United States Patent [19]

Schweisfurth

[11] **3,912,570**

[45] **Oct. 14, 1975**

[54] **APPARATUS FOR ATTACHING SELF-ADHESIVE PERFORATED EDGING STRIPS TO UNPERFORATED SHEET MATERIAL, MORE PARTICULARLY DRAWING COPY MASTERS**

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[73] Assignee: **Meteor-Siegen,** Siegen, Germany

[22] Filed: **Aug. 2, 1973**

[21] Appl. No.: **385,212**

[30] **Foreign Application Priority Data**

Aug. 3, 1972 Germany 2238118

[52] **U.S. Cl.** **156/351;** 156/378; 156/364; 156/521; 156/542; 156/DIG. 33; 156/DIG. 37; 156/DIG. 45

[51] **Int. Cl.²** **B65C 9/42**

[58] **Field of Search** ..... 156/461, 540, 541, 542, 156/543, 354, 364, 355, 362, 351, 378, 391, 459, 470, 464, 521, DIG. 2, DIG. 25, DIG. 33, DIG. 37, DIG. 45

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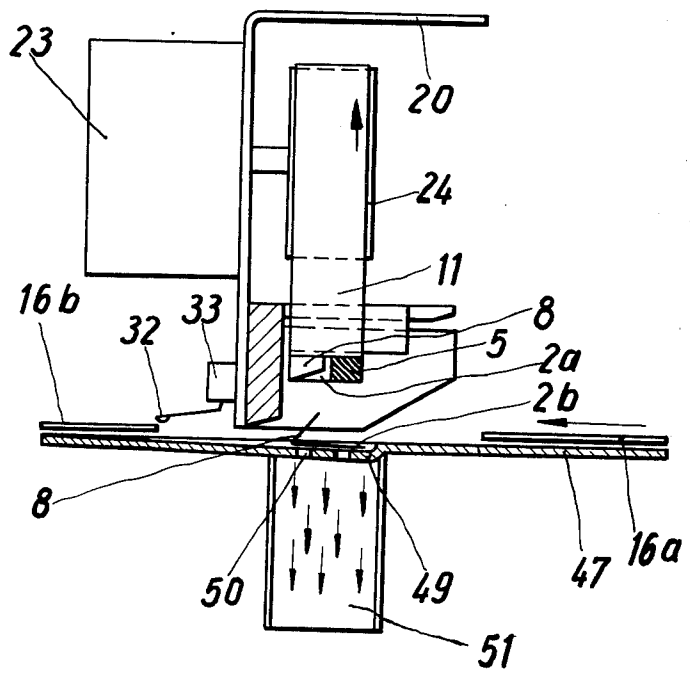
[57] **ABSTRACT**

This invention comprehends apparatus for attaching self-adhesive, perforated edging strips to unperforated sheet material which is moved on a horizontal conveyor, more particularly drawing copy masters, with a storage and supply device for the edging strips which are serially and self-adhesively attached on a support strip in the manner of a belt and are detached therefrom, relative to probes which respond to the feed of the sheet material and of the edging strips, on a separating edge which deflects the said support strip, the edging strips being moved into a stand-by position in which they are retained on a perforated plate by means of suction air, characterized in that the edging strips are supplied perpendicularly to the conveying direction of the sheet material, and the plate is disposed below the conveyor for the sheet material in such a way that its surface rises towards the conveyor in the conveying direction.

