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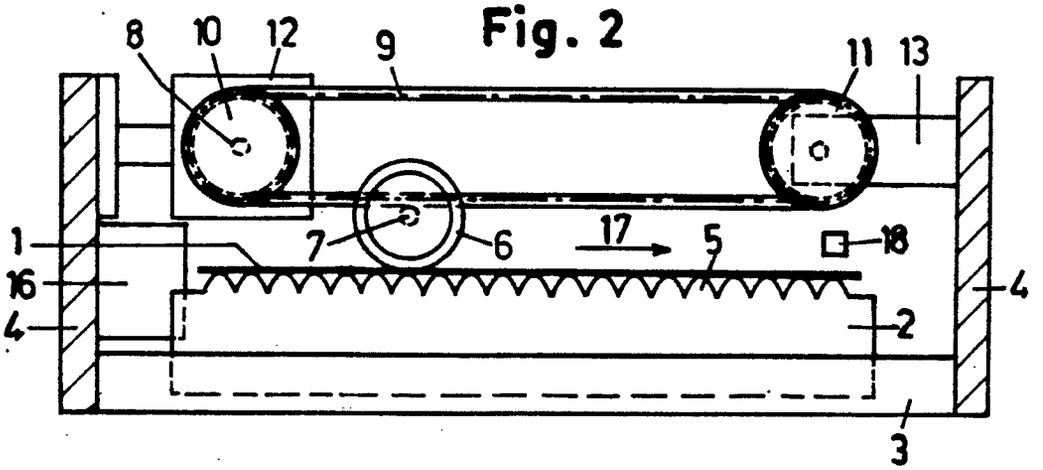
(54) Device for perforating cross-wise a strip.

(57) The perforating knife (2) is mounted by means of the support (3) between the side walls (4). Above the knife (2), a geared belt (9) is mounted which runs over two gear-wheels (10 and 11) mounted in the side walls (4). The gear wheel (10) is driven by the motor (12). A small wheel (6) is mounted with the shaft (7) on the geared belt (9). By means of pin tractors, the strip (1) is moved over the edge (5) of the knife (2) over the suitable distance, whereafter for perforating cross-wise, the geared belt (9) is driven, whereby the small wheel (6) is moved over the strip (1) and the knife edge (5).

Fig. 2



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"Device for perforating cross-wise a strip".

The invention relates to a device for perforating a strip cross-wise, which device comprises a frame, a perforating knife mounted on said frame, a counter-member which is mounted opposite the perforating knife on the frame, and means to move the strip relative to said perforating knife with the lengthwise direction thereof cross-wise to the perforating knife edge, and bring said strip between said knife and the counter-member.

Devices of this kind are often used for manufacturing so-called continuous forms. After a strip, generally a paper one, has been perforated adjacent the lengthwise edges thereof, it is provided by means of such a device, with perforations along the cross-wise direction where the forms have to be torn away from one another.

Such a device is generally mounted in such cases, on a printing machine for printing continuous forms, whereby the printing machine frame and the device frame form a single unit.

Known devices for perforating a strip cross-wise comprise a plurality of oblong perforating knives which are mounted on the circumference of a drum which is supported in the frame, with the axis thereof parallel to the knife edges. The counter-member is formed by a pressure drum which is supported in the frame with the axis thereof parallel to the axis of said drum, opposite said drum. The strip to be perforated is fed between both drums, whereby during the strip conveying, both drums are driven synchronously. Every time a knife contacts the counter-member, a perforation is made cross-wise in the strip lying in-between.

With such known devices, the spacing between succeeding perforations along the cross-wise direction is not adjustable or with difficulty only.

Such spacing is only dependent on the spacing as measured along the drum circumference between the succeeding knives and on the revolution rate of said drum. The revolution rate is generally fixed and unadjustable, and is exclusively dependent on the printing machine speed. The spacing between the knives on the drum may only be adjusted in a limited degree by changing the knife number, as these knives have to be distributed regularly over the drum. The only way to change the spacing between succeeding cross-wise perforations, is to replace the drum by a drum with another diameter, which raises quite a few problems.

