

[54] CONTINUOUSLY FEEDING APPARATUS
FOR ROLLED WEBS[75] Inventors: Minoru Kawazura, Tokyo; Shigeru
Watai, Ichikawa, both of Japan[73] Assignee: Toppan Containers Co., Ltd.,
Tokyo, Japan

[22] Filed: Nov. 3, 1972

[21] Appl. No.: 303,516

[30] Foreign Application Priority Data

Nov. 5, 1971 Japan..... 46-10357

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

[51] Int. Cl. B65h 19/18

[58] Field of Search 242/58.1, 58.3, 58.4, 58.5;
156/502, 504, 505, 506, 507

[56] References Cited

UNITED STATES PATENTS

2,035,682	3/1936	Wikle.....	242/58.4 X
2,613,042	10/1952	Dice.....	156/504 X
3,132,544	5/1964	Jones.....	156/502 X

3,188,015	6/1965	Kuster.....	242/58.4 X
3,440,126	4/1969	Bartholomay.....	242/58.4 X
3,753,833	8/1973	Bassett.....	242/58.4 X

Primary Examiner—John W. Huckert

Assistant Examiner—John M. Jillions

Attorney, Agent, or Firm—Wigman & Cohen

[57] ABSTRACT

A continuously feeding apparatus for rolled webs which connects the leading end of one web to the terminal end of another web with each other to continue the feeding of webs with easiness, cleanness and reliability, and comprising a pair of support arms to support a pair of rolled webs; a pair of guide rolls each of which is held by a pair of swingable arms and being shifted to and from the center portion of the apparatus, and further each of said guide rolls comprises a cylindrical tube having a plurality of apertures on the peripheral wall thereof and inside of which is fed with vacuum to adhere the leading end of one web to be connected; and a plurality of other guide rolls to guide said webs.

