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Norgaard et al.

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[54] **FEELER DEVICE, ESPECIALLY FOR PHOTOCOPYING APPARATUS**

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[52] **U.S. Cl.** **271/57,** 355/14, 355/18

[51] **Int. Cl.** **B65h 7/00**

[58] **Field of Search** 355/10, 14, 18, 27, 355/66, 97, 111; 271/57

[56] **References Cited**

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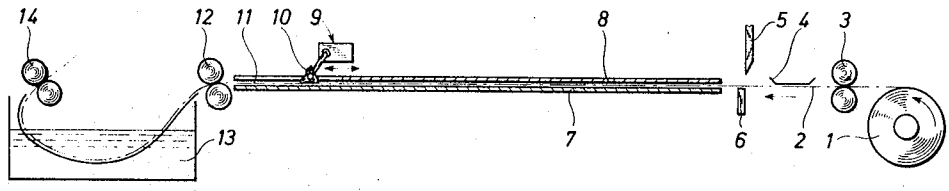
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[57] **ABSTRACT**

A feeler device comprising a freely rotatable feeler wheel member having three active surfaces lying on an imaginary cylinder. The feeler member is mounted on an arm and rests by its own weight against a supporting surface. The leading edge of a movable sheet formed blank strikes one of the the active surfaces and turns the feeler wheel so that it is lifted from the supporting surface and thereby moves the arm which activates a switch that causes the sheet-formed blank to stop its movement on the supporting surface. After a certain degree of rotation, another active surface of the feeler wheel rests upon the supporting surface and is thereafter engaged by the leading-edge of the next movable sheet-formed blank.

