 towards the bumps 98 and the side cam portions 96, as best seen in FIG. 4. Once the cam rollers 84 go over the respective bumps 98, the cam rollers 84 are squeezed between the increased cam diameter and the inside surface 74 of the core. The bumps 98 prevent the cam rollers 84 from rolling back towards the center portions of the cam surfaces 90.

[0019] Once both ends of the supply core have the flange assemblies 72 securely on, the supply roll 40 under its own weight is placed on the rewinding mechanism 22 on the supply end 32 of the apparatus 16. The supply roll 40 rests on the drive roller 56 and the idler roller 62 and is in frictional engagement with the rollers 56, 62. Similarly, the take-up roll 42 includes a pair of flange assemblies 72 secured to its ends. The strip material 14 from the supply roll 40 is fed through the feed path 36 of the apparatus 16 and attached to the core of the take-up roll 42. Alternatively, a leader can serve as an intermediary between the core of the take-up roll 42 and the strip material 14. One end of the leader can be taped to the core of the take-up roll 42 and the other end of the leader can be removably attached to the strip material 14. The take-up roll 42 also rests under its own weight on the drive roller 56 and idler roller 62 of the rewinding mechanism 24 in frictional engagement with the rollers 56, 62.

[0020] The rewinding mechanisms 22,24 at the supply end 32 and at the discharge end 34 of the apparatus 16 are properly lined up with the apparatus 16. The base 20 includes a plurality of tabs 102 to ensure proper alignment of the rewinding mechanisms 22,24 with respect to the apparatus 16, as best seen in FIG. 1. The lips 58 ensure that flanges 76 are properly aligned.

[0021] Referring to FIG. 5, as the apparatus 16 starts a work operation on the strip material 14, the apparatus 16 positively drives the strip material 14 by means of friction or sprocket wheel drive mechanism 110 from the supply end 32 of the apparatus to the discharge end 34 of the apparatus along the feed path 36. As the drive mechanism 110 of the apparatus 16 drives the strip material 14 in the longitudinal direction, the strip material is pulled from the supply roll 40. The supply roll 40 begins to rotate counterclockwise in response to the strip material 14 being pulled from the supply roll. The rotating supply roll 40 begins to rotate the idler roller 62 of the rewinding mechanism 22. When the idler roller 62 begins to rotate, the encoder 66 registers the movement of the idler roller 62 and signals the drive motor 60 via the control circuit 68 to turn on the drive motor 60. The motor 60 then rotates the drive roller 56 in the counterclockwise direction at a constant speed. The drive roller 56 rotating counterclockwise attempts to rotate the supply roll 40 in clockwise direction so as to rewind the supply roll 40. But since the apparatus 16 is positively driving strip material 14 from the supply end 32 to the discharge end 34, the strip material continues to be pulled from the supply roll 40 rotating the supply roll in the counterclockwise direction and slippage between the frictionally engaged drive roller 56 and the flanges 76 of the flange assemblies 72 occurs. The rotational speed of the supply roll 40 is governed by the driving speed of the drive mechanism 110 of the apparatus because slippage between the flanges 76 and the drive roller 56 occurs. Thus, the strip material continues to be pulled off the supply roll 40 at a speed substantially equal to the speed of the strip material being driven through the apparatus 16.

[0022] Referring to FIG. 6, on the discharge end 34 of the apparatus 16, as the strip material 14 is driven through the apparatus and is discharged at the discharge end 34 of the apparatus, the drive motor 60 drives the drive roller 56 in the clockwise direction, causing the take-up roll 42 to rotate in the counterclockwise direction. When the take-up roll 42 rotates in the counterclockwise direction, the strip material 14 coming from the apparatus is rewound on the take-up roll 42. Although the drive motor 60 drives the drive roller 56 at a faster speed than the speed of the strip material coming from the discharge end 34 of the apparatus, the rotational speed of the frictionally engaged take-up roll

42 is governed by the speed of the discharged strip material, resulting in slippage between the flanges 76 of the take-up roll 42 and the drive roller 56. When the apparatus 16 stops feeding the strip material with the drive roller 56 still attempting to rewind the strip material, material tension is produced. The material tension causes the take-up roll 42 to lift off the drive roller 56 and remain in contact with the idler roller 62.

