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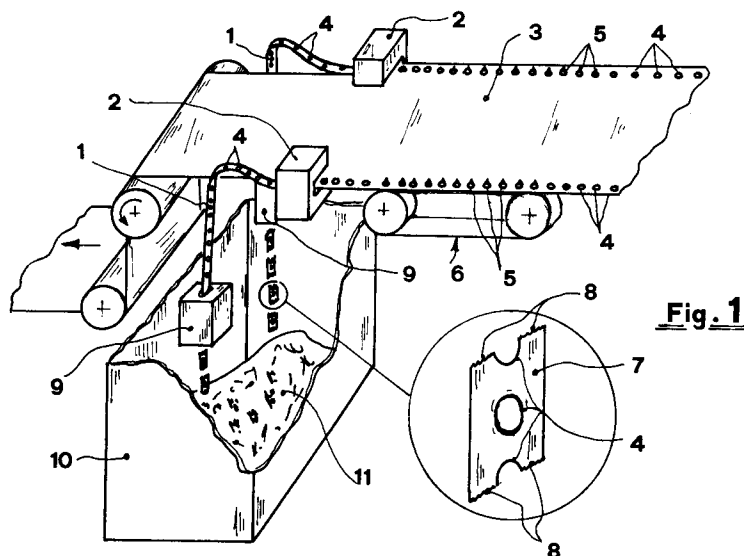
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I-50122 Firenze (IT)(54) **Method for collecting trimmed strips of paper and tearing device of the strips in short portions.**

(57) Method for the collection of strips (1) of paper trimmed by longitudinal shears (2) from a continuous paper (3) with lateral dragging holes (4). The strips (1) are trimmed by the shears (2) downstream the printing and then are torn into portions (7) having the same length. The tearing lines (8) are substantially transversal to the trimmed strips (1) and cross the holes (4), the tearing action being preferably produced by means of two couples of counter-rotating rollers (12, 13). The second couple (13) moves at a speed greater than that of the first couple (12). In a

tearing device of trimmed strips (1) into portions (7), the rollers of the first couple (12) have each two flattened opposite faces (2), whereby they come into contact twice in each turn, whereas the second couple of rollers (13) have each one flattened face (3), whereby the contact between them stops once in each turn. The device is extremely reliable, silent and presents many advantages with respect to the prior art means for the disposal of the trimmed strips from the printing sections.

**Fig. 1****EP 0 685 306 A1**

The present invention generally relates to the field of printing machines and more precisely it relates to a method for collecting trimmed strips of paper, in particular cut from a continuous strip of printed paper with lateral dragging holes.

In addition the invention relates to a tearing device of the trimmed strips into small portions.

Most of printing machines use continuous paper with lateral dragging holes. The presence of such holes is essential to provide an exact control of the position of the paper during the printing phases and above all it is important when the paper goes through many successive printing heads, so that the coincidence of the figures or the characters printed by the printing heads even with different colours is fulfilled.

In many cases, however, the finally printed paper is preferred without the presence of the lateral dragging holes. For this reason, before the final collection of the printed paper in packages of sheets, by means of special machines such as folders, tearing apparatus, shears, etc., the lateral strips which include the dragging holes are trimmed.

A very strongly felt problem is to remove the trimmed strips of paper which, owing to the high speed of the paper being printed, can become in a few minutes very cumbersome.

In most cases, at present, the heaps of trimmed strips are collected manually, as an example by means of rakes, and put into bags so that they can be compacted as much as possible and afterwards disposed of.

In some cases rather complex automatic systems have been designed which perform the suction of the trimmed strips along paths which lead them towards collecting containers.

A further existing disposal system consists in cutting the trimmed strips into portions several centimetres long so that they drop into containers placed underneath thus taking up not so much space. In fact, since no bulky skeins are made, the portions of paper lie in the container and become stratified, without holding air.

The above described systems for the disposal of the trimmed strips of paper, however, present several drawbacks. In the case of the manual collection, first of all, a person in charge of the disposal is needed, with added costs of personnel and considerable bulks of paper to be disposed of. In the case of the sucking plants, on the contrary, the main drawback is the high cost of such plants which require additional room and continuous assistance to prevent the paper from blocking the paper suction's path. Finally, the cutting system of the trimmed strips is the most suitable for reducing the costs and the encumbrance, but it has the inconvenience that the blades of the shears, which

cut the continuous strips into short portions, rapidly lose the sharpness, thus causing frequent blocking of the paper.