3 Claims, 4 Drawing Figures



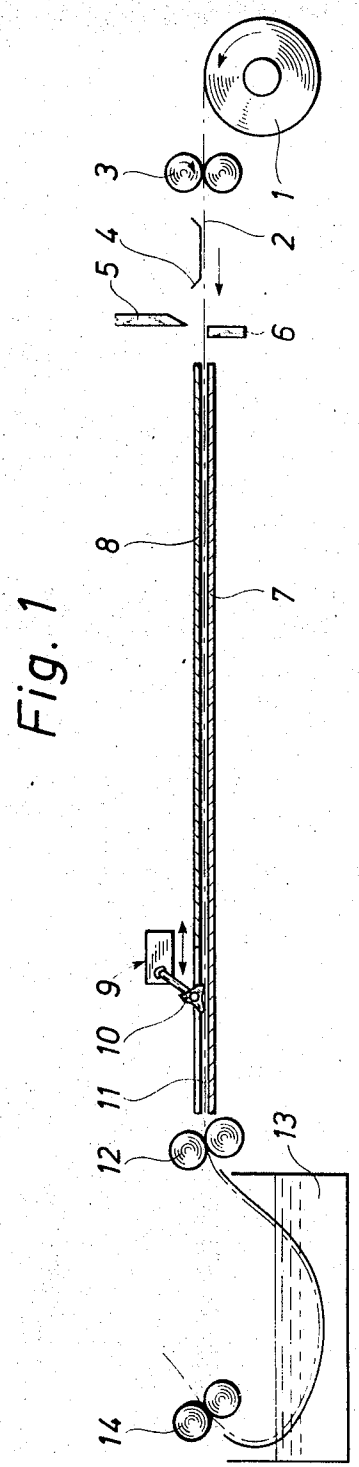


Fig. 1

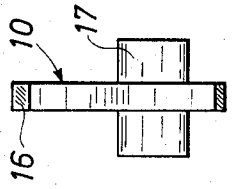


Fig. 4

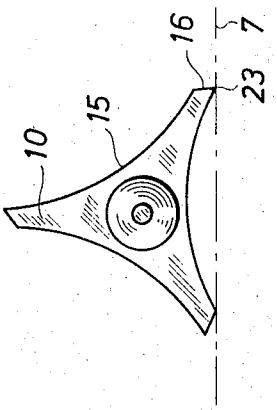


Fig. 3

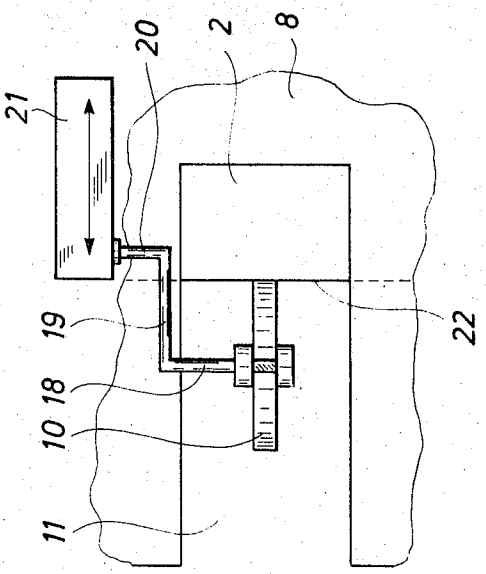


Fig. 2

FEELER DEVICE, ESPECIALLY FOR PHOTOCOPYING APPARATUS

The invention relates to a feeler device, especially for photocopying apparatus and for feeling the sliding movement of a sheet-formed blank along a supporting surface, especially for causing the blank to stop when its leading edge is in a predetermined position on the supporting surface.

In automatic photocopying apparatus, for example of the kind in which a continuous web of photocopying material is drawn from a magazine roll and moved along a supporting surface, for example a glass plate, to an illuminating or exposure station, it is necessary that the moving blank is stopped in a definite position on the glass plate in order that the image to be transferred to the blank may be properly positioned on the blank.

It has been tried to provide a movable feeler member connected with a microswitch or a similar control member at the place of the supporting surface where the leading edge of the blank is to stop, but owing to the slight thickness of the blank such a feeler device will often fail, since the blank, which, for example, may be a piece of paper having a thickness of less than 1/10 cm, either slides beneath the feeler or onto the feeler. Another difficulty is that after the blank has passed the feeler, the latter has to be brought into an active position, that is, to be returned in a direction opposite to the direction of movement of the blank.

In order to overcome these difficulties the feeler device may be provided in an opening in the glass plate so as to project above the supporting surface for the blank, but this solution is only applicable to an apparatus always using the same size of sheet. If the apparatus is to be adapted for variable lengths of sheet it is necessary that the feeler device may be moved to and fastened in different positions in relation to the glass plate, and in that case the opening provided in same has to be a slit extending in the direction of movement of the blank. As soon as the feeler is no longer at the end that faces the direction of movement of the sheet, the slit will leave a mark on the photographic blank at the exposure.

To overcome the said difficulties it has been proposed to sense the leading edge of the blank by means of a photocell, but this solution is relatively costly.

An essential feature of the feeler device according to the invention is that it consists of a feeler which is freely rotatable around an axis which is located above the supporting surface transversely of the direction of movement of the blank, the said feeler having at least three spaced surfaces distributed over an imaginary cylinder and located at greater distance from the axis of rotation than the remaining part of the feeler, which is carried by an arm connected with the operating member of a microswitch or a similar control member.

It has been found that the said technical problem can be perfectly solved by means of a feeler device of the aforesaid kind. When the leading edge of the moving blank strikes one of the surfaces of the feeler that rests upon the supporting surface and is facing the direction of movement of the blank, the feeler will be turned and simultaneously lifted, whereby the arm is turned, and this movement involves the activation of a microswitch. By adjusting the feeler device in such manner that the blank is moved so long that the surface of the feeler which the leading edge is pressing against is passed by a plane through the axis of rotation of the feeler at right angles to the supporting surface, the feeler will be turned so much by gravity that the next surface falls down upon the blank and thus at once is located in active position for engaging the leading edge of the successive blank.

The invention will now be described with reference to the drawing, in which

FIG. 1 is a schematic representation of a photocopying apparatus, viewed from the side,

FIG. 2 a part of FIG. 1, viewed from above on a larger scale,

FIG. 3 a feeler, viewed from the front, and

FIG. 4 the same as FIG. 3, viewed from the side.