5 Claims, 8 Drawing Figures



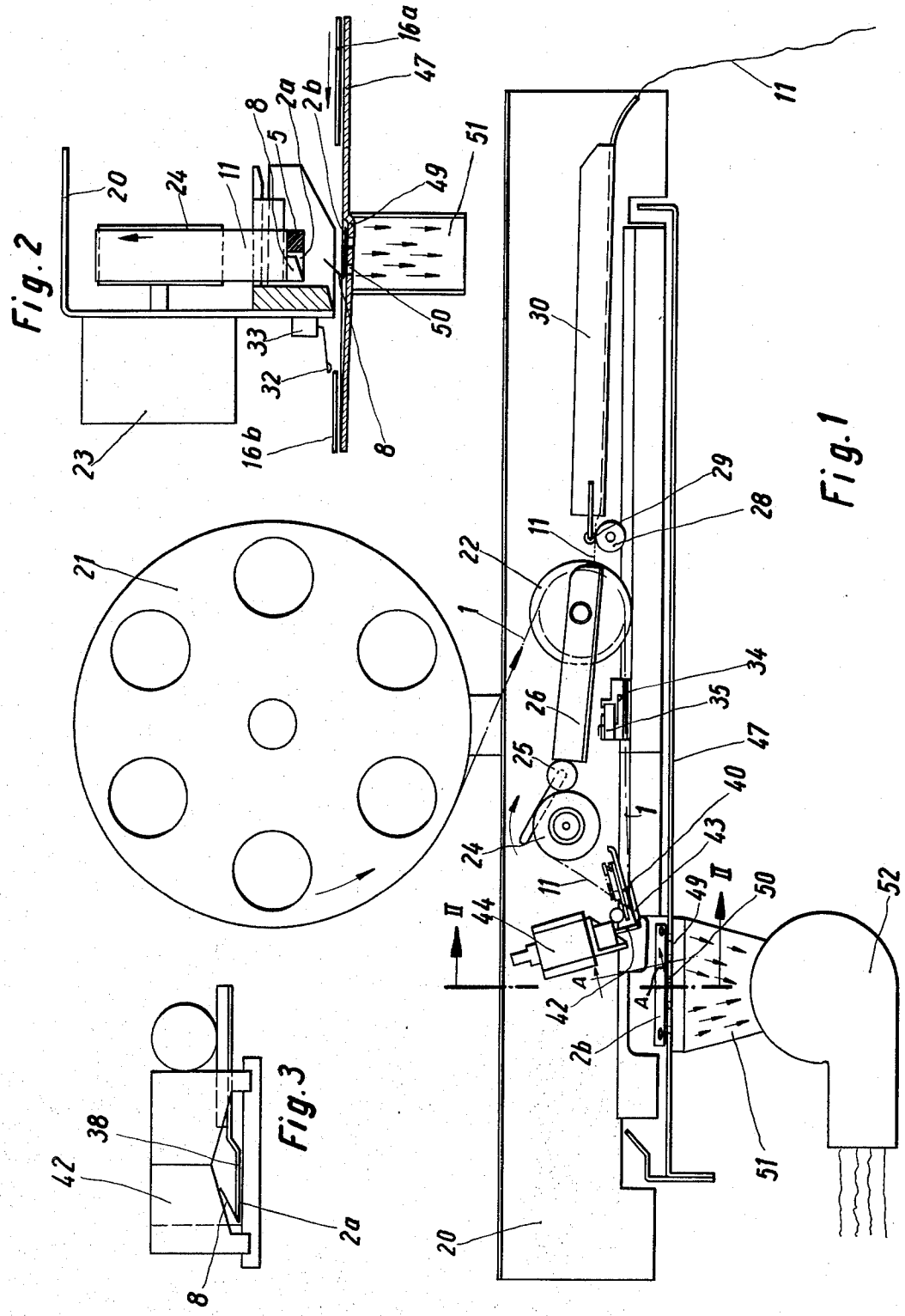


Fig. 2
Fig. 1
Fig. 3
16a
47
2a
2b
8
5
11
20
24
49
51
50
33
32
23
16b
30
29
28
22
1
34
35
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25
40
43
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42
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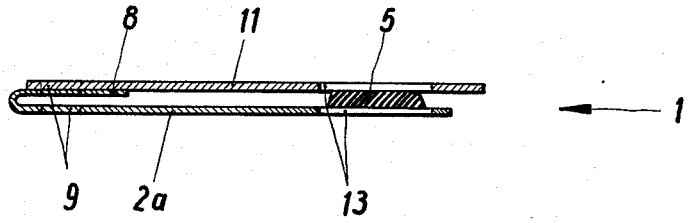

