United States Patent

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[54] **WEB-SUPPORTING ROLLER ASSEMBLY**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **242/71.8,** 226/196, 242/68, 242/73, 242/76
[51] **Int. Cl.** **B65h 75/14**
[50] **Field of Search** 242/68, 71.9, 73, 76, 71.8, 118.5; 226/196, 199

[56] **References Cited**
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ABSTRACT: Web-supporting roller assembly adapted to support a wide web of sheet material in perfect edge alignment for transport through web-processing equipment. The roller assembly comprises a central shaft, a web-supporting cylindrical tube thereon, flanges adapted to make locking engagement with each end of said tube and with said shaft. The web on said tube is greater in width than said tube and the flanges are greater in diameter than said tube so that the web, in loosely-wound form, can be tapped into perfect edge alignment on the tube by the flanges which can then be locked to said tube and said shaft to secure the web for transport through the apparatus.

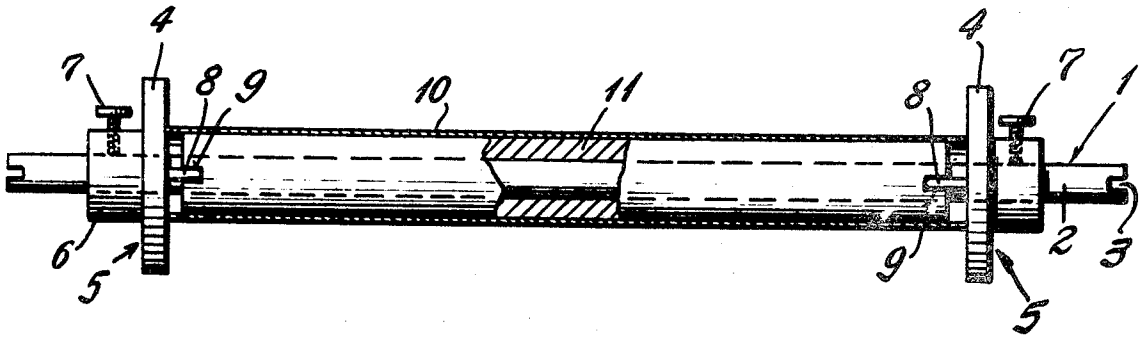

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Fig. 1

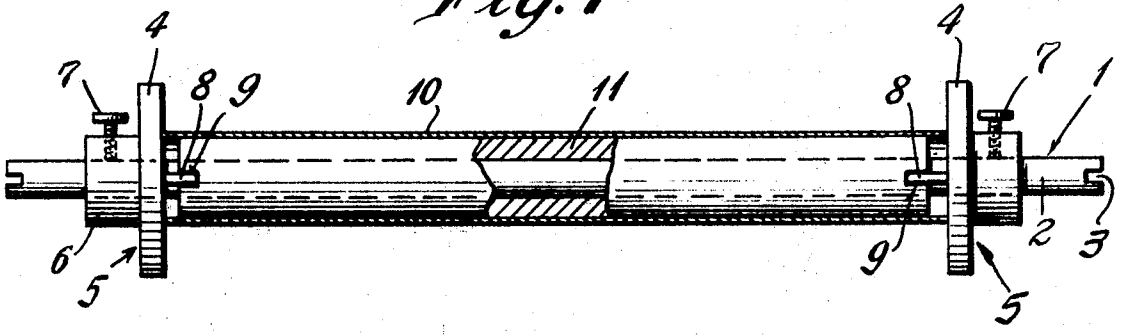


Fig. 2

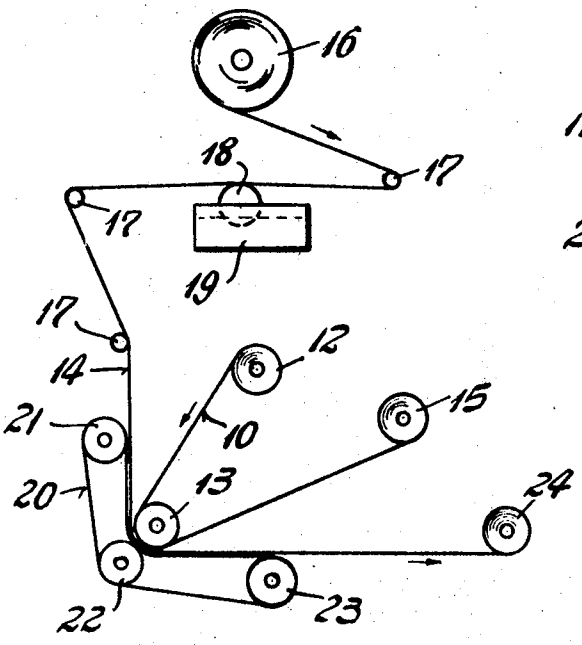


Fig. 3

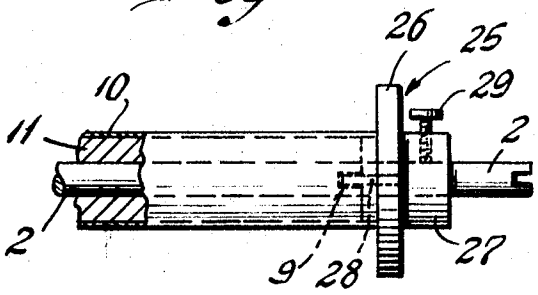


Fig. 4

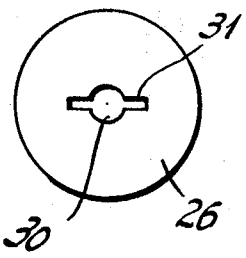
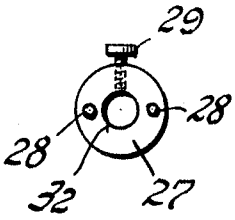


Fig. 5



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WEB-SUPPORTING ROLLER ASSEMBLY

The present invention is concerned with the problem of mounting one or more wide webs of sheet material on a sheet processing apparatus in such a manner that the web is initially secured in perfect edge alignment on its roller and maintained in such alignment for straight transport through the processing apparatus. The invention is primarily concerned with pattern-copying machines but the advantages of the invention are also applicable to any apparatus for processing webs of sheet material such as for the printing, coating, reading, cutting, etc. thereof.

In pattern-copying machines such as the Chemi-Copier Machine of the Perforated Pattern Co., Inc., New York, a web of reverse-imaged master paper up to 6 feet in width is transported from a master source roller into image-forming contact with a web of copy paper of suitable width. Image-forming material is dissolved from the master web to the copy web to form a direct-reading pattern on the copy web corresponding to the reverse pattern on the matter web. Thereafter the master web proceeds to a master takeup roller and the copy web proceeds to a copy takeup roller. The master takeup roller can then be interchanged with the master source roller and the master web can be transported a second time into image-forming contact with a fresh section of the copy paper web to produce a second copy of the master pattern. This procedure can be repeated to produce as many copies as desired since the image-forming composition on the master web is generally a hectograph composition capable of producing a great number of copies.