The photocopying apparatus according to FIG. 1 has a magazine roll 1 of photographic material, for example paper, in sheets which may be used as master in an offset printing machine. The sheet-formed material 2 is advanced by means of a pair of rollers 3, that is, in horizontal direction to the left in FIG. 1, past a control device 4 and a knife 5 with a holding-up member 6. The sheet material is then passed between a glass plate 7 and a steel plate 8 towards a feeler device 9 which has a feeler 10 resting on the glass plate 7, an opening 11 being provided in the steel plate 8. The feeler device 9 is displaceable in a direction parallel with the glass plate 7 and is reciprocable in the direction of movement of the sheet material. Thus, the feeler may be placed in a definite position on the glass plate 7.

Outside the opening 11 is provided a pair of rollers 12 adapted to move the exposed sheet down through a photographic bath 13, from which the sheet is removed by means of a pair of rollers 14.

As will appear from FIG. 3, the feeler 10 is formed as an equilateral triangle with sides 15 curving inwards, the points of the triangle being chamfered to form surfaces 16. FIG. 3 shows how the feeler 10 is resting on the glass plate 7 via two surfaces 16 which are so arranged that the one facing the direction of movement of the sheet material, that is, the one further to the right in FIG. 3, forms a right angle with the glass plate 7.

The feeler 10 has a hub 17 supported on a shaft 18 which is attached to an arm 19 provided on a shaft 20 so as to be swingable in a plane at right angles to the glass plate 7 and thereby to turn the shaft 20 which is connected with an operating member of a microswitch 21 for controlling the mechanism advancing the sheet material 2 along the glass plate 7.

When the sheet material is moved from the right to the left in FIGS. 1 and 2, its leading edge 22 will strike the front surface 16 of the feeler 10 and by its continued movement push the arm of the feeler before it, by which the feeler is turned about the shaft 18 and simultaneously raised so that the arm 19 is swung and the shaft 20 turned. This movement continues until the sharp edge 23 of the surface 16 has passed a vertical plane through the centre of the triangle, where, in the first place, the microswitch stops the operating mechanism and, in the second place, the feeler 10 is turned about the shaft 18 in anticlockwise direction, that is, the feeler continues the turning movement produced by the edge 22, after which the feeler drops by gravity into a position in which the successive surface 16 reaches the glass plate and faces the path of the sheet material. The feeler is then again in its active position, ready to be acted upon by the leading edge 22 of the next sheet-formed blank.

Owing to the position of the surfaces **16** in relation to the supporting surface **7**, the sheet material, even though it is very thin, will not be able to slide beneath the feeler or onto it, and it has been found that the said feeler device practically never fails. The reliable operation is also due to the relatively great movement performed by the arm **19** because the feeler is raised relatively much.

We claim:

1. A feeler device for photocopying apparatus or the like, adapted to feel the sliding movement of a sheet-like blank along a support surface; comprising a feeler having at least three peripherally spaced surfaces distributed over an imaginary cylinder; means rotatably supporting said feeler so as to be freely rotatable about an axis located above said supporting surface transversely of the direction of movement of the blank, said spaced surfaces extending at a greater radial distance from the axis of rotation than the remaining portion of the feeler and adapted to be respectively contacted by the leading edge of the blank upon sliding movement of the latter along said support sufface so as to impart rotation to said feeler about its axis; a pivoting arm means connected to said feeler; and microswitch means being operatively connected with said pivoting arm means so as to cause said blank to stop movement along said support surface in response to a predetermined position of said feeler.

2. A feeler device as claimed in claim **1**, said feeler comprising an equilateral triangularly-shaped disc having concavely formed side surfaces, the points of said triangle being chamfered to form said three spaced surfaces, said surfaces being each inclined so that the surface contacted by the leading edge of the blank is at right angles to said supporting surface when two of said spaced surfaces of said feeler rest on said support surface.

3. A feeler device as claimed in claim **1**, comprising shaft means supporting said feeler for rotation about its axis, said pivoting arm means supporting said shaft means so as to be swingable in a plane extending at right angles with said supporting surface; and said microswitch means having a pivotable operating member operatively connected with said pivoting arm means.

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