Fig. 5

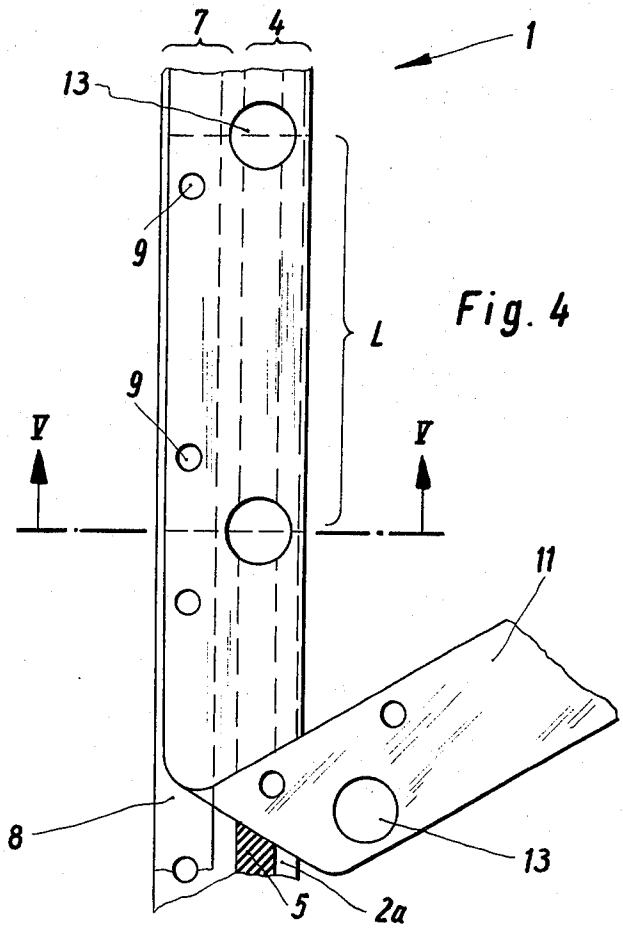

Fig. 4

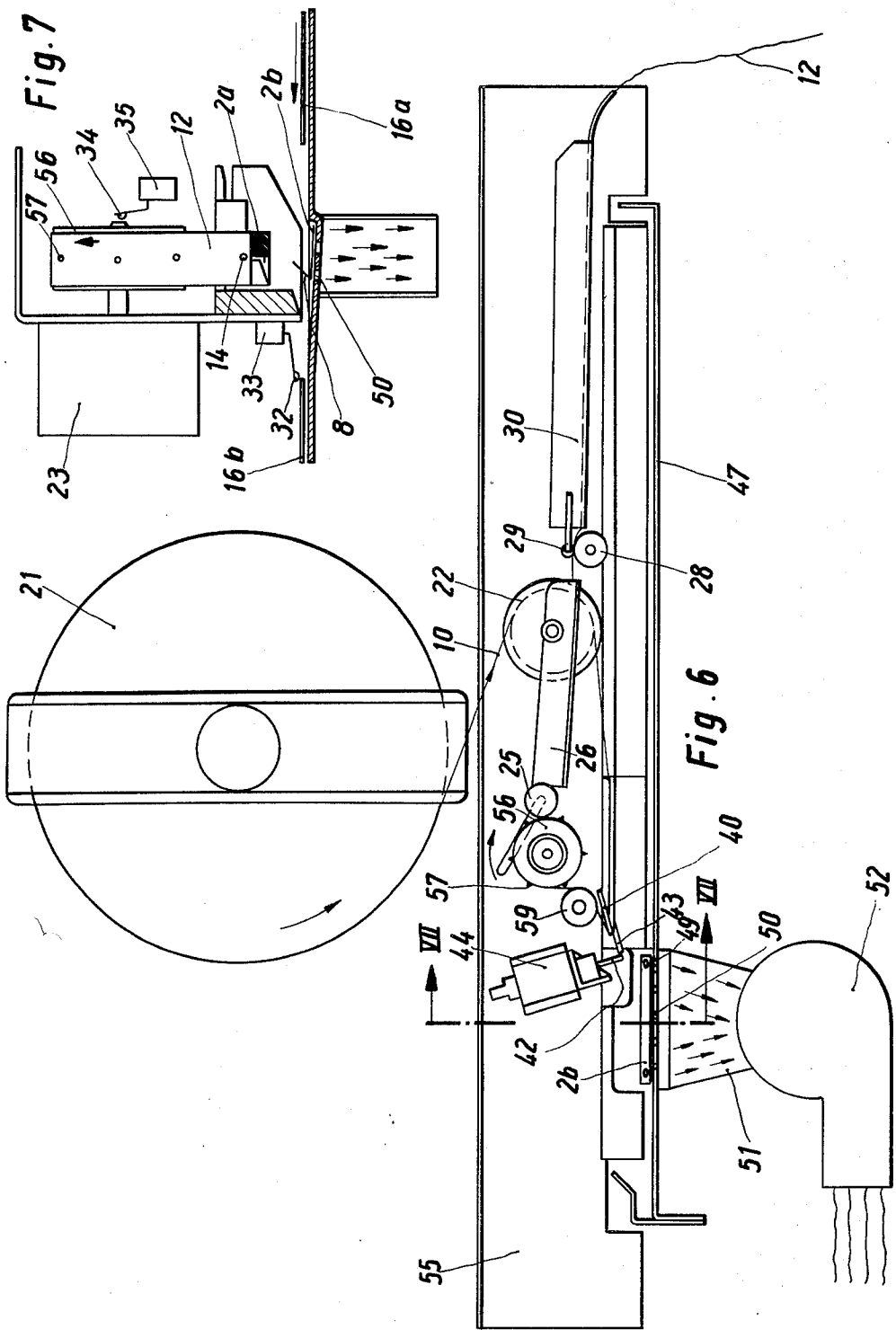
Fig. 7
Fig. 6
VII
VII

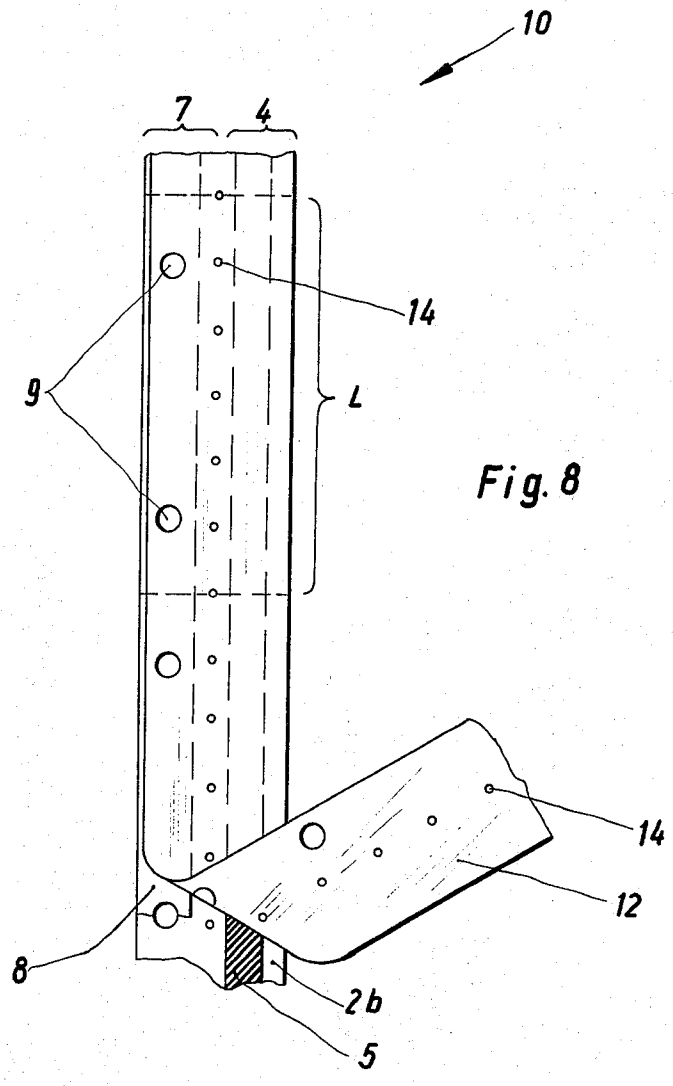

Fig. 8

APPARATUS FOR ATTACHING SELF-ADHESIVE PERFORATED EDGING STRIPS TO UNPERFORATED SHEET MATERIAL, MORE PARTICULARLY DRAWING COPY MASTERS

The invention relates to apparatus for attaching self-adhesive, perforated edging strips to unperforated sheet material which is moved on a horizontal conveyor, more particularly drawing copy masters, with a storage and supply device for the edging strips which are serially and self- adhesively attached on a support strip in the manner of a belt and are detached therefrom, relative to probes which respond to the feed of the sheet material and of the edging strips, on a separating edge which deflects the said support strip, the edging strips being moved into a standby position in which they are retained on a perforated plate by means of suction air.

A device of this kind is known for the attachment of self-adhesive labels to objects which are supplied successively and in which the conveyor belt which conveys the objects moves in the direction of the belt which supports the labels and the objects are moved under the label which is held in readiness whereupon the said label is pressed into position or blown into position.

