United States Patent [19]

Hurst

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[45] **May 27, 1975**

[54] **WEB SPLICING APPARATUS**

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[21] Appl. No.: **311,678**

[30] **Foreign Application Priority Data**

Dec. 6, 1971 United Kingdom 56634/71

[52] **U.S. Cl.** **156/504;** 156/157; 242/58.3; 242/58.4

[51] **Int. Cl.** **B65h 19/18**

[58] **Field of Search** 156/157, 159, 502, 504, 156/505, 544, 545; 242/154, 58.1, 58.3, 58.4, 58.5

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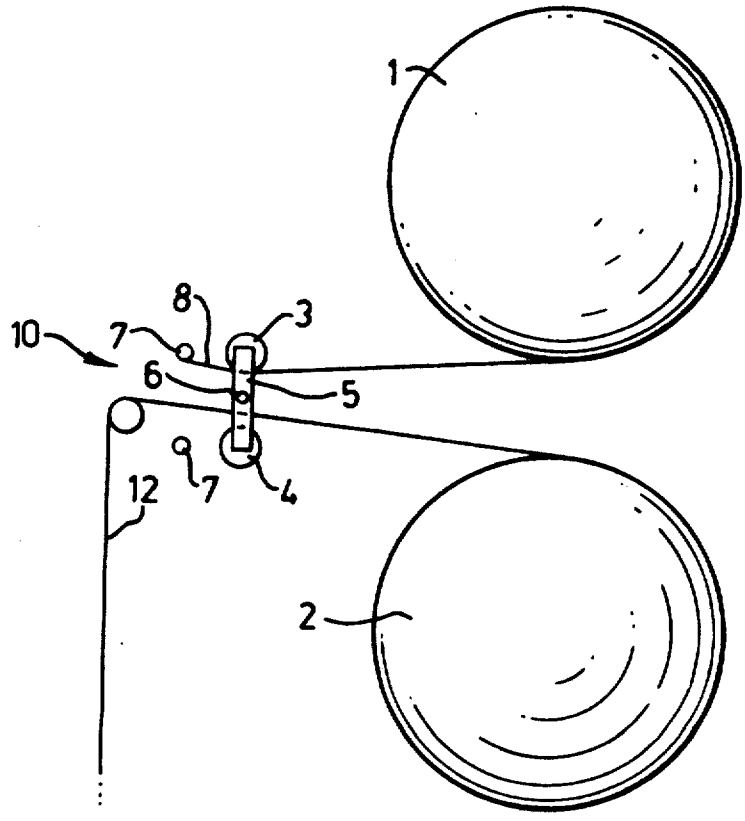
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Primary Examiner—William A. Powell
Assistant Examiner—Brian J. Leitten
Attorney, Agent, or Firm—Brady, O'Boyle & Gates

[57] **ABSTRACT**

The invention is a simple and inexpensive means for splicing together webs of paper, particularly for a newspaper printing press where it is desirable to be able to change reels of paper without stopping the press. The splicing means comprises a pair of rollers mounted on a common carrier which is trunnion mounted for rotation about an axis disposed between the rollers. The splicing means can be moved from a position where two webs to be joined pass between rollers without contacting one another, to a transposed position in which the webs are brought together and the resultant combined web is constrained to follow a sinuous path about the rollers. The end of the new web is pasted in any convenient manner. The mechanism for rotating the carrier may be a rack and pinion device actuated by a double-acting pneumatic ram.

3 Claims, 22 Drawing Figures



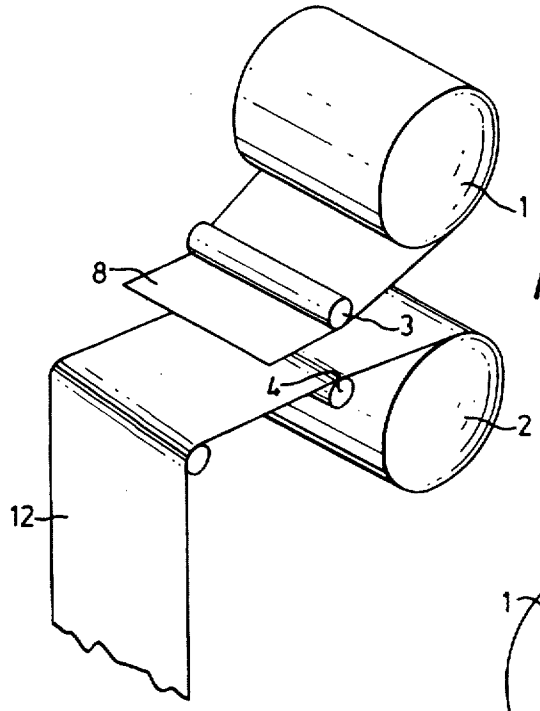


FIG. 1.