[0023] Referring to FIG. 7, when the feed direction of the strip material 14 in the apparatus 16 reverses, and the strip material is driven from the discharge end 34 to the supply end 32, the take-up roll 42 functions in the same manner as the supply roll 40 and the supply roll 40 functions in the same manner as the take-up roll 42. The positive drive mechanism 110 of the apparatus 16 pulls the strip material 14 from the take-up roll 42, causing the take-up roll 42 to rotate clockwise and causing slippage between the flanges 76 of the take-up roll 42 and the drive roller, which continues to rotate in the clockwise direction. The supply roll 40 begins to be rotated in the clockwise direction by the drive roller 56 because the strip material is no longer pulling the supply roll in the opposite direction.

[0024] The rotational speed of the drive roller 56 is set to be fast enough for the take-up roll to rewind strip material on an empty core when the apparatus operates at its fastest mode and discharges the strip material at the fastest rate. When the core is empty, the take-up roll must rotate faster to rewind the strip material in a timely fashion. However, rotational speed of both the supply roll and the take-up roll is governed by the speed that the strip material is driven through the apparatus, resulting in slippage between the drive roller and flanges. The idler rollers 62 are rotated by the supply roll 40 and the take-up roll 42 in either direction. After the apparatus 16 stops driving the strip material and the idler roller 62 comes to a stop, the encoder 66, after a certain predetermined delay, turns the drive motor 60 off.

[0025] The best mode embodiment of the present invention depicts a single drive roller 56 and a single idle 62 roller extending the width of the respective shafts 50,52. However each shaft 50, 52 can support two drive rollers and two idle rollers disposed on each end of the respective shaft to interact with two flanges 76. Additionally, some apparatus have capability to accommodate different widths of the sheet material 14. To be compatible with such apparatus, the rewinding mechanism 122 can be configured to have a single idler roll 62 and multiple drive rollers 156, as shown in FIG. 8. Alternatively, the rewinding mechanism can be configured to include a pair of adjustable drive rollers with preset positions along the drive shaft 150. Furthermore, a single drive roller 256 may have pairs of multiple lips 258 positioned at predetermined locations along its length to accommodate various widths of the sheet material 14, as shown in FIG.9.

[0026] One advantage of the present invention is that it improves the quality of the final product by minimizing the amount of dirt and dust settling on the strip material. Another advantage of the present invention is its ability to manage long graphic images. A further advantage of the present invention is that the drive motor is a constant speed motor and the rewinding mechanism of the present invention does not require complex and expensive equipment, such as variable speed motors. An additional advantage of the present invention is that the same rewinding mechanism of the present invention can both rewind and supply the strip material and therefore, can be placed on both ends of the graphic image apparatus - the supply end and the discharge end. A further advantage of the present invention is easy loading and unloading of the rolls of strip material onto the rewinding mechanism. The strip material is merely placed onto the rewinding mechanism.

[0027] Although the preferred embodiment shows the rewinding mechanism supporting the roll of strip material with flanges 72 disposed on both ends thereof, the rewinding mechanism of the present invention can rewind strip material onto a roll without having the flanges 72 on both ends. The roll 40 or 42 can rest directly on top of the drive and idler rollers 56, 62 under its own weight and can have the strip material either rewound or pulled therefrom, depending on the direction of the feed of the strip material.

[0028] Although the preferred embodiment of the present invention uses a Dayton™ Capacitor Start Gearmotor sold by Grainger™ , having a place of business in Hartford, Connecticut, numerous other types of motors can be used to drive the drive roller 56. Additionally, the rewinding mechanisms 22, 24 can be configured to share a single motor 60 that would drive both drive rollers 56. A belt system can be used to interconnect two drive rollers 56 of the rewinding mechanisms 22, 24.