It is the object of the invention to provide a device which attaches edging strips in like manner to sheet material, more particularly large drawing copy masters because hitherto it was necessary for self-adhesive perforated edging strips to be individually removed from a package and to be attached to the drawing copy master manually after the removal of the covering film. Direct utilization of known labelling apparatus is not possible because the drawing copy masters have a large surface area and are therefore not readily handled and because the edging strips also have a relatively large surface area but precise attachment of the edging strips to the sheet material without crinkling must be ensured.

Proceeding from the device described hereinbefore the invention solves the problem in that the edging strips are supplied perpendicularly to the conveying direction of the sheet material and the plate below the conveyor for the sheet material is arranged so that its surface rises towards the conveyor in the conveying direction.

In this way the sheet material is guided over the edging strip which is held in readiness and whose edge which is at a higher position initially makes contact with the sheet material, is entrained thereby and then gradually bears upon the sheet material without forming any creases. Furthermore, fixing the edging strip in its stand-by position requires only a slight positive pressure despite the large area of the strip because it is not necessary for the weight of the edging strip to be taken up; tests have shown that the negative pressure may be entirely or almost entirely omitted if the plate is suitably constructed so that it is frequently possible to continue operation even if the source of negative pressure fails.

The device according to the invention is particularly advantageous in the attachment of a folded edging strip; in this case a righting tongue is disposed between the separating edge and the plate to set the folded section of the edging strip relative to its main section at an angle while forming a hollow fillet which extends into the conveying path of the sheet material. In operation

the sheet material travels into the hollow fillet and entrains the edging strip which is again neatly joined to the sheet material owing to the angular position of the plate.

More particularly, the system may be arranged so that a first probe traces the removal of a sheet on which adhesive fixing has been completed and a second probe which traces each rotation of a length measuring roller which engages by means of pins into perforations of the edging strip belt or traces the perforations directly.

Further details and advantages of the invention are disclosed in the description hereinbelow of two preferred embodiments by reference to a drawing.