7 Claims, 7 Drawing Figures

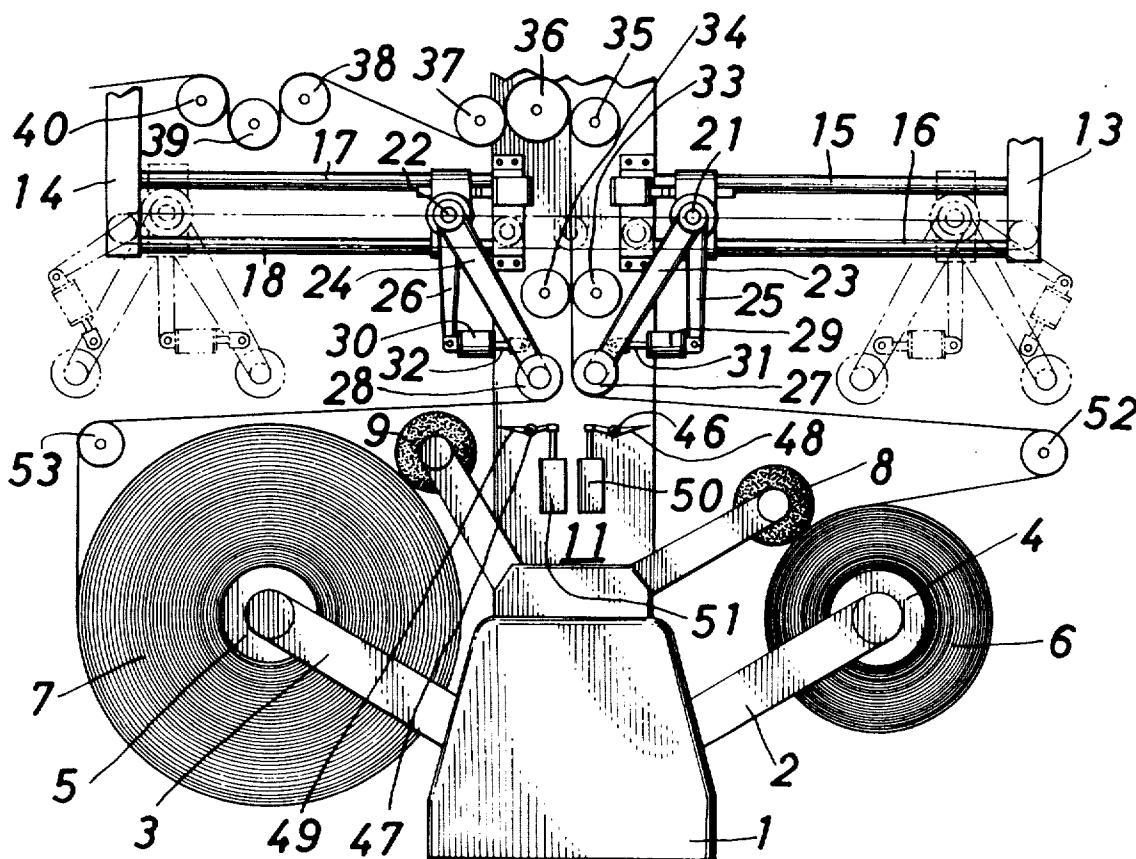


Fig. 1

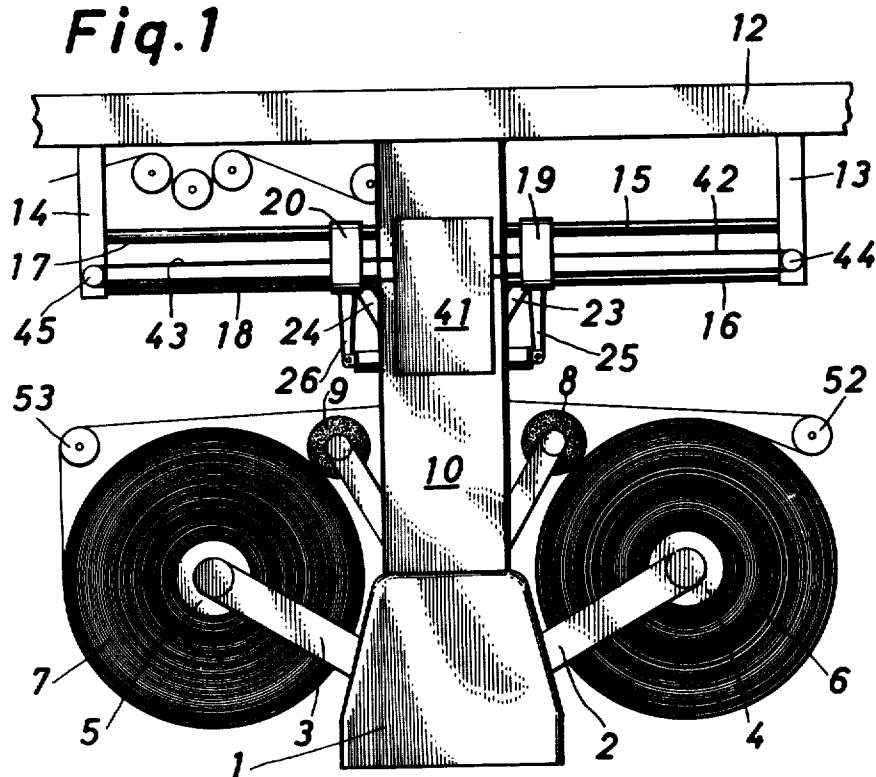


Fig. 2

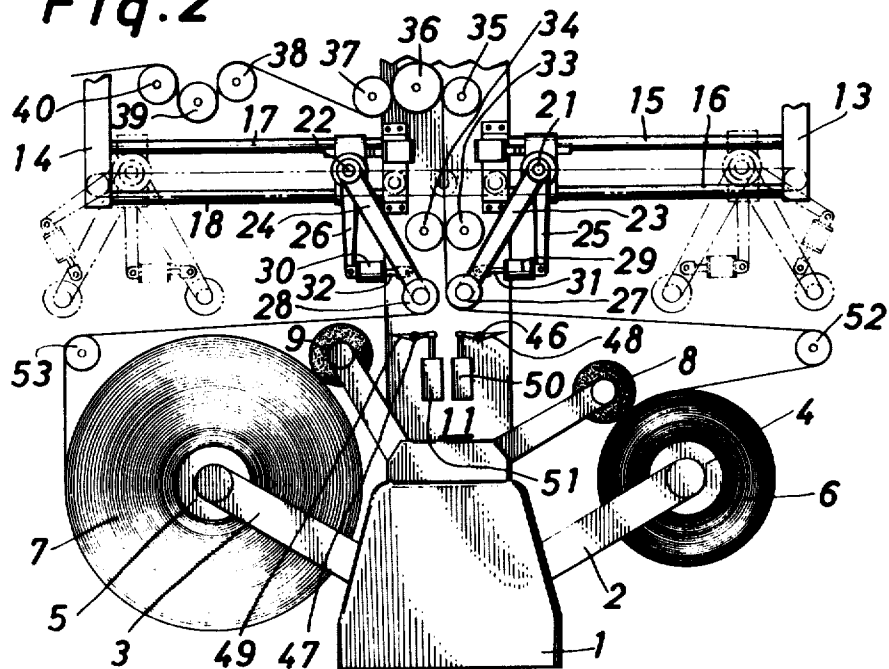


Fig. 3

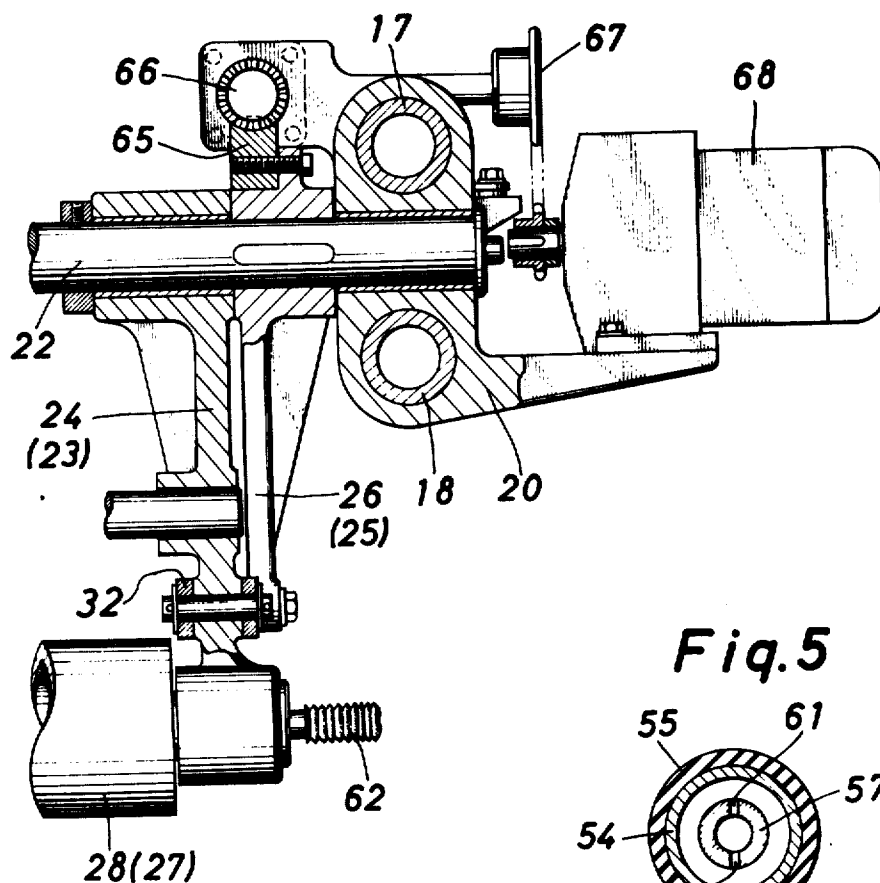


Fig. 5

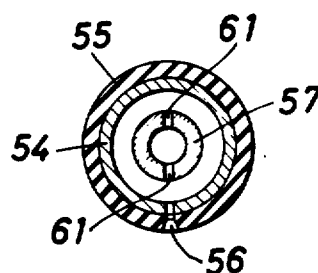