The invention has for object to obviate these drawbacks and to provide a device for perforating a strip cross-wise, which has a simple structure, but whereby the spacing between succeeding perforations may be adjusted in a very simple way.

For this purpose,one of those components formed by the perforating knife and the counter-member, is a small wheel which is movable over the other component and can press the strip against said other component, and the device comprises means for moving said small wheel over said other component to perforate thereby the strip lying therebetween, while the means for moving the strip relative to the perforating knife, are means to move intermittently the strip over said latter other component, in such a way as to stand still during the perforating, and said other component is stationary at least as said small wheel is being moved thereover and thus at least during the perforating.

The spacing between succeeding perforations along the cross-wise direction is dependent on the distance whereover the strip is being moved between said perforations. Said latter distance can be changed very easily and adjusted very accurately with the means for moving intermittently the strip.

In a particular embodiment of the invention, the small wheel is the counter-member and the perforating knife is said other component.

In a remarkable embodiment of the invention, the means for moving the small wheel over the other component comprise an endless element which is mounted on the frame, with a part along said other component, whereby the small wheel is rotatably fastened to said endless element.

In a useful embodiment of the invention, the means for moving the strip intermittently comprise two drive devices, one before and one after that unit formed by the perforating knife and the counter-member, and a control device which synchronously controls both said drive devices.

Advantageously, the strip is moreover already provided adjacent the lengthwise edges thereof with perforations and each of said drive devices comprises two pin tractors, one next to each strip lengthwise edge, which tractors go with a number of pins thereof through perforations along the strip lengthwise edges.

Other features and advantages of the invention will stand out from the following description of a device for perforating a strip cross-wise, according to the invention; this description is only given by way of example and does not limit the invention.

Figure 1 is a diagrammatic top view of a device for perforating a strip cross-wise, according to the invention.

Figure 2 shows a cross-section along line II-II in figure 1, drawn on a larger scale.

In both figures, the same reference numerals pertain to the same elements.

The device according to the figures for per-

forating a strip 1 cross-wise, comprises an oblong perforating knife 2 which is fixedly mounted by means of a support 3,between two upstanding side walls 4 which are part of a frame which forms a single unit with the frame of a printing machine for printing on said strip.

The perforating knife 3 is arranged with the serrated edge 5 directed upwards, horizontally along the cross-wise direction of the device.

A small wheel 6 is movable over the knife edge 5.

Said small wheel 6 is rotatable about a small shaft 7 which is secured to an endless geared belt 9, in such a way that the small wheel 6 lies completely next to said geared belt 9.

The geared belt 9 extends overall along the device cross-wise direction and thus in parallel relationship with the perforating knife 2, and in such a location that when the small wheel 6 lies below the geared belt 9, said small wheel runs over the knife edge 5.

The endless geared belt 9 runs at both ends thereof over gear-wheels 10 and 11.

The gear-wheel 10 is fast to a shaft 8 which is driven by an electric motor 12, which motor is secured to the one side wall 4.

The other gear-wheel 11 is freely-rotatably supported in a support 13 which is fastened to the opposite side wall 4. The small wheel 6 is made from hard steel and forms a counter-pressure member which as it runs over the knife edge 5, presses perforations in the strip 1 which lies over the knife edge 5 underneath the small wheel 6.

The strip 1 is led between the small wheel 6,or more precisely the unit formed by the small wheel 6 and the geared belt 9 on the one side, and the perforating knife 2 on the other side, and it is moved intermittently by means of four pin tractors 14.

Said pin tractors 14 have the same structure known per se and will not be described in detail here. They are comprised in the usual way of an endless belt which is provided with pins and driven by built-in stepping motors. The pins from the pin tractors 14 go through round perforations 15 which are provided along both strip edges, before the strip 1 reaches the device.