The first object of the present invention is therefore to provide a method for the collection of trimmed strips of paper, which does not have the above described inconveniences and drawbacks.

It is another object of the present invention to provide a tearing device of the trimmed strips of paper which is more reliable, more silent and less expensive than the aforementioned transversal cutting system of the strips.

The first object is achieved by the method according to the invention whose characteristic is that the trimmed strips are torn directly downstream the trimming shears into portions of the same length, along substantially transversal tearing lines crossing the dragging holes. The strips are preferably torn while passing through two couples of counter-rotating dragging rollers, the second couple of rollers moving at a greater speed than that of the first couple of rollers. This way the trimmed strip is torn every time in between the two rollers right in correspondence of said holes.

The second object is achieved by the tearing device according to the invention of the trimmed strips, whose characteristic is to comprise a first and a second couple of counter-rotating rollers, the second couple of rollers rotating at a greater speed than that of the first couple of rollers.

Preferably, the rollers of the second couple have two opposite flattened surfaces, whereby they contact each other twice for each turn, whereas the rollers of the second couple have each only one flattened face, whereby the contact between them stops only once for each turn, the speed of the second couple of rollers being twice the speed of the first couple of rollers.

Advantageously, means for feeding the trimmed strips are provided, these strips being dragged from the longitudinal shears up to the two tearing couple of rollers.

Further characteristics and advantages of the method and of the device according to the present invention will be made more apparent in the description which follows of one of its possible embodiments, given as an example, but not limitative, with reference to the attached drawings, in which:

- figure 1 shows a perspective view of an embodiment of the method according to the present invention for the collection of trimmed strips of paper;
- figure 2 is a diagrammatic view of the longitudinal section of two couples of counter-rotating tearing rollers of the trimmed strips according to the method of the present invention.

- figure 3 shows a partial longitudinal section of a dragging and cutting group of the paper to which a tearing device according to the invention is attached;
- figure 4 shows a diagrammatic view of means of transmission of the movement to the counter-rotating roller of the device of figure 3;
- figure 5 is a sectional view according to arrows V-V of the tearing device of figure 3;
- figures 6 and 7 show a diagrammatic view of two successive positions of the two couples of counter-rotating rollers of the tearing device of figure 3.

In figure 1, a collecting phase is shown, following the method according to the invention, of strips 1 trimmed by longitudinal shears 2 from a continuous strip of printed paper 3 which comprises lateral dragging holes 4 in which pivots 5 of a dragging device 6, also named tractor, engage. The trimmed strips 1 just comprise holes 4 and must be disposed of, so as to produce the least encumbrance and cause the least work to the employee working at the printing section.

According to the invention, strips 1 are torn into portions 7 which are very short along two tearing lines 8 which are substantially transversal and which cross holes 4.

Preferably, strips 1 are torn while going through special tearing devices 9 which will be described in details later on. The portions 8 of the trimmed strips 1 drop untidily onto the bottom of a container 10 forming heaps 11 which gradually fill the container 10 without leaving blanks. The filling occurs contrarily to what happens in the collecting bags of the skeins of the trimmed strips, which form in many printing sections, into which said strips are continuously disposed of, according to the known art.

The tearing occurs in the devices 9 according to the present invention in which, with reference to figure 2, two couples 12 and 13 of counter-rotating rollers are provided through which a strip 1 moves.

As happens in tearing devices already known in the art, the first couple of rollers 12 moves at a slower speed than that of the second couple of rollers, so that the portion of strip 1 which is comprised between the couple of rollers 12 and 13 is stretched until tearing along the lines 8.

Unlike the traditional tearing devices, in which the paper is torn along intentionally created perforation lines, according to the invention it is not necessary to make said perforations, because the paper breaks spontaneously along the lines 8, aided by the presence of holes 4 which cause a local weakness.

Each portion 7 of strips 1, which has already been torn at the passage between the two couples of rollers 12 and 13, may also present holes 4 not

crossed by the tear and comprised between the two tearing lines 8 (in figure 1 a portion 7 comprising a single, not torn hole 4 is shown). This depends principally on the distance between the holes 4, on the speed of strips 1 and on the distance between the two couples of rollers 12 and 13 as well as on their diameter.