Fig. 4

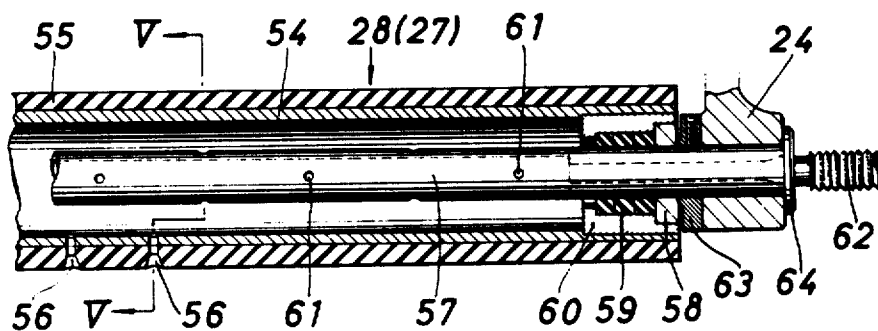


Fig. 6

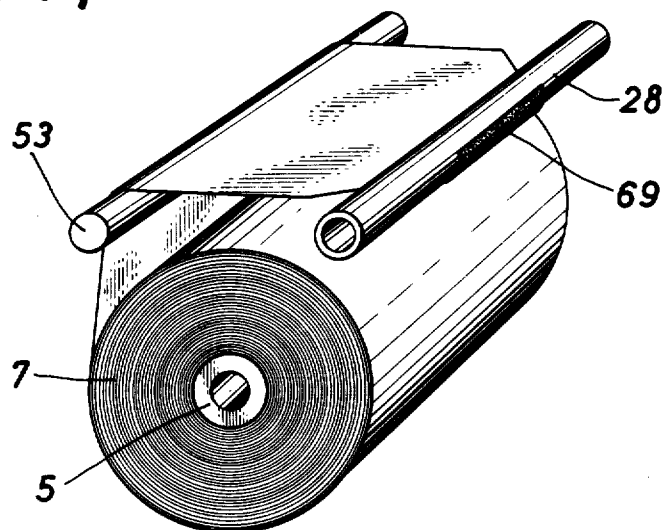
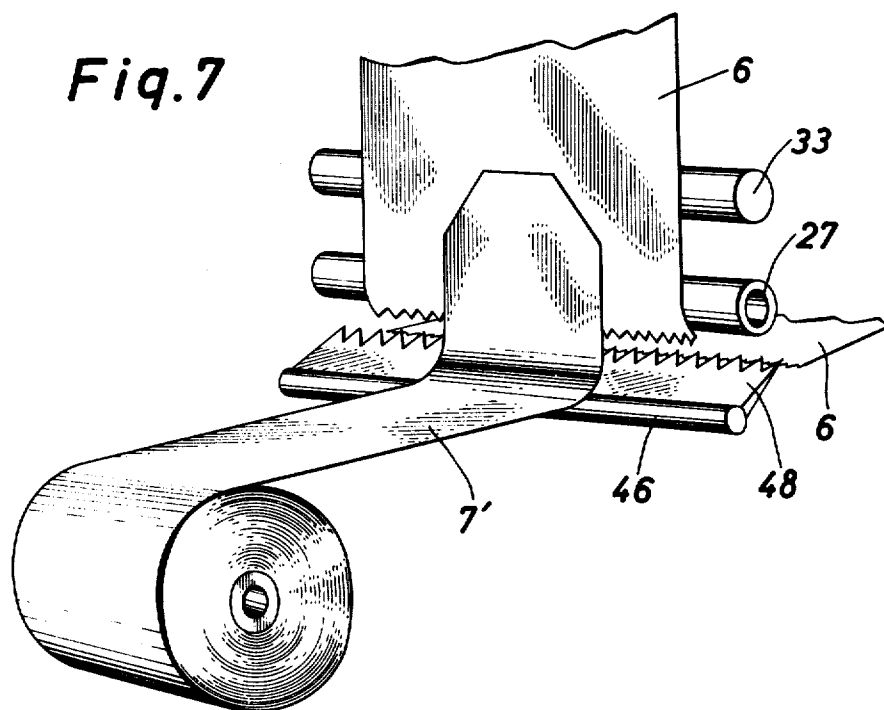


Fig. 7



CONTINUOUSLY FEEDING APPARATUS FOR ROLLED WEBS

This invention relates to a continuously feeding apparatus for sheet materials such as rolled paper or synthetic plastic film. More particularly, the invention relates to a splicer which connects the top or leading end of one rolled ready web to the terminal end of another running web automatically to carry out the continuous feeding of the webs.