[0029] Although the specification describes the housing 44 of the rewinding mechanism as having side brackets 46, 48 and the base 20 having tabs 102 for aligning the rewinding mechanism relative to the apparatus 16, the base 20 can have the side brackets 46, 48 integrally formed therewith to eliminate the need for the tabs 102.

Claims

1. A mechanism 24 for rewinding strip material 14 onto a roll 42 of strip material as said strip material 14 being discharged from an apparatus 16 performing a work operation on said strip material 14 and driving said strip material 14 in a feed direction along a feed path 36, said mechanism 24 characterized by:

   a housing 44;
   a drive roller 56 disposed on a drive shaft 50 supported by said housing 44;
   an idler roller 62 disposed on an idler shaft 52

supported by said housing 44 and spaced apart from said drive roller 56, said idler roller 62 and said driver roller 56 engaging a roll 42 of strip material; and

a drive motor 60 driving said drive shaft 50 and causing said roll 42 to rotate to rewind said strip material 14.

2. The mechanism 24 according to claim 1, wherein said drive motor 60 rotates said drive shaft 50 in one direction at a substantially constant speed.

3. The mechanism 24 according to claim 1 or 2, wherein said drive motor 60 rotates at a constant speed sufficient to rewind said strip material 14 onto an empty core of said roll 42 of strip material.

4. The mechanism 24 according to claim 1, 2 or 3, wherein said roll 42 of strip material 14 rests on said drive roller 56 and said idle roller 62 under its own weight allowing slip between said roll 42 of strip material and said drive and idler rollers 56, 62.

5. The mechanism 24 according to anyone of the foregoing claims, wherein said strip material 14 is pulled from said mechanism 24 by a drive means of said apparatus 16 when said feed direction of said apparatus 16 is reversed.

6. The mechanism 24 according to anyone of the foregoing claims, further characterized by an encoder 66 disposed adjacent to said idler roller 62 for detecting movement thereof.

7. The mechanism 24 according to claim 6, wherein said encoder 66 activates and deactivates said drive motor 60.

8. The mechanism 24 according to anyone of the foregoing claims, wherein said drive roller 56 includes a plurality of lips 258 disposed along said drive roller to accommodate the various widths of said strip material 14.

9. The mechanism 24 according to anyone of claims 1 to 7, wherein said drive roller 56 includes at least two drive rollers disposed along said drive shaft 50 to accommodate the various widths of said strip material 14.

10. The mechanism 24 according to anyone of the foregoing claims, further characterized by a flange assembly 72 disposed on each end of said roll 40 of strip material 14, each said flange assembly 72 coming into contact with said drive roller 56 and said idler roller 62.

11. The mechanism 24 according to claim 10, wherein said flange assembly 72 further characterized by:

a flange 76 having a substantially round shape;
a cam 82 fixedly attached to said flange 76, said cam 82 having a cam surface 90;
a plurality of cam rollers 84 each of said plurality of cam rollers 84 rotatably traveling along a corresponding said cam surface 90; and
a yoke 86 interconnecting each of said plurality of cam rollers 84 and allowing each of said plurality of cam rollers 84 to move radially, said yoke 86 rotatably attached to said cam 82.

12. A system for 10 printing, plotting or cutting a graphic image 12 on a strip material 14, said system characterized by:

an apparatus 16 for performing a work operation on said strip material 14, said apparatus 16 driving said strip material 14 along a feed path 36 generally from a supply end 32 to a discharge end 34 in a feed direction;
a first rewinding mechanism 22 disposed on said supply end 32 and supporting a supply roll 40 of said strip material 14; and
a second rewinding mechanism 24 disposed on said discharge end 34 of said apparatus 16, said second rewinding mechanisms 24 supporting a take-up roll 42 of said strip material 14 to rewind said strip material 14.