In the drawing

FIG. **1** is a diagrammatic side view of apparatus according to the invention for delivering perforated edging strips, of an edging strip belt with an endless edging strip series and with length measuring means adapted to trace perforations in the edging strip belt;

FIG. **2** is a section through the apparatus of FIG. **1** to an enlarged scale along the line II—II;

FIG. **3** is a section of the apparatus of FIGS. **1** and **2** as seen along the line A—A of FIG. **1**;

FIG. **4** is a section of an edging strip belt processing within the device of FIGS. **1** to **3**;

FIG. **5** is a section through a line V—V of FIG. **4** to an enlarged scale;

FIG. **6** is an embodiment of a device modified with respect to that of FIG. **1** for delivering perforated edging strips and whose length measuring device is adapted to trace a length measuring roller;

FIG. **7** is a section to an enlarged scale along the line VII—VII of FIG. **6**; and

FIG. **8** is a section to an enlarged scale of an edging strip belt which can be processed in the device of FIGS. **6** and **7**.

The apparatus illustrated in FIG. **1** of the drawing for the delivery of edging strips which are to be attached to the edge of sheet material, for example drawing copy masters, is provided with a continuous frame **20** functioning as a supporting element on which a supply reel **21** for accommodating an edging strip belt **1** is rotatably supported. A section of the edging strip belt **1** is shown to an enlarged scale in FIG. **4** of the drawing. The individual edging strips in this case take the form of an endless edging strip series **2***a* which are attached to a support strip **11**. The edging strip series **2***a* may be constructed of paper, transparent film or the like and is subdivided transversely to its longitudinal orientation into an inner section **4**, one side of which is coated with an adhesive trace **5**, and into an outer section **7** which is provided at predefined distances with perforations **9** and a back fold **8** through which the perforations **9** also extend. As will be disclosed in the description hereinbelow, the sheet material, which is provided with the edging strip, is completely inserted into the slit which is formed below the back fold **8** and is located by the adhesive trace **5**.

The support strip **11** of the edging strip belt **1** may be constructed of paper or of a plastics film and is prepared on its side which is opposed to that of the adhesive trace **5** so that it can be relatively easily pulled off. All perforations which extend through the edging strip series **2***a* also extend through the support strip **11**. This includes the separating position perforations **13** which are disposed precisely at the joints between two adhesive strips which are to be later separated in the device,

namely at distances from each other equivalent to one edging strip length L and cover at least the entire width of the adhesive trace **5.** This ensures that and knives used for cutting do not become contaminated with adhesive substance.

The sheet material **16***a* which is to be provided with the individual edging strips **2***b* passes through the device in the sectional view of FIG. **2** from right to left in the arrow direction while bearing upon a sheet support **47.** The sheet material **16***b* to which an edging strip **2***b* has already been adhesively affixed traverses past a first probe **32** with a microswitch **33** associated with a length measuring and control device. This device includes a second probe **34** with a microswitch **35** which is disposed downstream of a reversing pulley **22** in the conveying direction of the edging strip belt **1** according to FIG. **1,** the said edging strip belt **1** passing around the said roller as the first guiding element after leaving its supply reel **21.** The edging strip belt **1** is driven by an electric motor which may also be provided with a gearbox and is disposed within the driving device **23** and is coupled with a driving pulley **24** which drives the entire edging strip belt **1** over the support strip **11** which has already been detached. The support strip **11** is pressed by means of a prestressed tensioning roller **25** against the circumference of the driving roller **24** in order to transmit the necessary frictional torque. As may be seen by reference to FIG. **1,** a rounded detachment edge **40** is disposed between the second probe **34** and the driving pulley **24,** the support strip **11** being pulled around the said edge with a relatively small curvature radius while the relatively stiff edging strip series **2***a* which adheres to the support strip continues to be conveyed substantially rectilinearly in its previous conveying direction and after being separated from the support strip **11** moves into the gap of a separating device which comprises a support surface **43** and a separating knife **42** which can be actuated by an electromagnet **44.**