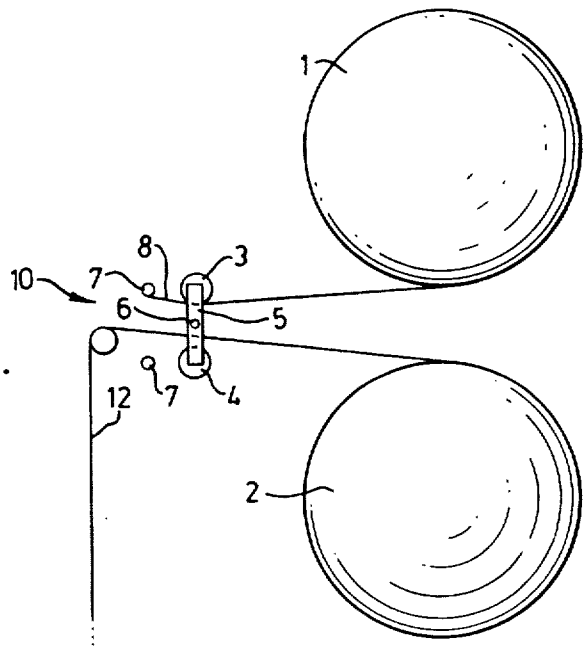


FIG. 1A.

FIG. 2.

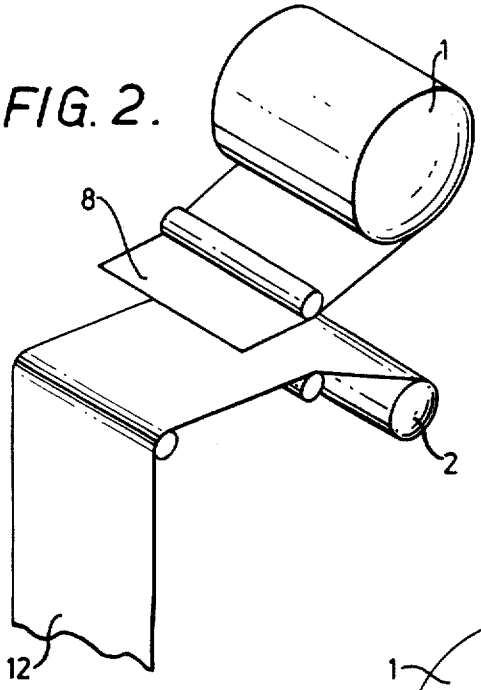
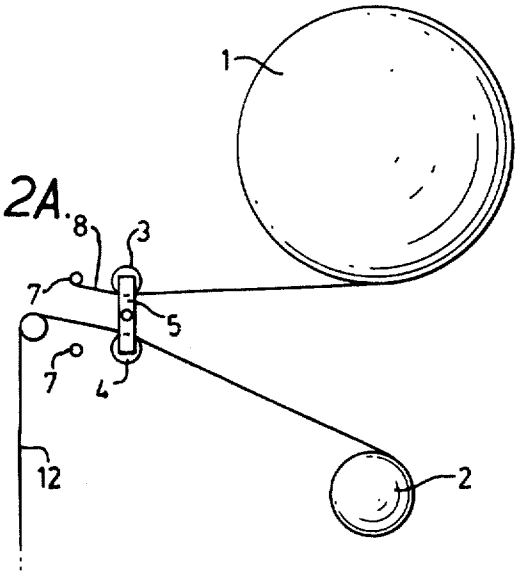


FIG. 2A.



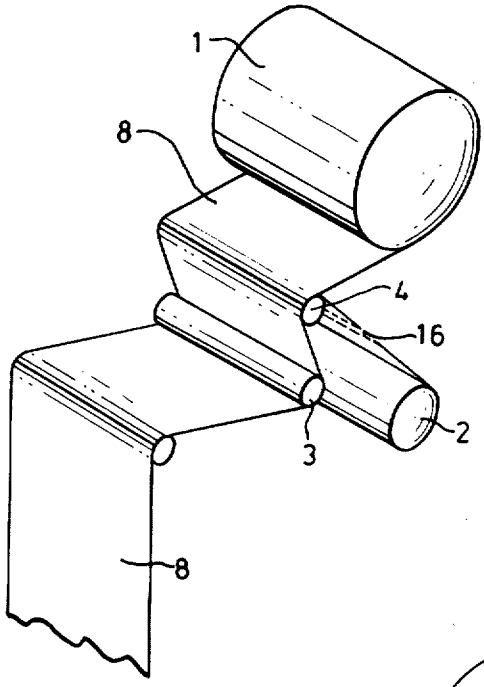


FIG. 3.