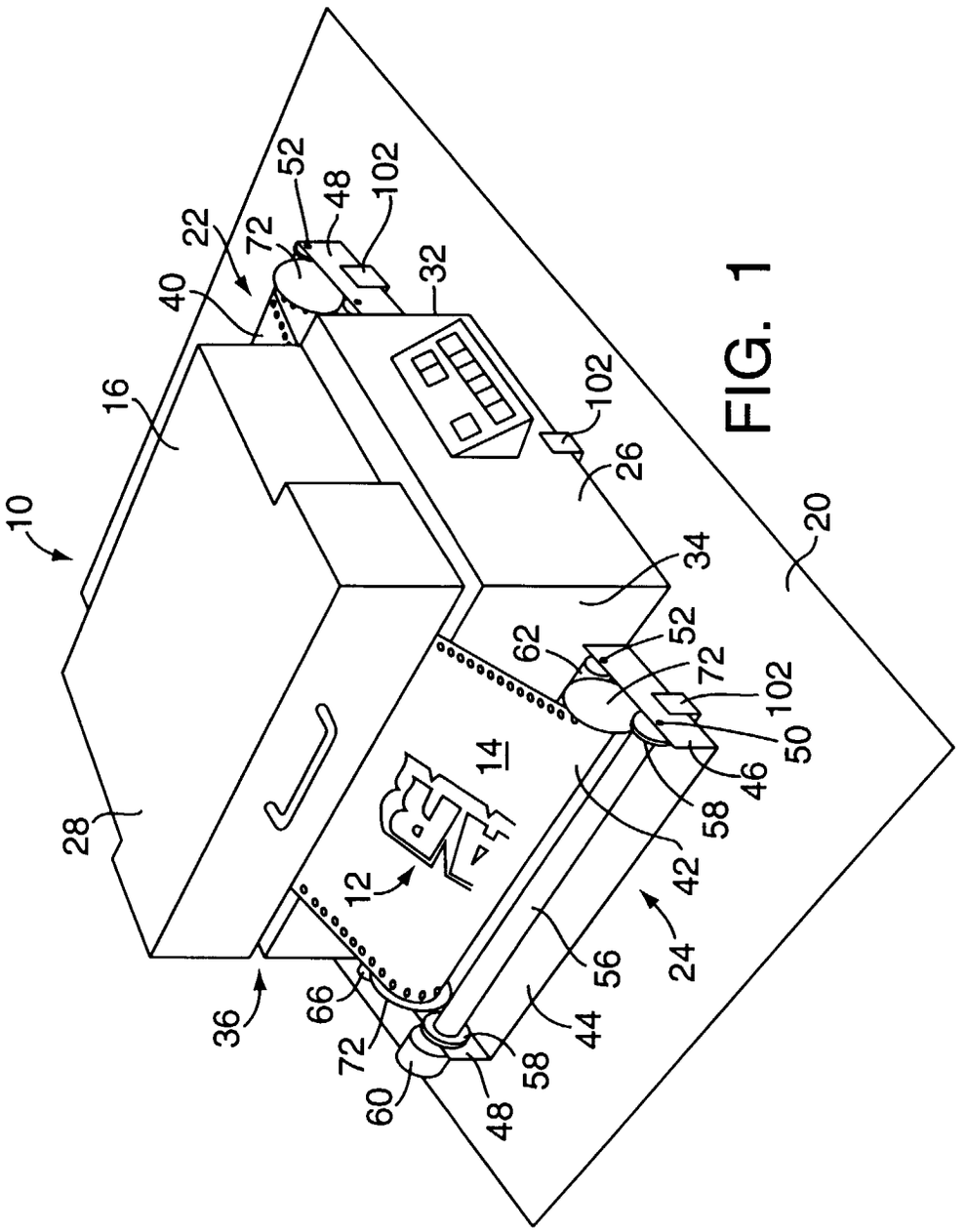
13. A flange assembly 22 for attaching onto a core of a roll of strip material 14 characterized by:

a flange 76 having a substantially round shape;
a cam 82 fixedly attached to said flange 76, said cam 82 having a plurality of cam surfaces 90;
a plurality of cam rollers 84 with each of said plurality of cam rollers 84 rotatably traveling along a corresponding said cam surface 90; and
a yoke 86 interconnecting each of said plurality of cam rollers 84 and allowing each of said plurality of cam rollers 84 to move radially, said yoke 86 movably attached to said cam 82.