The most important problem encountered with pattern-copying machines of this continuous type is the difficulty of securing the master web in perfect edge alignment so that it will be brought into perfect registration with the copy web, free of wrinkles and without tearing, at the point where the webs make image-forming contact.

Up until the present invention, it has been conventional to wind the master web on a source roller and collect it on a takeup roller, each of which comprises a supporting tube having a greater width than the width of the web. The web never attains perfect edge alignment of such a tube and therefore the web undergoes stress when it is transported through the apparatus. This frequently causes the web to wrinkle and may even result in tearing of the web. Even slight wrinkling is a critical disadvantage in the pattern-copying field since the master and copy webs must be in perfect surface contact at the point of image formation or else the images transferred to the copy web will be spotty and the copy pattern will not correspond exactly to the dimensions of the original unwrinkled master pattern.

It is the principal object of the present invention to overcome these problems and disadvantages of the prior known web-supporting and transporting systems and to provide a web-supporting roller assembly adapted to place and retain a continuous web of sheet material in perfect edge alignment.

These and other objects and advantages will be clear to those skilled in the art in the light of the present disclosure including the drawings in which:

FIG. 1 is a top view of the web-supporting roller assembly according to one embodiment of this invention,

FIG. 2 is a schematic side view of a pattern-copying apparatus incorporating the present invention,

FIG. 3 is an enlarged fragmentary view of a section of a web-supporting roller assembly according to another embodiment of this invention, and

FIGS. 4 and 5 are plan views of the flange section 26 and the collar section 27 respectively of FIG. 3.

The objects and advantages of the present invention are accomplished by means of the discovery of a novel web-supporting roller assembly which permits a wide web of sheet material to be collected thereon and which permits such a web to be tapped into perfect edge alignment in a simple and reliable manner. The present preferred web-supporting roller assembly is illustrated by FIG. 1 of the drawings. The assembly 1 comprises a central shaft 2 adapted to attach the assembly to a processing apparatus. As illustrated, the shaft has means such as slots 3 at the ends thereof for engagement with a drive shaft on the processing apparatus. The shaft carries two flanges 4 comprising flange sections 5 and shaft collar sections 6 slidably mounted over the shaft and containing means for releasably securing the collars to the shaft, such as screw means 7.