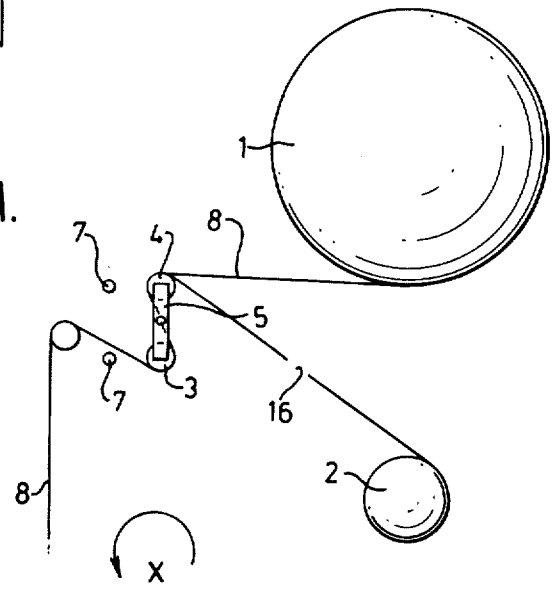
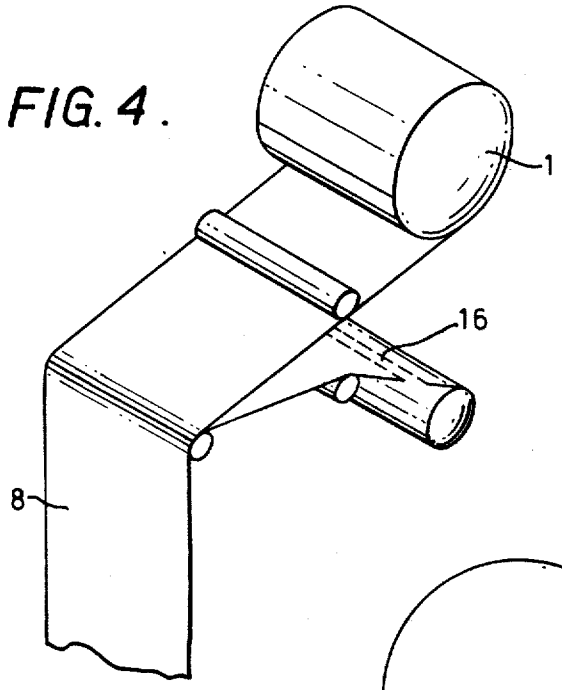


FIG. 3A.

FIG. 4.



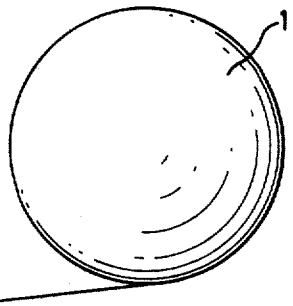


FIG. 4A.

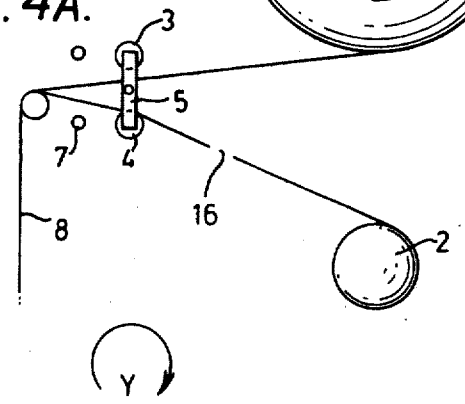


FIG. 5.

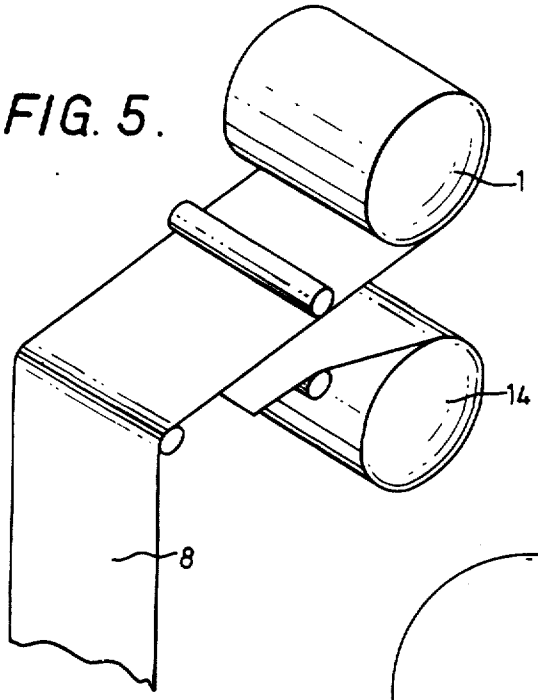


FIG. 5A.

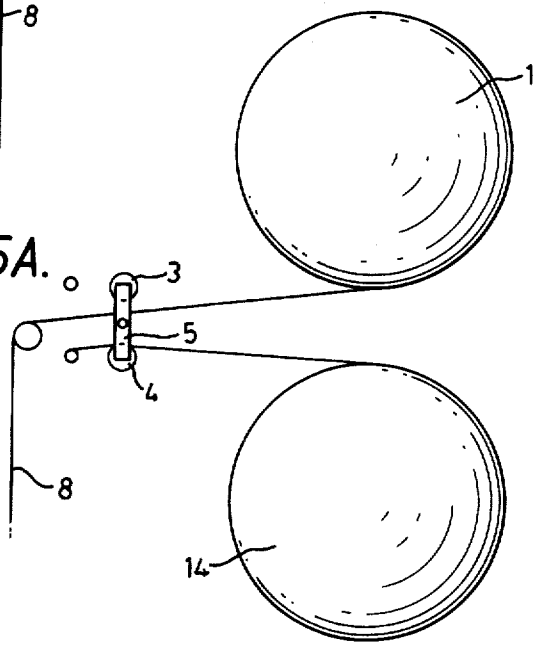


FIG. 6.