14. The flange assembly 72 according to claim 13 wherein each of said plurality of cam surfaces 90 further characterized by a central cam portion 94 having a minimum cam diameter 100 and a pair of side cam portions 96 having a gradually increasing diameter, said side cam portions 96 disposed on each side of said central cam portion 94, said cam rollers 84 traveling from said central cam portion 94 toward said side cam portions 96 such that each said roller 84 engages said cam surface 90 and inside surface 74 of said core 70 to secure said

flange assembly 72 onto said core 70.

15. The flange assembly 72 according to claim 14 wherein each of said plurality of cam surfaces 90 further comprises a pair of bumps 98 separating said side cam portions 96 from said central cam portion 94 to prevent said cam rollers 84 from rolling toward said central cam portion 94.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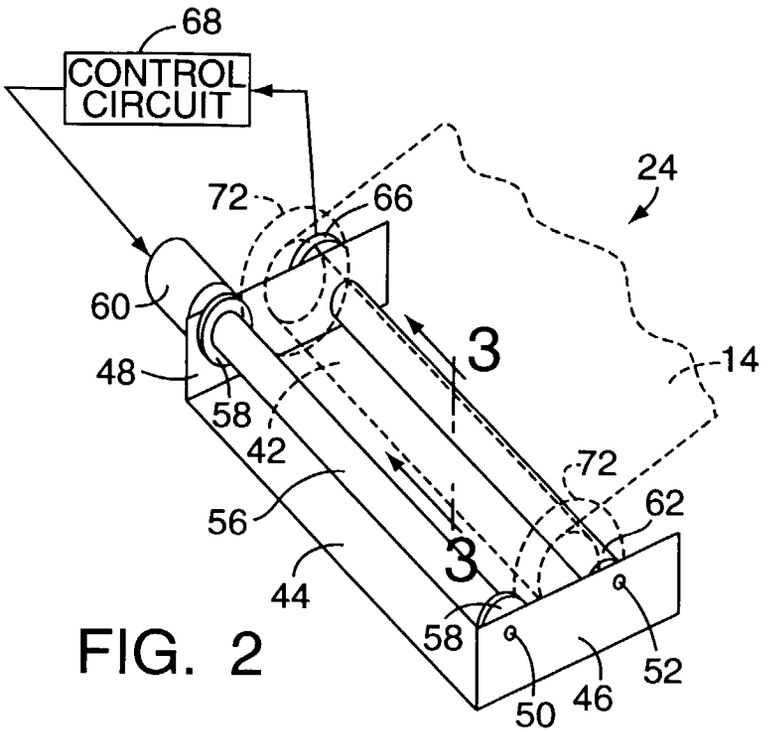
28

FIG. 1


68
CONTROL CIRCUIT
24
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48
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56
44
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62
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FIG. 2