In order to perform the best collection in the container of the portions 7, it is suitable that the portions 7 themselves are as short as possible and that they comprise a number as low as possible of holes 4. However, even if the portions 7 were longer, the advantages of having a heap less encumbering as possible of portions are always relevant with respect to the solution in which the trimmed strips are not torn at all.

The tearing method of the trimmed strips 1 in two portions 7 is also very convenient with respect to the solution in which transversal shears are used to cut the strips 1 in small portions. In fact, by using a tearing device instead of a shearing device, there is the advantage of not having to check the shears' sharpness, with a consequent greater reliability.

With reference to figure 3, a tearing device according to the invention, generally indicated with 20, is applied to a dragging group 21 of a strip of paper 3 which, while passing through longitudinal shears 2, is deprived of the trimmed strips 1. Before engaging with shears 2, this strip 3 of continuous paper engages with a tractor 6 by means of pivots 5, which drag the paper itself. The strip 3 of paper, then, once deprived of trimmed strips 1, moves straight forward for being finally packed after the printing or for further operations.

According to the invention, the device 20 comprises two couples of counter-rotating rollers 12 and 13, through which a trimmed strip 1 passes. In the general case of figure 2, the second couple of rollers 13 moves at a greater speed than the speed of the first couple of rollers 12 so that the trimmed strip 1 of paper is stretched between the two couples of rollers and breaks as above described. The difference of speed is normally comprised between 10% and 100%.

In the preferred embodiment shown in figure 3, the rollers of the couple 12 have each two opposite flattenings 22, whereas the rollers of the second couple 13 have each one flattening 23. The speed of the rollers 13 is twice the speed of the rollers 12. This is possible, as an example, by a gearing shown in figure 4 and 5, where the first couple of rollers 12 are put into rotation by two equal counter-rotating gears 24 operated by a pinion 25 having a diameter which is exactly half the diameter of a pinion 26, coaxial to pinion 25 and which puts into rotation two gears 26 equal to gears 24 and which transmits the motion to the second couple of

rollers 13. The gears 25 and 26 are mounted on an axle 28 which rotates together with the tractor 6, by means of a belt 29.

The form of the couples of rollers 12 and 13, having flattened faces 22 and 23, as above described is particularly advantageous in that it allows for a sort of "breath" to the trimmed strip 1 during its movement. In fact, in order to prevent trimmed strip 1 from being stretched by rollers 12 and torn in a whatever point downstream the shears 2, it is necessary that rollers 12 themselves go at a speed which is slightly less than that of trimmed strip 1. The presence of flattenings 22 and 23, allows that, as shown in figure 6 and 7, at each half turn of rollers 12, and then at each turn of rollers 13, strip 1 can recover a small loop which forms upstream owing to the lower speed of rollers 12 with respect to the speed of trimmed strip 1.

In figure 3 conveying means of trimmed strips 1 are also shown. Strips 1, after crossing shears 2, are lead onto a conveyor belt 30 which moves at the same speed of shears 2.

The two couples of rollers 12 and 13 may advantageously be coated by a gummy material 35 (figure 3), so that the noise is reduced as well as the adherence and the life of the rollers themselves are increased. It is not excluded, however, that rollers 12 and 13 can be made of not coated metal, simply knurled in order to increase the adherence.

The device 20 according to the invention, may be even attached to trimming groups of already existing printing sections. In fact, it is sufficient to provide conveying means of the trimmed strips 1 and means for the introduction of the latter into the devices 20 themselves. The driving means of the couple of rollers 12 and 13 may also be equipped with a driving independent from the driving of tractor 6, provided that the former has the same speed as the feeding speed of the trimmed strips 1.

Although reference has been made to rollers 12 and 13 having flattenings 22 and 23 respectively, it is not excluded that the rollers are fully cylindrical, without any flattenings. This would not allow the above described "breath" to trimmed strips 1. The absence of this breath could however be compensated by the presence of a loop upstream the device 20, controlled by sensor means which causes the increase or the decrease of the speed of rollers 12 and 13 as a function of the position of the loop itself. This embodiment is not shown in details for simplicity of description, being already known in the art of the paper conveying systems.

Claims

1. Method for the collection of strips (1) of paper trimmed by longitudinal shears (2) from a con-

tinuous paper (3) with lateral dragging holes (4), characterised in that said trimmed strips (1) are torn downstream said shears (2) into short portions (7), said strips being torn on tear lines (8) substantially transversal and crossing said dragging holes (4).