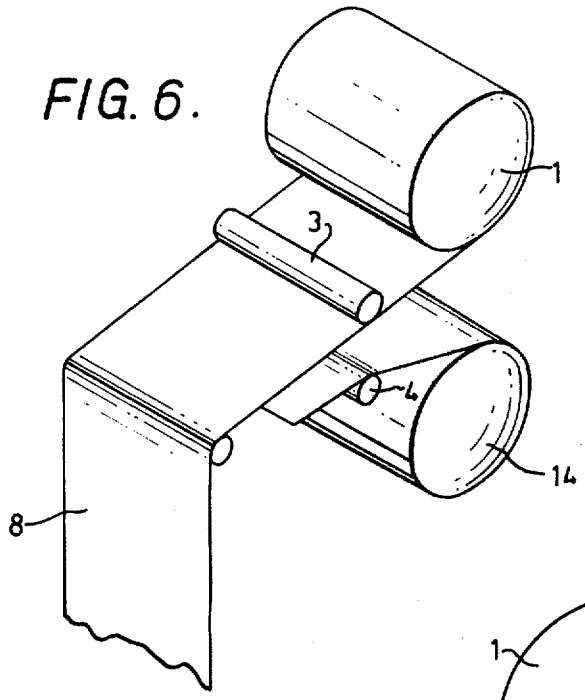


FIG. 6A.

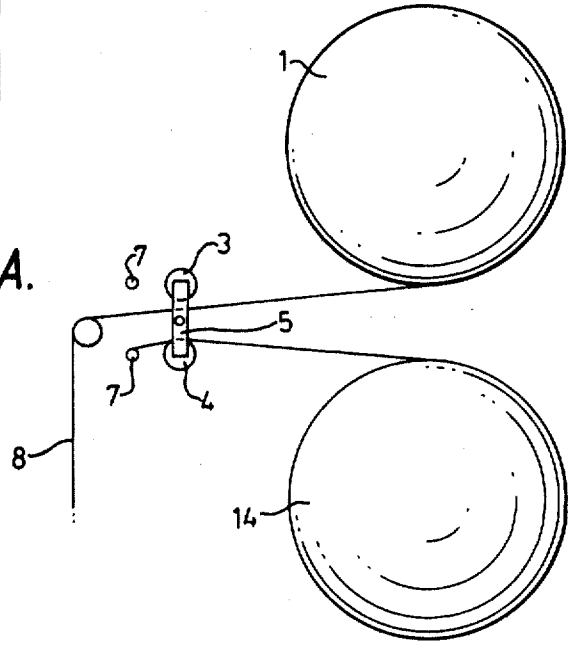


FIG. 7.

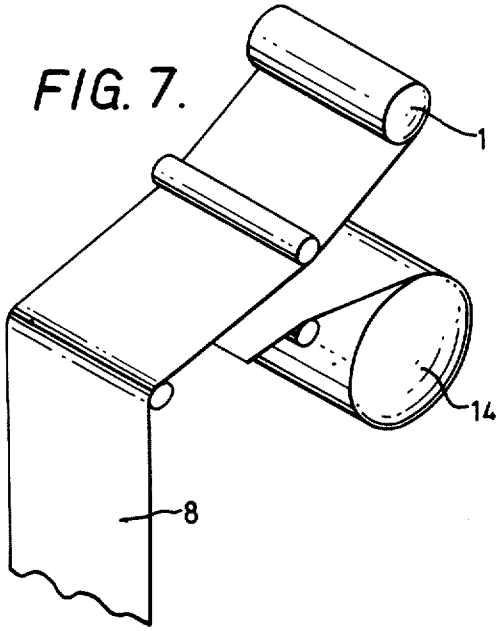
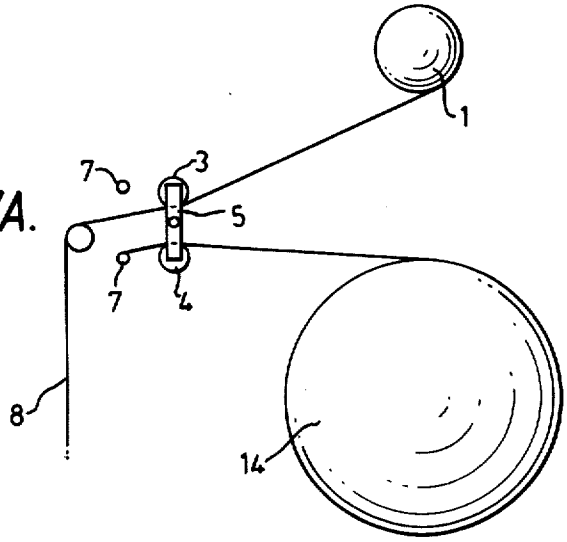


FIG. 7A.