The operation of the length measuring and control device will now be described in detail. As soon as sheet material **16***b* which has been completely provided with edging strips **2***b* in accordance with FIG. **2** is pulled through to the left below the first probe **32** the microswitch **33** thereof will actuate the driving means **23** and the driving pulley **24** sets the entire edging strip belt **1** including the supply reel **21** into motion via the support strip **11.** This feed motion continues until the second probe **34** engages with the next separating perforation **13** in the edging strip belt **1,** the said perforation being disposed at a distance which is exactly equal to the length L of the edging strip. The microswitch **35** will be operated and ensures that the driving pulley **24** stops suddenly while at the same time or after a short delay the electromagnet **44** energizes and its cutting knife **42** cuts an individual edging strip **2***b* in the zone of the separating position perforation **13,** the said edging strip having been previously pushed through.

As may be readily seen by reference to FIG. **1,** the leading end of the detached edging strip **2***b* was already disposed near a fixing plate **49** prior to the cutting operation, the said fixing plate forming an inclined indentation relative to the horizontal sheet support **47** and being provided with apertures **50** which are connected via a suction air shaft **51** to a suction blower **52.** The constantly operating suction air blower **52** applies pull to the detached edging strip **2***b* and retains it in the slightly inclined position illustrated in FIG. **2.** As may also be seen by reference to FIG. **2,** the back fold **8** has previously been righted at a predefined angle in accordance with FIG. **3** by means of a knife edge righting tongue **38** which is disposed near the detaching edge **40.** While the detached edging strip **26** is now located in the illustrated position under the suction effect of the negative pressure, the next sheet **16***a*, which is to be provided with adhesive fixing means, is completely inserted into the hollow fillet formed under the back fold **8** of the edging strip and the connection to the sheet material **16***a* is obtained by applying manual pressure or by a suitable pressure ram. The sheet material **16***b* which has then been provided with an edging strip **2***b* is subsequently delivered to the left from the device as shown in FIG. **2,** and on leaving the first probe **32** it triggers the feed of the next edging strip **2***b* in the manner described hereinbefore. After leaving the gap between the driving pulley **24** and the tensioning pulley **25,** the detached support strip slides into a guide chute **26,** is conveyed forward in the gap between a feed roller **28** with a slip clutch and a pressure roller **29** through a second guide chute **30,** and finally leaves the device via a curved delivery (see FIG. **1**). The driving torque in the gap between the rollers **28** and **29** must be smaller than the torque between the driving pulley **24** and the tensioning pulley **25.**

FIGS. **6** and **7** of the drawing show in schematic form a further embodiment of a device according to the invention for delivering edging strips. This embodiment is intended particularly for processing adhesive strip belts **10** on whose supporting strip **12** separate edging strips **2***b* are already attached in a serial disposition. The device according to FIGS. **6** and **7** also incorporates a cutting device with a cutting knife **42** and an electromagnet **44** in the same way as the previously described embodiment but which are not required for the preseparated edging strip **2***b*.

The drawing uses the same reference symbols for individual parts of the apparatus of FIGS. **6** and **7** to the extent to which they coincide with those of FIGS. **1** to **3.** Since the embodiments are in any case very similar to each other the description hereinbelow will be confined to those parts of the apparatus of FIGS. **6** and **7** which differ from those of FIGS. **1** to **3.**

The edging strip belt **10** illustrated in FIG. **8** of the drawing is provided in the middle between the inner section **4** and the outer section **7** with a row of uniformly distributed central perforations **14** which extend through the edging strips **2***b* as well as through the support strip **12.** The distances between the said central perforations **14** are selected so that a specific number of such distances corresponds accurately to one length L of edging strip; in the present embodiment, the distance between two successive central perforations **14** amounts to one sixth of the edging strip length L.