In the ordinary splicer which feeds the rolled webs continuously, two webs are placed on both sides of the apparatus, and the sheet of one side web is fed through appropriate guide rolls, and when the sheet of the web is passed near to the terminal end thereof, said end is adhered to the top end of another web, thereby the continuous feeding of the webs is carried out. In such apparatus, however, the to end of the web to be connected is applied with a strong adhesive on one side and with a weak adhesive on another side, in which said strong adhesive is used for connecting the top end and the terminal end of the webs, while the weak adhesive is used for attaching temporarily the top end of web to a guide roll. When one web is fed nearly to the terminal end thereof, the guide roll which being attached with said top end of another web is pushed to the terminal end of the former web material, thereby the top end of the web is adhered to the terminal end of the web by the strong adhesive, while the top end is peeled off from the guide roll as it is temporarily adhered by the weak adhesive.

In this case, the weak adhesive remains on the connected portion of the web and is passed to the succeeding apparatus as it is. Thus, such adhesive clings to other succeeding guide rolls and processing apparatus to cause several troubles. For example, the speed of feeding is reduced, the sheet material is wrinkled, and the quality of the product is lowered.

Therefore, the object of the present invention is to provide an apparatus for feeding the rolled webs which is free from the above-mentioned disadvantages.

Further object of the invention is to provide a splicer for continuously feeding the rolled web smoothly and reliably.

Still further object of the invention is to provide a splicer which can support easily the top end of the web to be attached to the terminal end of another web.

Still further object of the invention is to provide a splicer which can continuously feed the differently sized webs.

Pursuant to the above objects, this invention proposes a splicer which comprises a pair of support arms to support a pair of rolled webs, a pair of guide rolls each of which is held by a pair of swingable arms and shifted to and from another roll, and a plurality of other guide rolls to guide said webs to appropriate directions and finally to the succeeding apparatus. Further, each of said pair of guide rolls comprises a cylindrical tube having a plurality of apertures on the peripheral wall thereof and inside of said guide roll is connected to a source of vacuum so as to adhere the top end of one web to be connected. Thereby the top end of the web can be held by the feed roll without using adhesive until it is connected to the terminal end of another web, and the adhesive is applied only on one surface which is to be adhered to said terminal end, thus after the adhesion

of the two sheets of webs, the adhesive is not exposed to the remainder of the apparatus.

In order that the invention may be more fully understood, a preferred embodiment and other features will now be described by way of example and with reference to the accompanying drawings, in which:

FIG. 1 is a front elevation of a splicer of an embodiment of the invention;

FIG. 2 is a schematic illustration of the same embodiment to show the operation thereof;

FIG. 3 is an enlarged partial sectional view showing the attachment portion of the feed roll;

FIG. 4 is a partial sectional view of the feed roll;

FIG. 5 is a sectional view taken along the line V—V in FIG. 4;

FIG. 6 is a perspective view of the web in the waiting state to be connected; and

FIG. 7 is a perspective view of the webs which are just connected with each other and are different in their widths.

Now referring to FIG. 1 and 2, the embodiment of the present invention will be explained further in detail. The numeral 1 denotes the bed of the apparatus, and the right and left side which are provided with support arms 2 and 3, respectively. The support arms 2 and 3 support respective core shafts 4 and 5, on which webs of paper or synthetic plastic films 6 and 7 are rolled. The numerals 8 and 9 are pressure rolls to impart the feeds of webs with resistance.

The front and rear portion of said bed 1 are provided with struts 10 and 11 and the upper ends of said struts 10 and 11 are attached to a pair of frameworks 12, respectively. In symmetrical relation to the strut, pairs of support pieces 13 and 14 are attached downwards, and between said support pieces 13 and 14, and said struts 10 and 11, pairs of guide rails 15, 16 17 and 18 which are made of pipes are provided in the horizontal direction, respectively. Thereby the guide mechanisms are formed.