2. Method according to claim 1, wherein said trimmed strips (1) are torn when passing through two couples of counter-rotating rollers (12,13), the second couple (13) of rollers moving at a speed 10-100% greater than that of the first couple (12) of rollers.

3. Tearing device for a trimmed strip (1) of paper having longitudinal holes (4), characterised in that it comprises a first (12) and a second (13) couple of counter-rotating rollers both dragging said strip (1) which moves therethrough, the first couple (12) of rollers rotating at a speed 10-100% greater than the speed of the second couple (13) of rollers.

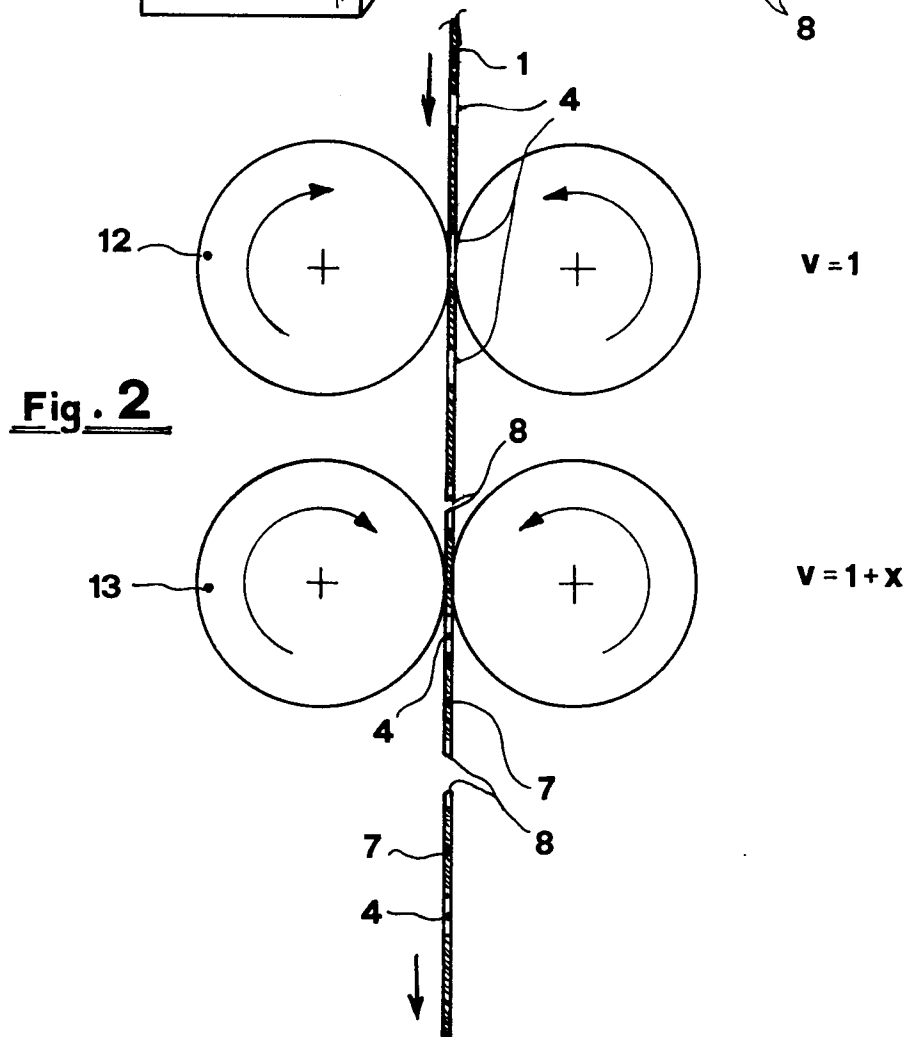
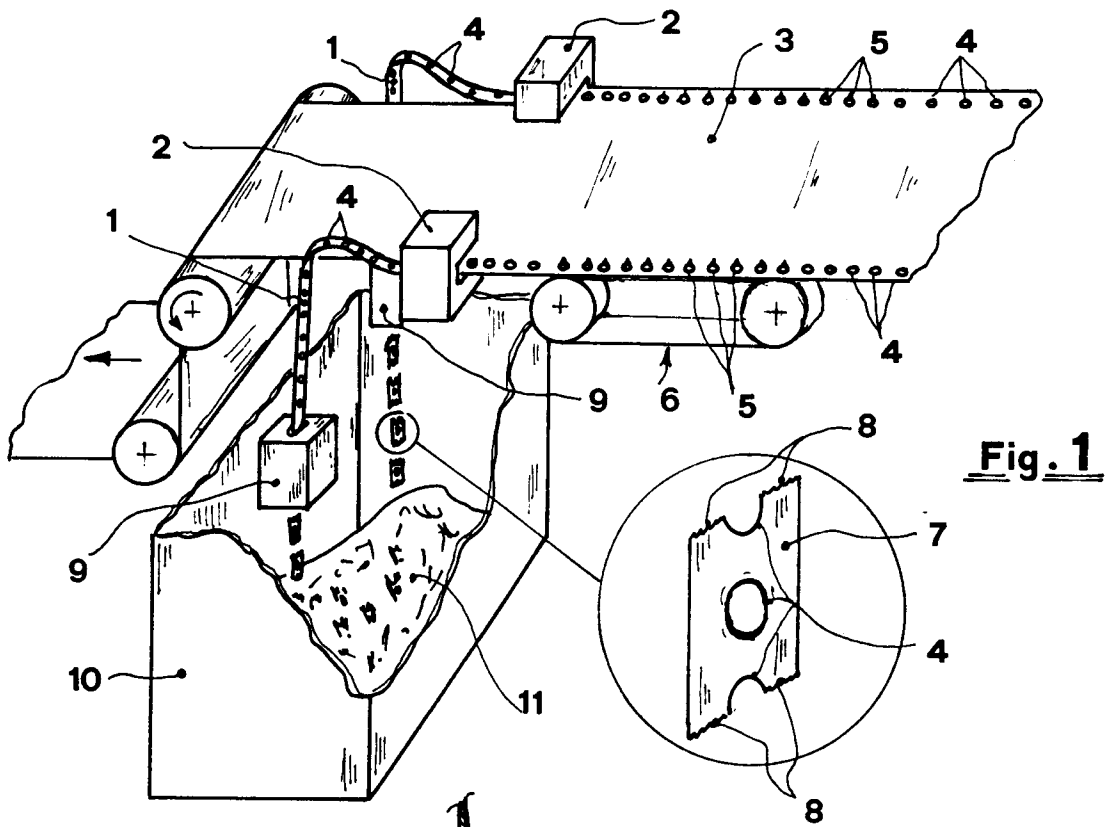
4. Tearing device according to claim 3, wherein said first couple (12) of rollers have each two opposite flattened faces (22), whereby they come into contact twice in each turn, and the rollers of said second couple (13) have each one flattened face (23), whereby the contact between them stops once in each turn, the speed of said second couple (22) of rollers being twice the speed of said first couple (23) of rollers.