Two pin tractors 14 are located on that side of the perforating knife 2 where the strip 1 is being fed. Both other pin tractors 14 are arranged on the opposite side of the perforating knife 2. Said pin tractors thus form two by two drive devices, respectively in front of and beyond the perforating knife 2. Both pin tractors 14 of a drive device are fastened respectively on either side of strip 1, to the corresponding side wall 4.

The motors of the four pin tractors 4 drive same synchronously, in such a way that the strip 1 between the frontmost and the backmost drive device is not released, nor stretched, but remains suitably tight. Before and after said drive devices, the strip 1 forms a supply loop, not shown in the figures for clearness' sake.

The motors of the four pin tractors 14 are controlled together with the motor 12 through an electronic control device 16, and actually in the following way.

With the strip 1 standing still, thus while the pin tractors 14 are out of action, the control device 16 operates the motor 12 in such a way that the geared belt 9 is driven. The movement direction of the geared belt 9 is shown in figure 2 with arrow 17.

The small wheel 6 runs thereby from left to right as seen in figure 2, over the knife edge 5, or more precisely over the strip 1 which lies on said edge 5, and presses thereby perforations in strip 1.

When the small wheel 6 has run through strip 1 along the cross-wise direction, a detector 18, which may for example be a photo-cell, arranged opposite the right-hand end in figure 2 of perforating knife 2,couples a signal to the control device 16 which operates in response to said signal, the four pin tractors 14 and actually for as long as the strip 1 has been moved over the suitable distance which corresponds to the spacing between two succeeding perforations.

In-between the geared belt 9 moves further until the small wheel 6 lies again at the bottom, opposite that end lying to the left in figure 2, of the perforating knife, whereafter the motor 12 is stopped.

As soon as the pin tractors 14 have moved the strip 1 far enough along the lengthwise direction thereof, and said strip 1 stands still again, the control device 16 orders again the motor 12 to operate, whereby thus the geared belt 9 is moved again and a new perforation is made in strip 1. The above-described cycle is repeated again.

The spacing between two succeeding perforations is exclusively dependent on the distance whereover the strip 1 is moved every time. Such spacing which is thus dependent on the time the pin tractors 14 are operating, can be adjusted very accurately and easily changed by means of the control device 16.

The above-described device has a very simple structure and is relatively compact. It may easily be built in a new or an existing continuous-form printing machine.

The invention is in no way limited to the above-described embodiment and within the scope of the patent application, many changes may be brought to the described embodiment, notably as regards

the shape, the arrangement, the composition and the number of the components being used for embodying the invention.

Claims

1. Device for perforating cross-wise a strip (1), which device comprises a frame (4), a perforating knife (2) mounted on said frame (4), a counter-member (6) which is mounted opposite the perforating knife (2) on the frame (4), and means (14) to move the strip (1) relative to said perforating knife (2) with the lengthwise direction thereof cross-wise to the perforating knife edge (5), and bring said strip (1) between said knife (2) and the counter-member (6), characterized in that one of those components formed by the perforating knife (2) and the counter-member (6), is a small wheel (6) which is movable over the other component (2) and can press the strip (1) against said other component (2), and the device comprises means (9,10,11,12) for moving said small wheel (6) over said other component (2) to perforate thereby the strip (1) lying therebetween,while the means (14) for moving the strip (1) relative to the perforating knife (2), are means to move intermittently the strip (1) over said latter other component (2), and said other component (2) is stationary at least as said small wheel (6) is being moved thereover.

2. Device according to claim 1, characterized in that the small wheel (6) is the counter-member and the perforating knife (2) is said other component.

3. Device according to claim 2, characterized in that the perforating knife (2) is fixedly mounted on the frame (4).

4. Device according to claim 3, characterized in that the means (14) for moving the strip (1) are means for moving said strip (1) over the edge (5) of the perforating knife (2).