The flange sections 5 are adapted to confine between them on the shaft a wide web 10 of sheet material wound on a hollow tube 11. The width of tube 11 is slightly less than the width of web 10 so that the edges of the web 10 contact the inner faces of each of the flange sections whereas the ends of the tube 11 do not contact either flange section. The ends of the tube, however, preferably contain notches or slots 9 which are engaged by individual projections such as pins 8 extending outwardly from the inner faces of each of the flanges 4, the pins 8 being sufficiently long and/or wide to engage the areas of the tube adjacent the notches 9 when the tube 11 carrying the web 10 is confined between the flange sections 5 and the flanges are secured to the shaft by screw means 7.

The position of the projections or pins 8 on each flange will correspond to the radius of the tube 11 so that the projections center the tube over the shaft. If the inner diameter of the tube is only slightly greater than the diameter of the shaft, then the tube will be self-centering and the projections will extend from each flange adjacent the hub section. If the inner diameter of the tube is much larger than the diameter of the shaft, then a continuous projection ring or two or more oppositely disposed pins are preferred on each flange to keep the tube centered over the shaft, and the ring or pins will be positioned on the face of each flange section 5 at positions corresponding to the radius of the tube. The overlap of the web of sheet material adjacent each flange will rest upon the projections and help maintain the tube and web centered over the shaft.

It is preferred that each of pins 8 has a length slightly greater than the depth of notch 9 plus one-half the difference between the width of the web and the width of the tube. In this way the length of each pin is such that the tip of each pin makes pressure engagement with the portion of the tube recessed within each notch and the tube is thus maintained centered even when the web is not present thereon.

FIG. 2 of the drawings illustrates a pattern-copying apparatus embodying the present invention. A continuous web 10 of master paper imaged with alcohol-soluble dyestuff is expended from supply roller 12 and around pressure contact roller 13 into contact with a continuous web 14 of copy paper to effect copying. The copy paper is expended from supply roller 16, under a first idler roller 17 and over application roller 18 which moistens the web with alcohol from vat 19. The moist web passes around second and third idler rollers 17 and is transported by continuous drive belt 20 into pressure contact with the imaged side of the master web 10 between pressure contact rollers 13 and 22. Belt 20 is transported over rollers 21, 22 and 23, one or more of which are power driven.

The master images contact the moistened copy web in the nip of rollers 13 and 22 to cause the solvent on the copy web to dissolve dyestuff from the images present on the master web and produce a copy of such images on the copy web. The imaged copy web is collected on takeup roller 24, and the used master web is collected on takeup roller 15.

According to the present invention, master sheet rollers 12 and 15 are as illustrated by FIG. 2 of the drawings so that the master web 10 can be placed in perfect edge alignment on the source roller 12 for straight transport to pressure roller 13 and so that the master web collected on takeup roller 15 can easily be placed in perfect edge alignment for retransport through the apparatus to produce a second copy.

Once the master web is collected on takeup roller 15, it is necessary to interchange web-carrying roller 15 with empty supply roller 12 to produce a second copy. Referring to FIG. 1 as illustrative of takeup roller 15 of FIG. 2 carrying the used

master web, the used master web is realigned thereon by loosening the screw means 7 on both of the shaft collar sections 6 and separating the flanges 4 from the web 10 to withdraw the pins 8 from contact with the web-supporting sleeve 11. The flanges, which are slidable over the shaft, are then simultaneously tapped lightly against the opposite edges of the web to realign the edges of the loosely-wound web. When the web is aligned the flanges 4 are positioned against the opposite edges thereof. The pins 8 center the tube 11 beneath the web 10 and confine it in place. Then the screws 7 on shaft collar sections 6 are tightened to lock the flanges 4 to the shaft and to confine the flange sections 5 against each edge of the web.

Referring to FIG. 2, this realignment step may be carried out while the web is positioned on takeup roller 15 or after roller 15 has been interchanged with empty supply roller 12 for retransport through the apparatus to produce a second copy. The web-supporting tube 11 is maintained centered beneath the web 10 by means of pins 8 and the web 10 is maintained in perfect edge alignment by means of flanges 4. Thus the web travels straight and flat, free of lateral stresses, through the apparatus and does not develop wrinkles or tear. This permits the making of exact copies which correspond exactly to the dimensions of the subject matter on the master, such as a series of patterns.