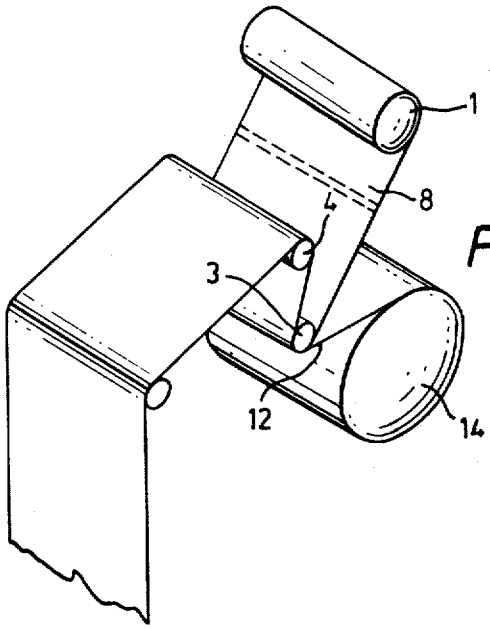


FIG. 8.

FIG. 8A.

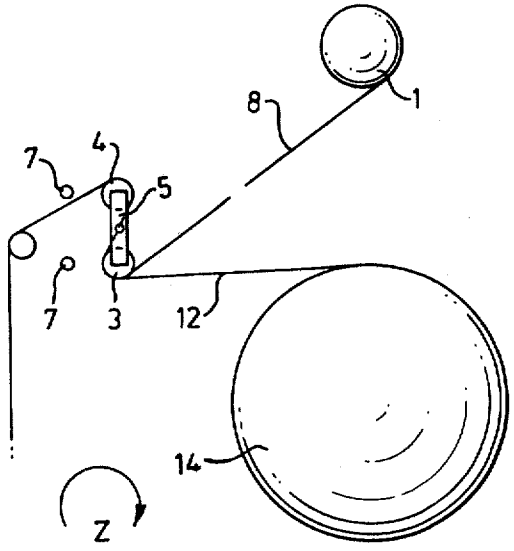


FIG. 9.

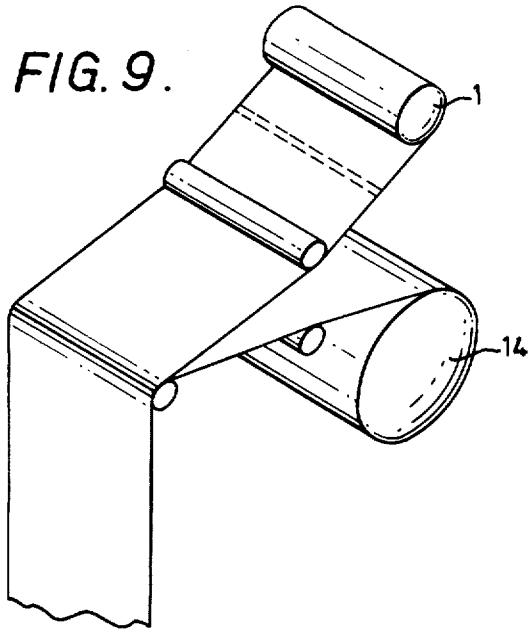


FIG. 9A.

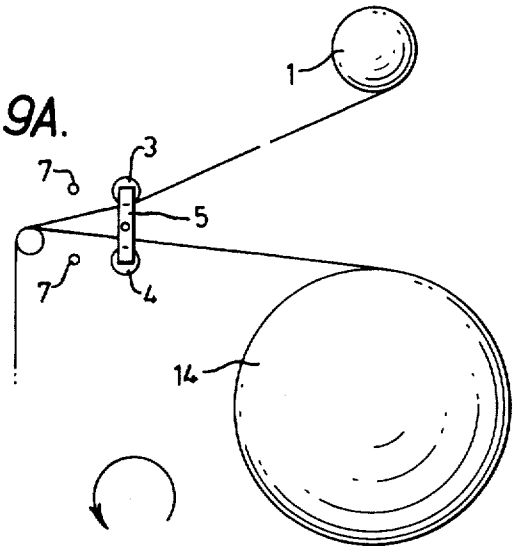


FIG. 10.