FIG. **7** discloses that the first probe **32** traces the sheet material **16***b* which is completely provided with edging strips in the same way as in the first embodiment. However, the second probe **34** with its microswitch **35** in this embodiment traces a cam of a driving and length measuring roller **56** which is driven by the previously described driving device **23** and provides for the feed of the edging strip belt **10.** As indicated in FIG. **6,** the circumference of the driving and length measuring roller **56** is provided with six pins **57** whose spacing on the circumference of the said driving and length

measuring roller **56** corresponds precisely to the distance between the central perforations **14** on the edging strip belt **10.** As soon as the driving device **23** is triggered by the first probe **32,** the driving and length measuring roller **56** performs one rotation after which it is switched offf again by the second probe **34** and is temporarily decelerated. In this individual rotation, which is precisely maintained, the supporting strip **12** which passes around the driving and length measuring roller **56** will have been advanced by six central perforations **14** so that an individual edging strip **2***b* will become detached against the detachment edge **40** to be taken up in the manner already described by the fixing plate **49** of the fixing device to be retained thereby in order to be joined to the sheet material **16***a* in the manner described hereinbefore.

If the edging strip belt **10** does not comprise individually tacked edging strips **2***b* but an endless edging strip row **2***a*, the second probe **34** will also operate the electromagnet **44** of the cutting device in the manner already described hereinbefore.

The apparatus according to the invention may be employed in conjunction with a machine for folding drawing copy masters or the like and may be incorporated into the operating cycle of such a machine without the need for additional control means.

I claim:

1. Apparatus for attaching self-adhesive, perforated edging strips to unperforated sheet material such as drawing copy masters, comprising substantially horizontal conveying means on which said sheet material moves in a given direction, a storage and supply device for the edging strips which are serially and self-adhesively attached on a support strip in the manner of a belt, means for feeding said edging strips and said support strip over a predetermined path from said storage and supply device substantially to a point of substantially transverse intersection with said conveying means, means for controlling the operation of said feeding means including probes respectively disposed adjacent said conveying means and along said feed path which respond to the feed of the sheet material and of the edging strips, a separating edge adjacent said feed path and over which the feed of said strip is substantially reversed to deflect said support strip, the edging strips continuing in the initial feed separated from said support strips, a stationary inclined perforated plate located opposite the feed means such that the conveying means for the sheet material passes said sheet material between the feed means and said plate and on which said separated edging strips are received and retained by means of suction air, the inclination of said perforated plate being such that its surface inclines from a position removed from the conveying means toward the conveying means in the conveying direction of the sheet material for associating edging strips therewith.

2. Apparatus according to claim **1** wherein the edging strips each have a main section and a folded section and further comprising a righting tongue disposed laterally between the separating edge and the plate for engagement with a folded edging strip beneath the folded section, said tongue setting the folded section of the edging strip at an angle relative to the main section of said strip while forming a hollow fillet which extends into the conveying path of the sheet material when the strip is received on the plate.

3. Apparatus according to claim **1** wherein said support strip has perforations therein and a first probe traces the removal of a sheet with completed adhesive fixing, and further comprising a length measuring roller adjacent said path and having outwardly extending pins thereon engaging with perforations in said strip, a second probe tracing each rotation of said length measuring roller.

4. Apparatus according to claim **1** wherein said support strip has perforations therein and a first probe traces the removal of a sheet with completed adhesive fixing, and a second probe traces the perforations in said support strip.

5. Apparatus as set forth in claim **1** wherein consecutive edging strips are integrally attached to one another, and further including severing means adjacent said separating edge and actuated in time relation with movement of said edging strips to sever successive edging strips.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,912,570 Dated October 14, 1975

Inventor(s) Werner Schweisfurth

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 6, line 3, after "feed" insert --direction--

Signed and Sealed this

thirteenth Day of *April 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks