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A. VAERO

3,256,760

APPARATUS FOR SEVERING INDIVIDUAL SHEETS FROM A CONTINUOUS BAND

Filed July 1, 1964

2 Sheets-Sheet 1

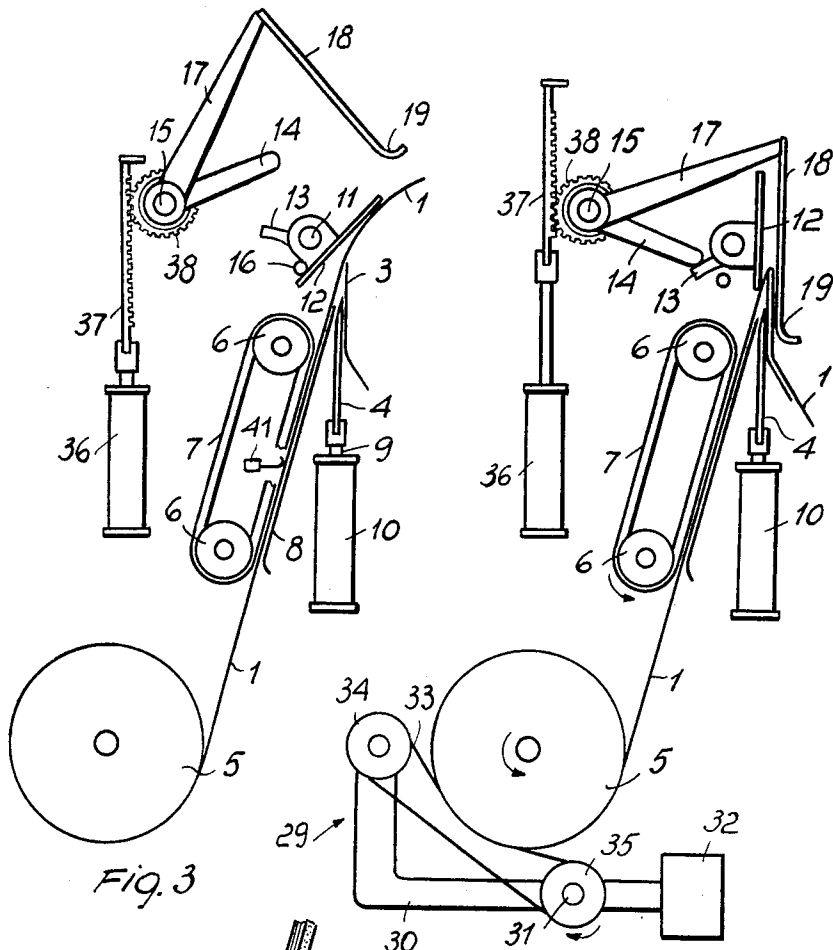


Fig. 3

Fig. 4

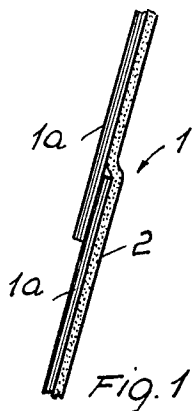


Fig. 1

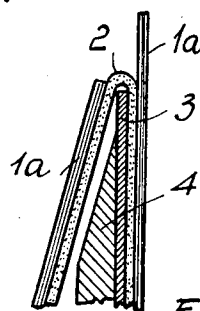


Fig. 2

ALFRED VAERO
INVENTOR

BY

Karl J. Ross
AGENT

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A. VAERO

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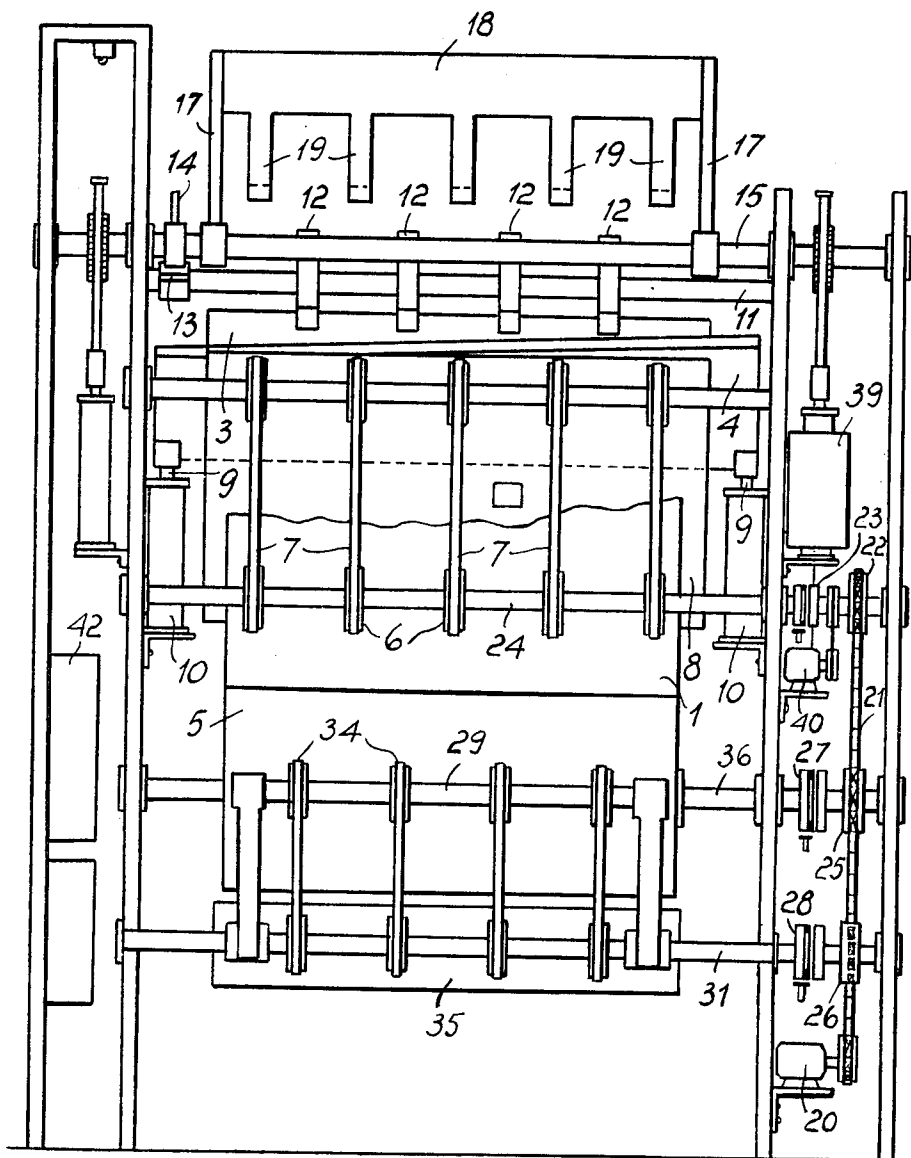


Fig. 5

ALFRED VAERO
INVENTOR.

BY

Karl G. Ross

AGENT

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APPARATUS FOR SEVERING INDIVIDUAL SHEETS FROM A CONTINUOUS BAND

Alfred Vaero, Copenhagen, Denmark, assignor to Coverphan Italiana S.r.l., a corporation of Italy
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3,287

1 Claim. (Cl. 83—176)

This invention relates to an apparatus for severing individual sheets from a band formed of a continuous lamination of overlapping sheets of paper.

The invention is particularly suitable for a band or tape having a continuous support in the form of a continuous foil of plastic material to one side of which the sheets of paper are adhered. The sheets of paper are arranged one after the other along the foil web or band and have their contiguous edges overlapped. The foil support or lamination is preferably of transparent plastic material and is used as a coating for the sheets of paper which may be, for example, pictures, pages of a pamphlet, graphic representations, etc.

The severing of the individual sheets from a band as described above has hitherto been performed by tearing off the sheets singly by manual operation. This procedure has various drawbacks in that it is time-consuming and involves a relatively large percentage of waste. A paper band of this kind cannot be cut in the ordinary way because this would mean cutting off the overlapping portion of a sheet, which portion is to be used in the further treatment of the material, that is for crimping over or encompassing the severed sheets.

An object of the invention is to provide a method of severing the individual sheets of a band of the type described which is devoid of the said drawbacks. This and other objects which will appear from the following description has been achieved by a method which is characterized in that the said band is folded at the zone of overlapped end edges of contiguous sheets on the laminated material, the sheets of the band facing outwards, and that the laminated layer is severed along the folding thus produced. The said method provides an accurate cutting involving a minimal risk of damaging the sheets by permitting the cutting to be performed by mechanical operation.

The invention, moreover, relates to an apparatus for carrying out the above described method. This apparatus provides a more perfect cutting and a larger output than if the cutting were made by manual operation. In fact it will be possible to obtain a production rate which is 3 or 4 times as large as that obtained by manual operation.

The invention will be explained here with reference to a preferred embodiment shown in the attached drawing, in which:

FIG. 1 shows in an enlarged scale a longitudinal section of a band of overlapping sheets of paper;

FIG. 2 shows the same band of paper sheets folded for cutting;

FIG. 3 is a diagrammatical lateral view of an embodiment of an apparatus according to the invention with some parts omitted for the sake of clarity, and in a smaller scale than that of FIGS. 1 and 2;

FIG. 4 is the same view of the apparatus with certain parts in another position;

FIG. 5 is a front view of the apparatus.

The band or web of paper sheets 1 as shown in FIG. 1 consists of sheets of paper 1a with overlapped edges, which sheets received a layer 2 of, for instance a thermoplastic material in a laminating machine, whereby the sheets form a continuous band held together by the ther-

moplastic layer. FIG. 2 shows the same band folded over a folding plate 3 under which a knife 4 is disposed for cutting the plastic layer.

As best shown in FIG. 3 the band 1 is fed from a supply reel 5 by an entraining belt drive comprising pairs of pulleys 6 cooperating with endless rubber belts 7 and by means of members (described below) is led discontinuously (i.e., intermittently) forward to a guide plate 8.

The entraining belt drive 6, 7 is driven by an electromotor 20 (FIG. 5) through a chain transmission 21 wound around the sprocket wheel 22 which through an electromagnetic clutch and brake device 23 actuates the driving shaft 24 of the entraining belt drive 6, 7. The chain 21 engages also the sprocket wheels 25 and 26 which by way of electromagnetic clutch and brake devices 27 and 28, respectively transmit motion to the reel 5 and a braking belt drive indicated generally with 29. The braking drive 29 comprises a frame 30 pivotably supported on the shaft 31 and a counterweight 32 pressing the belts 33 against the reel 5, the belts 33 being wound about pulleys 34 and 35 supported on shafts 36 and 37 respectively. The braking belt drive allows the band 1 to be tensioned during the operation and during the braking of the apparatus.

The knife 4 is located between the guide plate 8 and the folding plate 3, and in the embodiment shown here the said knife is actuated by the piston rods 9 of pneumatic cylinders 10. A number of guide skids 12 are mounted on a rotatable shaft 11 above the guide plate 8. The shaft 11, moreover, supports a tappet 13 cooperating with an arm 14 mounted on another rotatable shaft 15. The shaft 11 is further provided with a spring member (not shown) which, when the tappet 13 is not engaged by the arm 14, urges the guide skids 12 downward to engage an arresting member 16, in the position shown in FIG. 3.

On the shaft 15 are mounted two arms 17 which support a folding plate 18 provided along one side with resilient bent portions 19 which, at the turning of the shaft 15, will move freely between the guide skids 12.

FIG. 3 and FIG. 4 show the arms 17 and the guide skids 12 when the two rotatable shafts are in their extreme positions.

In this embodiment the shaft 15 is actuated by the pneumatic cylinders 36 engaging with the racks 37 of the piston rods thereof with pinions 38 keyed on shaft 15 at both ends thereof. The pneumatic cylinders are connected through a pipe system (not shown) with the air tank 39 supplied with air pressure from the compressor 40.

The apparatus comprises further a feeler 41 sensible to the change of thickness of the band 1 and actuating the controlling electrical circuit of the apparatus which controls the electromagnetic clutch and brake devices and the electromotor 20.

The apparatus operates as follows:

The paper band 1 is carried forward from the supply reel 5 in between the fixed guide plate 8 and the discontinuously operated rubber belts 7 by a distance corresponding to the length of a sheet of the band less overlapping. The band moves upwards and passes the folding plate 3 as shown in FIG. 3, contacting the guide skids 12 which urge it sideways. The advancing of the band continues until the front edge of the following sheet is level with the folding plate 3, as shown in FIG. 2 on a larger scale, when the movement of the band is arrested by the register feeler means 41 and the shaft 15 is turned clock-wise by means of the pneumatic cylinders 36, whereby the bent portions 19 fold the paper band over the folding plate 3 holding it closely thereagainst. The band is now on one side of the knife held by the rubber

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belts 7, and on the other side of the knife by the pressure of the bent portions 19 against the folding plate 3. The knife 4, the sharp edge of which is inclined relatively to the edges of the paper sheets (FIG. 5), is now advanced by means of the hydraulic cylinders 10 towards the band 1 and cuts the band beginning at one edge thereof. While the shaft 15 rotates into the position indicated in FIG. 4, the arm 14 actuates the tappet 13 on the shaft 11 to turn the guide skids 12 into the position shown in FIG. 4, whereby the knife 4 is permitted to pass freely by the skids 12. The cut-off sheet drops along the folding plate 3 on to a collecting arrangement which is not shown. The process is then repeated as explained above.

In a modified embodiment the apparatus may be coupled directly to the laminating machine.

The various driving members are controlled by electrical circuits the control panel of which is indicated in 42. Such circuits may be of any known type and are not represented since their specific features are not a part of this invention.

It is understood that the invention is not limited to the specific embodiments shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claim.

I claim:

An apparatus for cutting off paper sheets from an in-

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termittently advanced band of sheets joined by a layer of a thermoplastic material, said apparatus having an inclined guide plate and conveyor means extending along the said guide plate and defining a travelling path for the advance of said band therebetween; a folding plate disposed at an upper end of the travelling path and forming an acute angle with said guide plate; a swingable guide member disposed above said guide plate and said conveyor means for guiding the upper part of the band over an upper edge of said folding plate; a control arrangement comprising swingable angle levers for folding the upper portion of said paper band over said upper edge of the folding plate; and a vertically slidable severing knife disposed in the gap between said folding plate and said guide plate and shiftable toward the vertex of said angle for sending said layer between said plates.

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25 WILLIAM W. DYER, JR., *Primary Examiner.*

F. T. YOST, *Assistant Examiner.*