5. Device according to any one of claims 1 to 4, characterized in that the means (9,10,11,12) for moving the small wheel (6) over said other component (2),comprise an endless element (9) which is mounted on the frame (4), with a part along said other component (2), whereby the small wheel (6) is rotatably fastened to said endless element (9).

6. Device according to claim 5, characterized in that the endless element (9) is a geared belt and the means (9,10,11,12) for moving the small wheel (6), comprise two gear-wheels (10 and 11) at least one of which is driven and whereover the geared belt (9) runs.

7. Device according to any one of claims 1 to 6, characterized in that the means (14) for moving intermittently the strip (1) relative to the perforating knife (2), comprise two drive devices, one before and one after said perforating knife (2), and a control device (16) which synchronously controls the drive devices.

8. Device according to claim 7, characterized in that the strip (1) is provided along the lengthwise edges thereof with perforations, and each drive device comprises a pair of pin tractors (14) the pins of which go through the perforations along both respective edges of said strip (1).

9. Device according to either one of claims 7 and 8, characterized in that the control device (16) controls the movement of the small wheel (6) over the other component (2) when the means (14) for moving the strip (1) are unoperative, but controls said means (14) to move the strip (1) after a perforation has been made in the strip (1) due to the movement of the small wheel (6).

10. Device according to claim 9,characterized in that it comprises a detector (18) which couples a signal to the control device (16) when the small wheel (6) has ended the movement thereof over the other component (2) during the perforating operation, the control device (16) in response to said signal operates the means (15) for moving the strip (1).