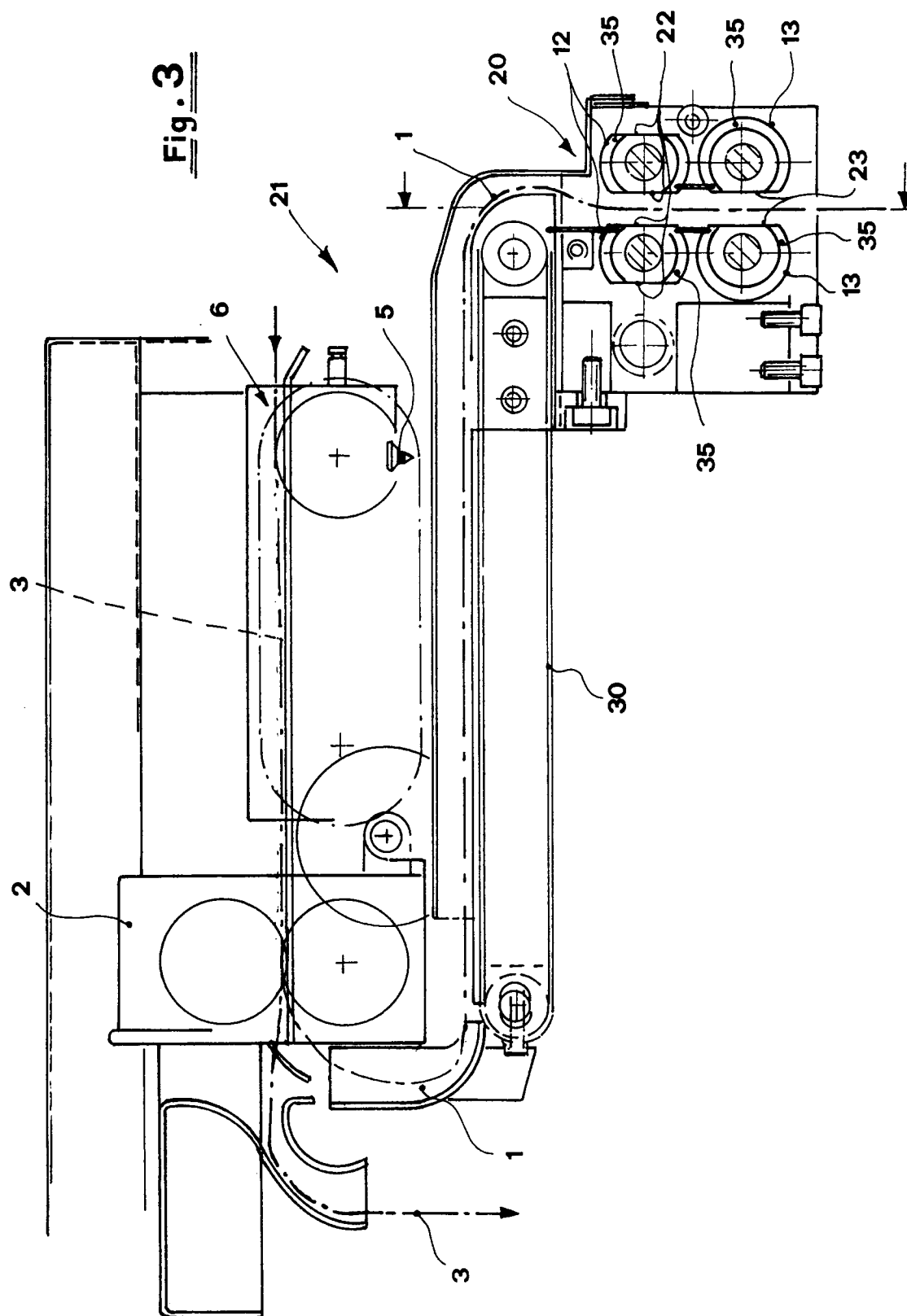
5. Device according to claims 3 and 4, wherein said rollers (12, 13) are coated by a gummy material (35).

6. Device according to the previous claims, wherein upstream said couple of rollers (12, 13) conveying means of said trimmed strips coming from trimming shears (2) are provided comprising a conveyor belt (30).

7. Device according to the previous claims, wherein said rollers of said first couple (12) have a speed slightly less than the speed of said trimmed strips (1) of paper.

8. Device according to the previous claims, wherein said first couple of rollers are put into rotation by two equal gears (24) engaging with a first pinion (25) integral to a second pinion (26) having double diameter with respect to the former and engaging with a second couple of equal gears (27) which put into rotation said second couple (13) of rollers.





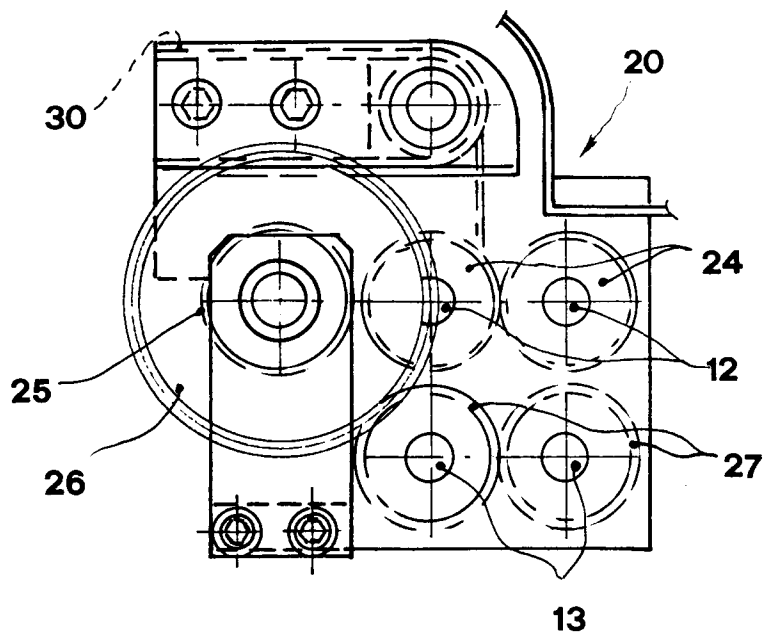


Fig. 4

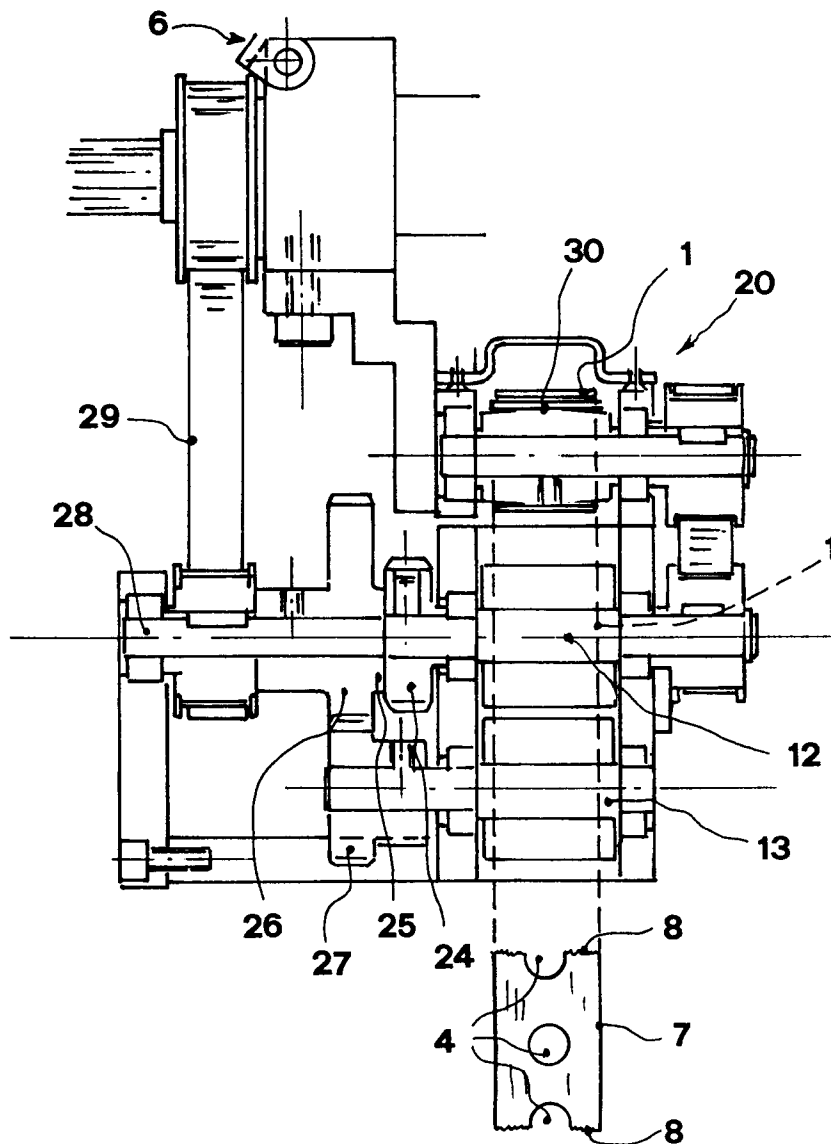
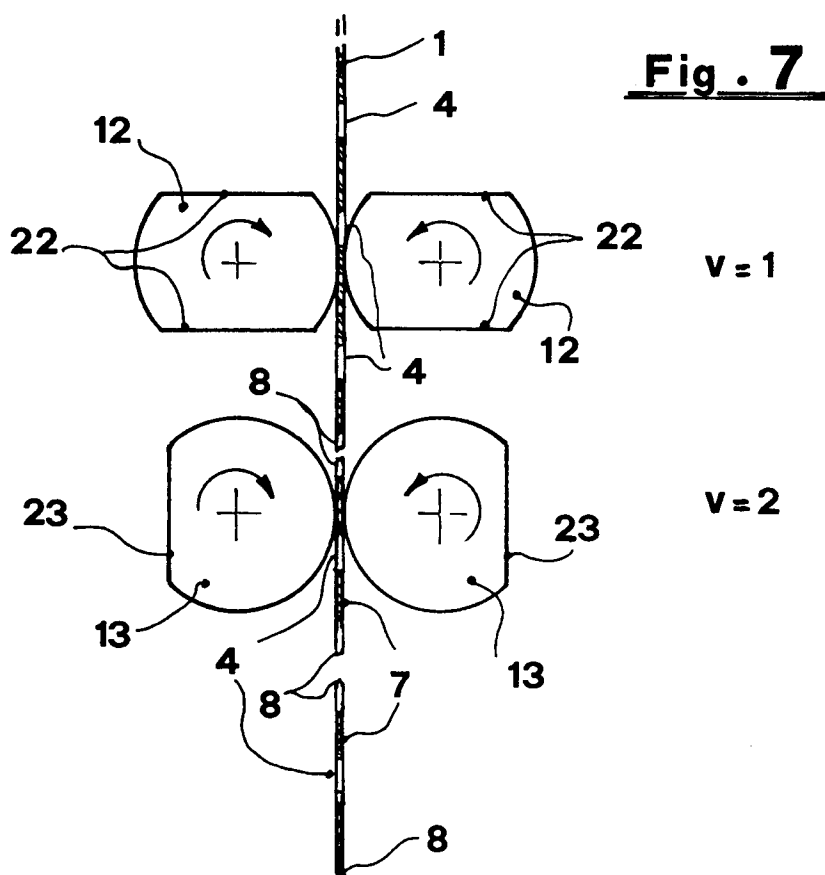
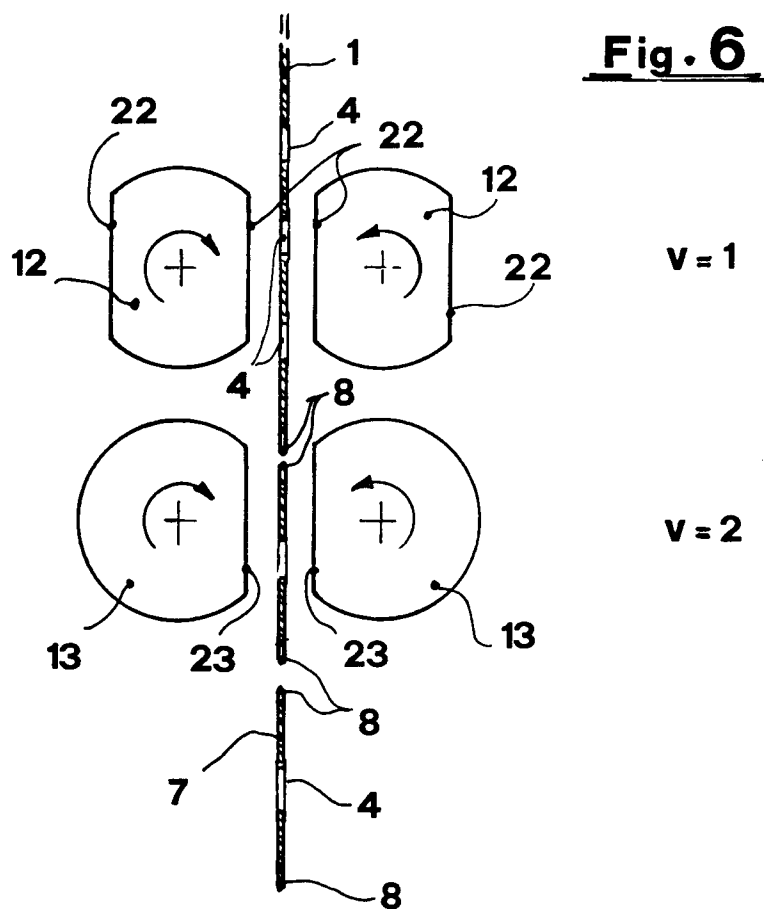


Fig. 5





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EUROPEAN SEARCH REPORT

Application Number
EP 95 83 0223

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)
Y	US-A-3 937 377 (SCHUELER) THE WOHLER DOCUMENT ---	1,3,6	B26F3/02
Y	US-A-3 847 318 (PARENTI)	1,3,6-8	
X	* column 6, line 1 - column 9, line 13; figures 1-23 *	2,4,5	
Y	GB-A-551 379 (WILLIAMS) * page 2, line 125 - page 3, line 62; figures 5-8 *	7,8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B26F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 September 1995	Examiner Berghmans, H
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