Respective pairs of the above-mentioned guide rails 15, 16 and 17, 18 are provided with sliding pieces 19 and 20. Further, between a pair of the front and rear sliding pieces 19, a shaft 21 is attached, and near the both ends of said shafts 21, pairs of swing arms 23 and auxiliary arms 25 are swingably provided. While, a shaft 22 is in like manner attached to the pair of front and rear sliding pieces 20, and pairs of swing arms 24 and auxiliary arms 26 are swingably attached to the both ends of said shaft 22 in the left side of the apparatus. The free ends of said pairs of swing arms 23 and 24 are provided with guide rolls 27 and 28 which guide the webs 6 and 7 to the upper direction, and the free ends of said pairs or the auxiliary arms 25 and 26 are provided with air cylinders 29 and 30. The piston rods 31 and 32 of said air cylinders 29 and 30 are attached to said swing arms 23 and 24. Further, a plurality of guide rollers 33, 34, 35, 36, 37, 38, 39 and 40 are provided between the struts 10 and 11, and the frameworks 12.

A box 41 which contains an electric motor is attached to the strut 10 in order to move the above-mentioned sliding pieces 19 and 20, and the torque of said motor is transmitted through chains 42 and 43 to the sliding pieces 19 and 20 engaged therewith, further in order to synchronize the movements of the sliding pieces 19 and 20 on the rear side with those on the front side, axles 44 and 45 are provided through the support pieces 13 and 14 and said chains 42 and 43 are

engaged with these axes 44 and 45, thereby the sliding pieces 19 and 20 on the rear side can be moved also simultaneously by the rotation of said motor.

Between the struts 10 and 11, cutters 48 and 49 are provided which rotates on axes 46 and 47, and are operated by air cylinders 50 and 51, respectively. The numerals 52 and 53 are guide rollers for the feeding of web materials.

With regard to the principal members, i.e., the guide rolls 27 and 28, further explanation will be made referring to FIGS. 3 to 5. The numeral 54 denotes a core metal tube of the guide roll 28, and the outer surface of said metal tube 54 is covered with rubber material 55 to provide strength and elasticity to the roll 28. A plurality of apertures 56 are made on one side in the middle portion of the guide roll 28. This guide roll 28 is provided with a support shaft 57 along the axis of said roll 28, and one end of said support shaft 57 is closed. The guide roll 28 is supported at the both ends by bearings 58 and rotatably sealed by packings or oil seals 59, where said bearings 58 and packing or oil seal 59 constitute supporting members 60 which are air-tightly fitted to the ends of said guide roll 28.

The peripheral surface of said support shaft 57 is provided with a plurality of apertures 61, and both ends of the shaft 57 are put out from both ends of the roll 28. The projected ends of said shaft 57 are supported by swing arms 24 and one end of said support shaft 57 is attached with a flexible tube 62 which is connected to an appropriate vacuum source. The numerals 63 and 64 indicate fixing members for the support shaft.

Each of the above-mentioned auxiliary arms 25 and 26 is provided with a worm gear 65 which is engaged with a worm 66, and said worm 66 is connected to a sprocket 67 by way of a pair of bevel gears (not shown). Said sprocket 67 is driven by a motor through a chain, and the motor is installed in a casing 68 which is fixed to the sliding piece 20.

The operation of the splicer of the present invention having the above-mentioned structure will be explained in the following.

The web of rolled paper or plastic film 6 is attached to the support arms 2 on one side, and it is fed to an appropriate processing apparatus through the guide roll 52, the guide roll 27 and other plurality of guide rolls. In the meantime, another web 7 of the same size or different size is fixed to another support arm 3, and the top end of said web is fitted to the apertures 56 of the guide roll 28, at the same time the inside of the roll 28 is reduced in pressure by a vacuum source through the flexible tube 62 and the support shaft 57, thereby the latter web is kept in the waiting position. In this case, the motor in the box 41 is operated by a switch of the control box (not shown) to shift the swing arm 24 to the outside ends of the guide rails 17 and 18, and at the same time, the motor in the box 68 is also driven and the auxiliary arm 26 is swung to the out side through the sprocket 67, bevel gears, worm 66 and worm gear 65, thereby the swing arm 24 and the guide roll 28 are positioned as shown by the chain lines in FIG. 2.