Fig. 1

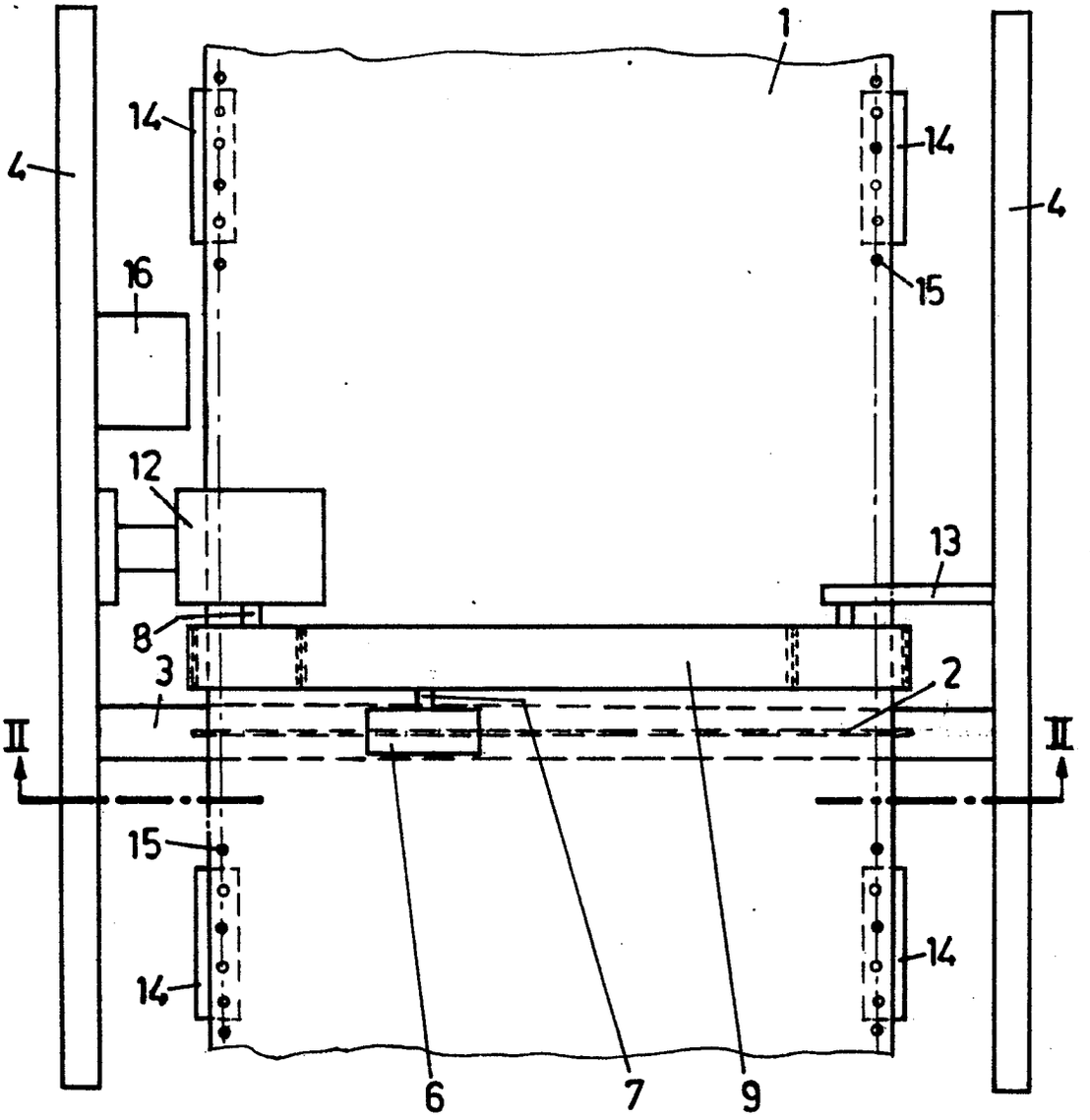
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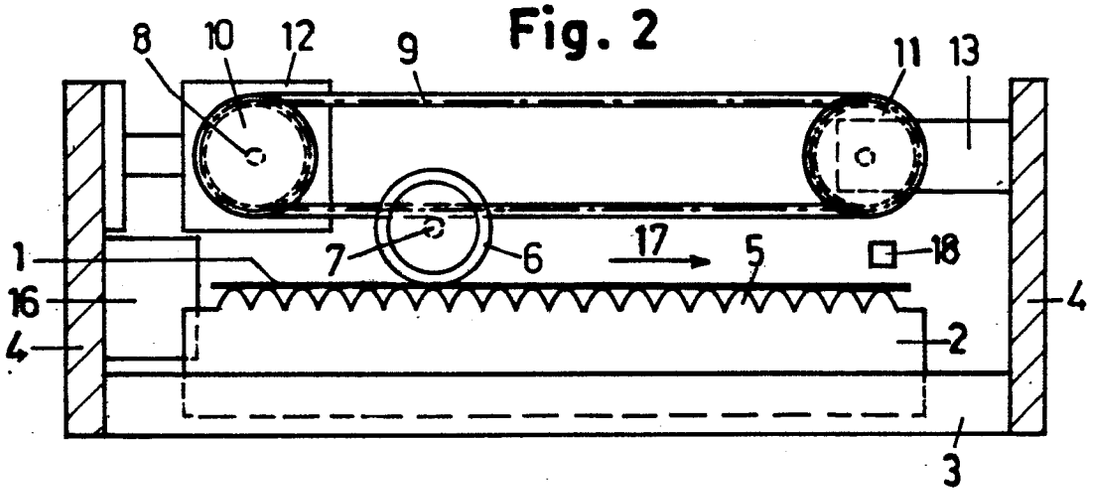
Fig. 2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European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 88200381.7

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US - A - 4 485 713 (DOTTA) * Totality * --		B 26 F 1/06
A	DE - A1 - 3 130 090 (MEULEN) * Fig. 1; abstract * --		
A	DE - C - 392 610 (STOBBE) * Totality * ----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 26 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	16-05-1988	HOFMANN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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