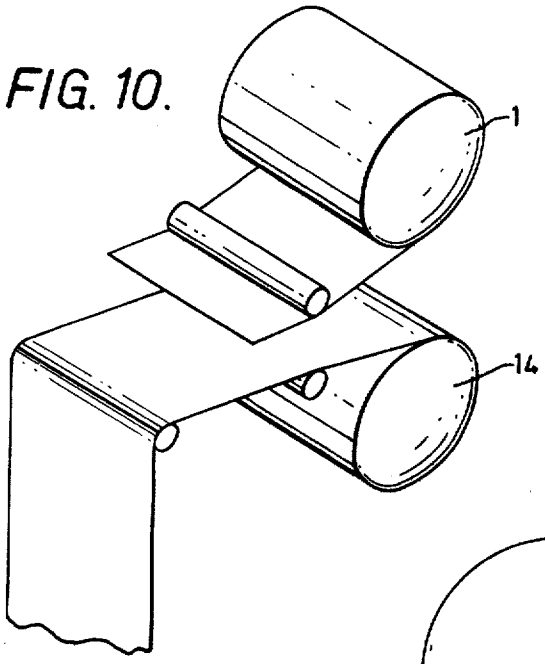


FIG. 10A.

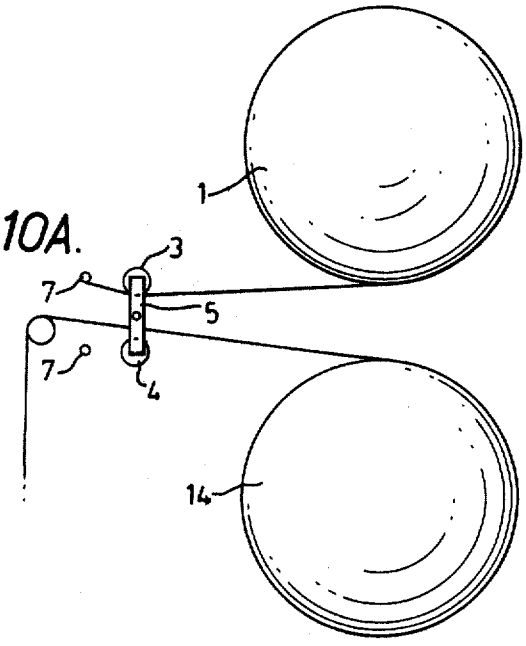


FIG. 11.

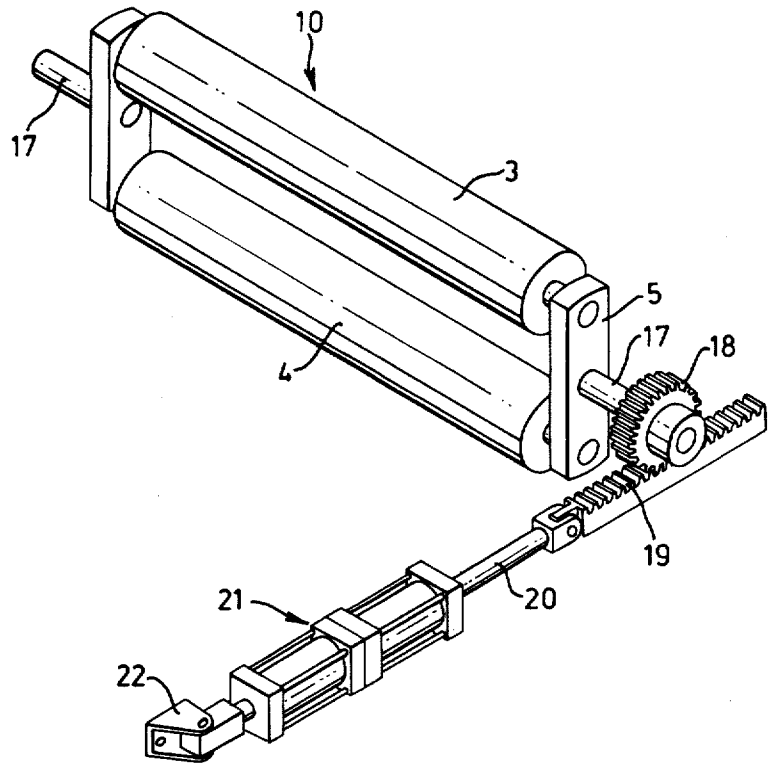
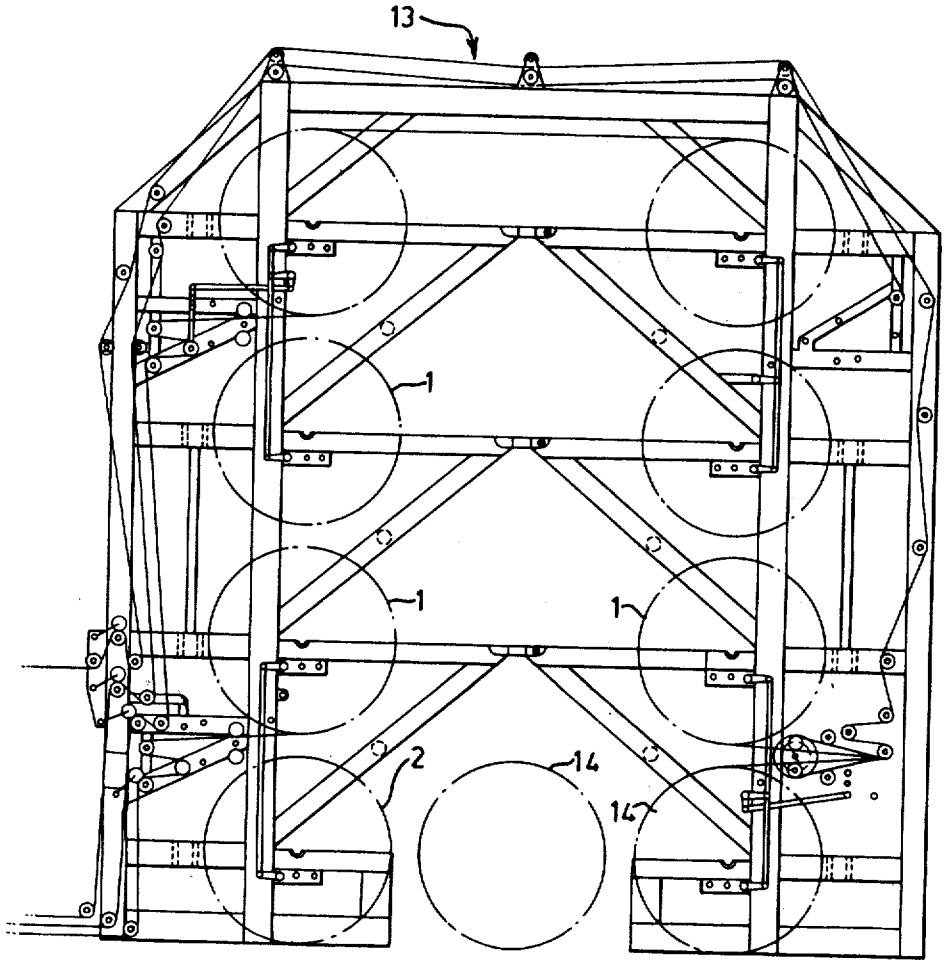