In this position, the top end of the web 7 is stuck to the guide roll 28 by vacuum, and the other side of the top portion of web is then applied with proper adhesive or double-sided self-adhesive paper 69. Then the switch is operated to shift the guide roll 28 to the position near the struts 10 and 11. In this state, when the presently feeding web 6 is passed near to the terminal

end thereof, the air cylinder 30 is operated by a switch to push the guide roll 28 to the guide roll 27 and the top end of the web 7 is connected to the terminal portion of the web 6 by said adhesive 69, at the same time, the vacuum within the guide roll 28 is released and the cutter 48 is operated simultaneously by the action of the air cylinder 50 to cut the web 6. Accordingly, the portion of double layer webs 6 and 7 is very short.

As disclosed in the above, the splicer of the present invention is possible to connect the top portion of one web 7 to the terminal portion of another web 6, thereby the continuous feeding of the web material can be accomplished without any difficulty. Thus a long term continuous operation can be performed by repeating the above operations. Further, as shown in FIG. 7, the differently sized web material 7' may be connected also in the same manner with ease.

As explained in the above, it is not necessary to apply the adhesive to both sides of the top portion of the web material, therefore no problems are caused in the succeeding processes and the quality of the product can be improved. Further, the clinging of dust and rust by the adhesive can be prevented to reduce the maintenance work of the apparatus including the splicer itself and succeeding ones.

Thereby, easy, reliable and clean operation of the continuously feeding apparatus of rolled webs can be carried out.

It should be emphasized, however, that the specific embodiment as shown herein is intended as merely illustrative and in no way restrictive of the invention.

What is claimed is:

1. A continuously feeding apparatus for connecting the leading end of a ready rolled web to the terminal end of a running rolled web to continue the feeding of webs, comprising a pair of support arms mounted on a frame for supporting said rolled webs, a pair of guide rolls, a pair of swingable arms mounted on said frame for supporting each of said guide rolls, each of said guide rolls including a cylindrical tube having a plurality of apertures on the peripheral wall thereof, the interiors of said tubes communicating with a vacuum source whereby said leading end may be adhered thereto so as to be held in position for connection to said terminal end, guide mechanism means including guide rails and motor means for horizontally shifting each of said swingable arms along said guide rails relative to said frame between an outside preparatory position where said leading end may be adhered to its respective guide roll and adhesive means applied to one side of said leading end and a central position where said guide rolls are adapted to be brought together to connect said leading end to said terminal end, and means for moving said swingable arms to move said guide rolls toward one another at said central position for pressing said leading end against said trailing end to effect a connection of said webs.

2. A continuously feeding apparatus as claimed in claim 1, wherein said guide mechanism further includes sliding pieces slidably mounted on said guide rails, and wherein said swingable arms are carried by said sliding pieces.

3. A continuously feeding apparatus as claimed in claim 2, and further including auxiliary arms carried by said sliding pieces, and means acting through said auxiliary arms for swinging said swingable arms at said outside preparatory position.

5

4. A continuously feeding apparatus as claimed in claim 2, wherein said means for moving said swingable arms at said central position includes auxiliary arms connected to said sliding pieces, and air cylinder means acting between said auxiliary arms and said swingable arms.

5. A continuously feeding apparatus as claimed in claim 3, wherein said means acting through said auxiliary arms include a gearing arrangement driven by a motor and sprocket drive.

6

6. A continuously feeding apparatus for rolled webs as claimed in claim 1, in which a pair of cutters are provided and one of said cutters is actuated simultaneously when the leading end of the ready web is connected to the terminal end of the running web to cut the latter web.

7. A continuously feeding apparatus for rolled webs as claimed in claim 1, in which a pair of pressure rolls are provided to give partial resistance to said rolled webs.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65