The web-supporting tube 11 is generally at least about one-eighth inch and up to about 1 inch shorter at each end than the web 10 it carries. Preferably the tube is from one-fourth to one-half inch shorter at each end than the web. The web, in the pattern-copying field, generally has a width of from about 3 to 6 feet. It should be understood that the difference between the width of the tube and the width of the web can be varied depending upon the nature and length of the sheet material being employed. In all cases, however, the tube must be at least one-eighth inch shorter at each end in order to obtain the benefits of the present invention.

If the tube is less than one-eighth inch shorter at each end, or of equal width to the web, then the tube will generally be exposed at one end or the other so that during the tapping operation one flange will contact the tube while the other contacts the web. This frequently causes the edge of the web on the side contacted by the flange to buckle or fold and get lodged between the flange and the edge of the tube. Thus, during the unwinding operation, that edge of the web is prevented from unwinding freely and tears or at least undergoes stress which causes wrinkling of the web.

According to another embodiment of this invention, the flanges employed may be two-piece flanges 25 as illustrated in FIGS. 3, 4 and 5 of the drawings. These comprise flange sections 26 and collar sections 27 which carry the tube-engaging pins 28 and means 29 for locking the collar section 27 to the shaft 2.

As shown more clearly in FIG. 4, the flange section 26 has a hub 30 which is slidable over the shaft 2 and has openings such as slots 31 which accommodate the pins 28 of the collar section 27 when the collar section is positioned in surface contact with the flange section.

The collar section 27, as shown in FIG. 5, has a hub 32 which is slidable over the shaft and has the tube-engaging pins 28 mounted thereon. The location of the pins may be adjustable along the radius of the collar to accommodate web-supporting tubes of different diameters if desired.

The flanges of FIG. 3 are advantageous in that the flange sections 26 may be used to tap the web into alignment without interference between the pins 28 and the web-supporting tube 11. When the one-piece flange 4 of FIG. 1 is used, the pins 8 thereon must be guided into the notches 9 of the tube 11 in order to tap the web 10 into alignment. However this presents no real problem.

While the embodiment of the invention specifically illustrated by FIGS. 3 to 5 of the drawings comprises slotted flanges, it should be understood that openings of any shape are suitable which permit the pins of the shaft collars to pass through to the web-supporting tube. Slots are preferred, however, particularly in association with shaft collars on which the pins are radially adjustable to accommodate web-supporting tubes of different diameters.

It should also be understood that the present web-supporting tubes need not be provided with notches to receive the pins of the shaft collar, although this is preferred since it restrains the tube against rotation relative to the shaft collars and shaft. However, the extremities of the tube may be engaged by the pins and the latter may be provided, if desired, with points which pierce the tube edges slightly to restrain the tube from movement relative to the pins. Similarly, the projections on the flanges may comprise continuous rings which project from the flange sections and engage the entire circumference of the extremities of the tube thereby increasing the area of contact and reducing the possibility of relative slippage between the flanges secured to the shaft and the web-supporting tube having the web secured thereto.

I claim:

1. Web-supporting roller assembly adapted to support a wide web of flexible sheet material in perfect edge alignment for transport through web-processing equipment which comprises a central shaft, a web-supporting tube on said shaft, and flanges slidable on said shaft at each end of said tube, each said flange comprising a shaft collar section provided with locking means adapted to secure said collar to said shaft, a flange section adapted to engage the edge of the web on said tube, and at least one projection extending outwardly from said flange section to engage said web-supporting tube, said projection extending at least one-eighth inch from said flange section, whereby a web of flexible sheet material which is at least one-fourth inch wider than said tube can be wound on said tube and tapped into perfect edge alignment by said flange sections and said tube can be centered beneath said web and secured to said flanges by means of said projection which engages the extremities of said tube whereby the edges of said web are engaged only by said flange sections and said tube is engaged only by the projection extending from said flange sections and is maintained spaced from each said flange section by said projection to prevent the edges of the web from becoming lodged between the extremities of said tube and said flange sections.

2. An assembly according to claim 1 in which said projections on said flanges comprise individual pins.

3. An assembly according to claim 2 in which said flanges comprise separable flange sections and collar sections, and said projections comprise individual pins, the said pins being mounted on said collar sections and the flanges sections being provided with opening through which said pins extend into engagement with said tube when the flange sections are in engagement with the ends of the web on the tube and the shaft collar sections are positioned against the flange sections.

4. An assembly according to claim 1 in which said web-supporting tube is provided with slots at each end thereof and the projections on each flange comprise individual pins which enter said slots and engage the area of said tube adjacent said slots, said pins being sufficiently long that the ends of said tube are spaced from said flange sections by at least one-eighth inch when said pins are in engagement with said notch areas.

5. An assembly according to claim 1 in which said web comprises a paper web carrying a pattern imaged thereon with hectograph duplicating composition.