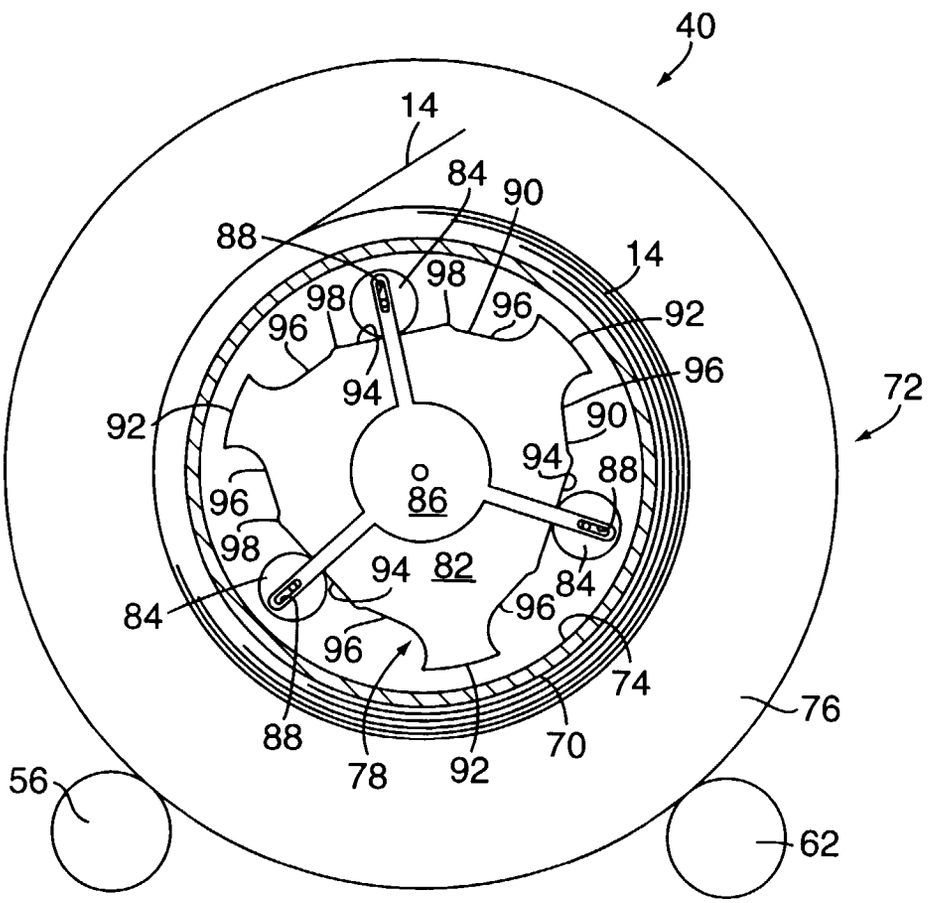
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FIG. 3