FIG.12.



WEB SPLICING APPARATUS

The invention relates to printing machinery and more particularly to automatic reel changing apparatus for high speed printing presses and to reel stands incorporating such automatic reel changing apparatus.

It is a disadvantage of many known reel stands that in order to replace an expired reel by a fresh reel of paper during a printing run it is necessary to stop the printing press, thus effectively reducing the output of the press, perhaps by as much as forty per-cent. Such a reduction can only be avoided at present either by using a printing press of higher output or by using an automatic reel changing device which is complicated and thus costly.

It is an object of the invention to provide a simple and thus inexpensive device whereby reels may be changed without the necessity of stopping the printing press, and it will be appreciated that the invention finds particular application in situations where a high printing speed is essential, e.g. in the printing of newspapers.

From one aspect the present invention provides web splicing apparatus comprising means for bringing an adhesive coated portion of a first web and a second web into surface-to-surface contact and for constraining the newly joined webs to follow a sinuous path to ensure intimate contact between the two webs. The apparatus may comprise a parallel pair of web guides, e.g. rollers, on a common carrier which is adapted for orbital movement about an axis disposed between the rollers and parallel with the axes thereof, the two webs being passed between the rollers, and means for rotating the carrier. In operation the arrangement is such that the rollers can be moved from a position in which the webs pass therebetween without contacting one another to a position in which the webs are brought together and the resultant combined web is constrained to follow a sinuous path about the rollers, which ensures that the webs are firmly secured together.

Any suitable means may be provided for rotating the carrier, e.g. a rack and pinion device actuated by a double-acting pneumatic ram. It has been found desirable when joining the webs to move the rollers from their non-operative to their operative position as quickly as possible.

The apparatus preferably comprises means for holding the end of the new web under tension and against one of the pair of rollers prior to and during the joining. The means may comprise one or more and preferably two spring biased tapes releasably secured to the web (.e.g. by an adhesive) to permit the tapes to become detached from the webs immediately after the webs have been joined. The apparatus may also comprise means for pasting the end of the new web and/or means for severing the expired web.

From another aspect the invention comprises a reel stand comprising web splicing apparatus as defined above, the reel stand having for each web a loading and a running position whereby a fresh reel can be loaded while the other web is being consumed.

From yet another aspect the invention comprises printing machinery having web splicing apparatus as defined above or having a reel stand as defined above.

One embodiment of the invention will now be described with reference to the accompanying diagrammatic drawings, in which:

FIGS. 1 and 1A are respectively a perspective view and a side view of automatic web splicing apparatus in a first position of operation;

FIGS. 2 and 2A to FIGS. 10 and 10A are respectively perspective views and side views of the apparatus of FIGS. 1 and 1A in further positions;

FIG. 11 is a perspective view of the web splicing mechanism;

FIG. 12 is a side elevation of a reel stand incorporating web splicing apparatus as shown in FIGS. 1 to 4, and which permits reels to be changed.

Referring first to FIGS. 1 and 1A to FIGS. 10 and 10A of the drawings there is shown automatic web splicing apparatus 10 for use in association with a reel stand for a printing press and by means of which an expired reel can be changed for a new reel without the necessity of stopping the press. With a high speed printing press producing newsprint it will normally be necessary to slow the press to crawl speed during reel changing, but this, of course, will depend on the tensile strength of the web, the normal speed of operation of the press, and the inertia of the new reel. The drawings show a pair of reels 1 and 2 associated with each press, only one of the reels being used at one time. Preferably the configuration of the reel stand is also such that expired reels can be replaced with fresh reels without impeding the drawing of web from the other reel.

The reel changing apparatus comprises a pair of web guides in the form of rollers 3 and 4 mounted on a carrier 5 for orbital movement about an axis 6 equispaced between the axes of the rollers 3 and 4 and parallel thereto. A web 12 being fed to the press from the reel 2 passes between the rollers 3 and 4. The end of the new web 8 to be joined to the end of the expiring web also passes between the rollers 3 and 4, and is held in this position by tensioning means 7, e.g. a pair of spring urged flexible tapes whose ends are temporarily stuck to the web by means of an adhesive. At this stage the disposition of the carrier 5 is such that the webs 12 and 8 are disposed remotely from one another as is shown in FIG. 1.

As shown in FIG. 2, the reel 2 has been consumed so that it is necessary to change-over to the new reel 1.

Before the leading end of the new web 8 is joined to the expiring end of the old web, the end of the new web is coated with an adhesive in conventional manner, for example, using a strip of double-sided adhesive tape.

When the two webs are to be united, the carrier 5 is rotated through 180° in the direction shown in arrow X, see FIGS. 3 and 3A, so that the adhesive-coated surface of the new web contacts the surface of the web 12. At the same time the transposition of the rollers 3 and 4 causes the joined web to follow a sinuous path which ensures intimate contact between the two webs to be joined. During rotation of the carrier, which is done as quickly as possible by means of a rack and pinion device actuated by a double acting pneumatic ram which is more fully described below, the tensioning tapes of means 7 become detached from the end of the web 8. After the joining has been completed the carrier 5 is rotated in the opposite direction through 180° (arrow Y) into the position shown in FIG. 4. Also the end of the expiring web 12 is severed as indicated at 16 in any suitable manner e.g. manually or automatically, either in the FIG. 3 or in the FIG. 4 position as desired. Web is now fed to the press from the reel 1. As shown in

FIG. 5 the expired reel 2 is then displaced by a fresh reel 14.

When the reel 1 expires it can be replaced by the newly loaded reel in the manner described above. This sequence is shown in FIGS. 6 and 6A to 10 and 10A. In this case however joining is effected by rotating the carrier 5 in the opposite direction to that effected when joining the web 8. This is shown by the arrow Z of FIG. 8A.

The web splicing mechanism 10 shown in FIG. 11 of the drawings comprises a pair of web guide rollers 3 and 4 which are mounted on a carrier 5 which is supported by trunnions 17 whereby the rollers can be rotated about the trunnion axis. One trunnion shaft 17 has a pinion 18 secured thereto, the pinion meshing with a toothed rack 19. The rack is connected to a double-acting pneumatic ram 21 by means of a piston rod 20, and the ram 21 is fixed to the machine frame by a bracket 22. In this manner the rollers can at will be rotated in either direction.

Referring to FIG. 12 of the drawings there is shown a reel stand structure 13 which simultaneously serves four printing units. The structure holds eight reels 1, 2 arranged in four groups of two so that two reels are associated with each printing unit, one being used while the other is being loaded. An automatic web splicing apparatus 10 as described above is associated with each pair of reels. The configuration of the stand is such that expired reels can be replaced without stopping the press, the new reels being inserted between the reels mounted in the stand, as indicated at 14.

I claim:

1. Apparatus for splicing a moving web comprising, a pair of parallel web guides which are spaced apart to define between them a single path through which the moving web can pass, a common carrier on which said pair of web guides are mounted, said carrier having a pivot axis spaced laterally between and parallel with said pair of web guides, said carrier being pivotable about said axis to cause orbital movement of the web guides, means adjacent said carrier and spaced from the web guides for releasably holding a second web under tension and adjacent one web guide of the pair of web guides, which second web is stationary and a portion of which is provided with an adhesive coating whereby it can be secured to said moving web, and means connected to pivot said carrier to move said web guides from positions in which the moving web and the second web are mutually remote to positions in which the webs are brought into surface-to-surface contact with one another and the resultant combined web is constrained to follow a sinuous path about said pair of web guides to ensure intimate contact between the two webs, whereupon the second web is released by the tensioning means, the means for releasably holding the second web under tension being disposed such that the stationary web can be held against either web guide, the arrangement being such that pivoting of the carrier in one direction will effect splicing of the webs when the stationary web is held against one of the web guides and pivoting of the carrier in the other direction will cause splicing of the webs when the stationary web is held against the other of the web guides.

2. Web splicing apparatus according to claim 1, wherein the web guides comprise rollers.

3. Web splicing apparatus according to claim 1, wherein the means for pivoting the carrier comprises a rack and pinion device actuated by a double-acting pneumatic ram.

* * * * *