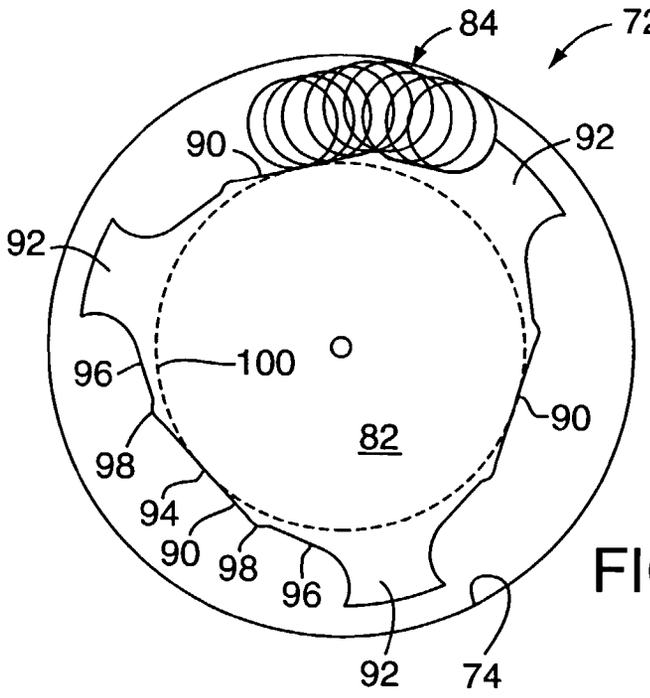

FIG. 4

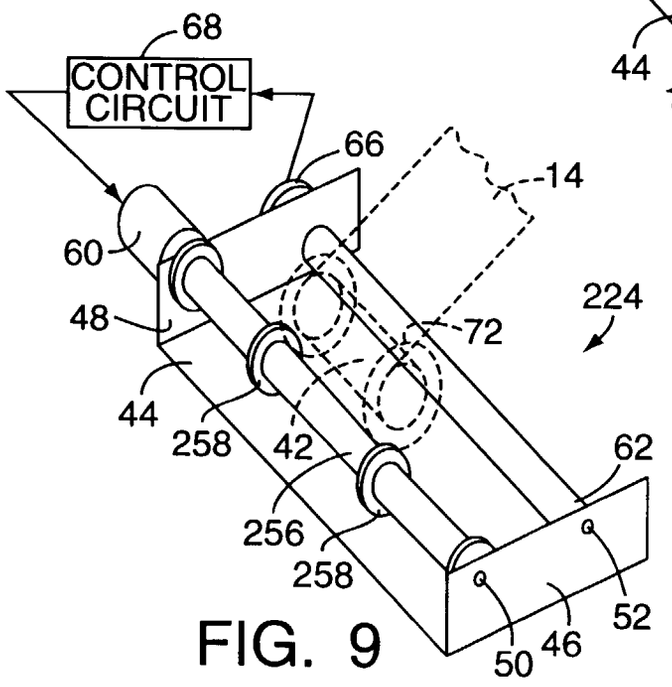

FIG. 9

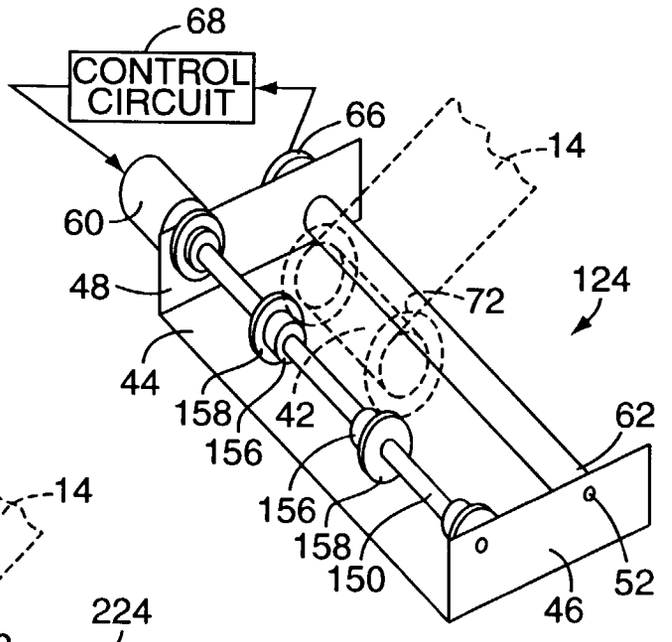

FIG. 8

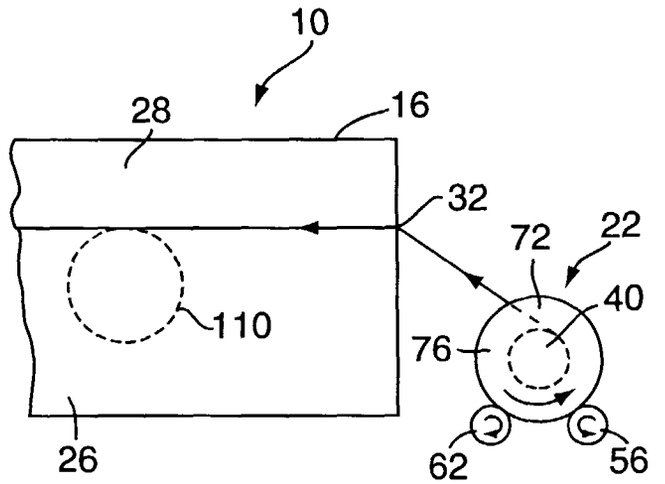

FIG. 5

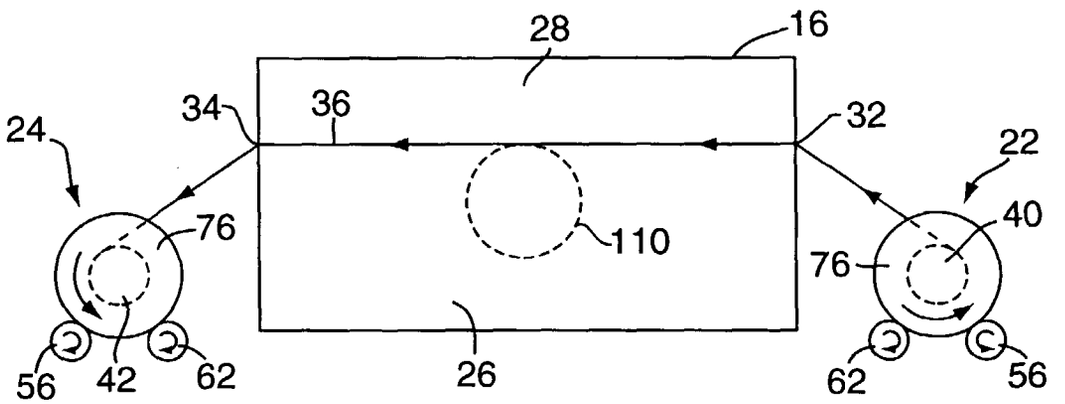

FIG. 6

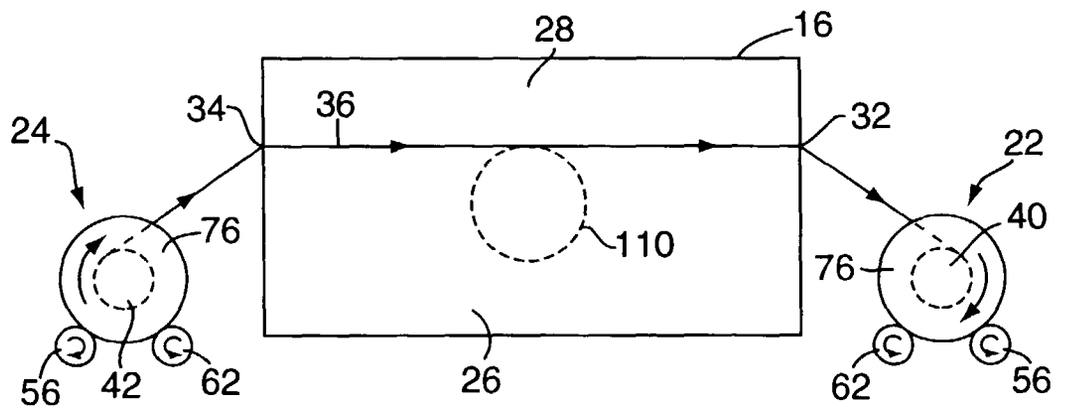

FIG. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 0452

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	EP 0 694 409 A (CANON KK) 31 January 1996 (1996-01-31) * column 5, line 40 - column 6, line 40; figure 1 *	12 1,4	B41J15/00 B65H18/20
Y	US 3 834 637 A (REED G) 10 September 1974 (1974-09-10) * column 1, line 1 - line 36 * * column 2, line 48 - column 3, line 12; figures 1,2 *	1,4	
A	US 5 575 436 A (MCDERMOTT MICHAEL F) 19 November 1996 (1996-11-19) * column 3, paragraph 1; figure 1 *	1,4	
A	DATABASE WPI Section PQ, Week 9834 Derwent Publications Ltd., London, GB; Class Q36, AN 98-393154 XP002099672 & JP 10 157888 A (YAMAZAKI T), 16 June 1998 (1998-06-16) * abstract *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B41J
B65H

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 April 1999	Wehr, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 99 10 0452

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-12

European Patent Office

LACK OF UNITY OF INVENTION SHEET B

Application Number
EP 99 10 0452

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-12

   A mechanism for rewinding strip material onto a roll of strip material with a drive roller for causing said roll to rotate and with an idler roller; a system for printing, plotting or cutting a graphic image on a strip material with a first rewinding mechanism disposed on a supply end and a second rewinding mechanism disposed on the discharge end

2. Claims: 13-15

   a flange assembly for attaching onto a core of roll of strip material comprising a flange and a cam attached to said flange and a plurality of cam rollers that are interconnected by a yoke

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 10 0452

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-04-1999

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82