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(54) **Abnormal-paper sensing apparatus in a printing machine.**

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DE-A- 3 336 721
FR-A- 2 155 578
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Description

Background of the Invention

The invention relates to printing machines and more particularly to an abnormal-paper sensing apparatus in a printing machine, which apparatus includes an insertion guide plate for receiving and inserting a sheet of paper into a printing unit and associated at its front end with front lays for adjusting the position of the sheet of papers, and at least one sensor for sensing the presence of a front folded corner of a sheet of printing paper which hits against said front lays and stops, following the absence of reflected light due to the folded corner.

In a sheet-fed printing machine, sheets of printing paper stacked on a stacker of a paper feeder are drawn and fed one by one by a sucker, starting with the top sheet, to a feeder board and then delivered onto the insertion guide plate with the aid of a carrier tape and feed rolls. The sheet of paper then hits against the front lays and stops thereat with it being adjusted with reference to the vertical by the front lays and also with respect to right and left by a transverse needle device. The sheet of paper which has hit against the lays and stopped is then captured and carried by a pawl of a swing device and then is printed while it is being carried with it being substitutively captured by a thicker pawl.

Sheets of paper are required to be fed one by one to the printing machine without being bent or folded. Therefore, when undesirable feeding, such as feeding of a sheet of paper having a folded corner or double-sheet feeding, has occurred, this fact is sensed and the capture by the pawls and the paper-feeding onto the insertion guide plate are stopped. An abnormal sheet of paper of this type is folded at its front right and/or left corner into a triangle. In order to sense this corner folding, it is known (see US-A-4 480 546) to provide reflection type sensors several millimeters before the front lays above the sheet of paper to sense the presence of reflected light from the sheet of paper which hits against the front lays and stops to determine thereby that there is a corner folding in the sheet due to the fact that no reflected light is received. When a sheet of paper having a different size is used, the sensor is moved correspondingly.

In such corner folding sensor, however, the insertion guide plate itself will reflect light which is projected to its exposed portions. Therefore, the sensor is likely to determine erroneously that there is no corner folding and the paper feeding will be continued although, actually, there is a folded corner. In order to avoid this, tests have been carried out by providing through holes in the insertion guide plate so as to cause the projected light to

pass through the holes without reflecting the projected light when there is a corresponding corner folding. However, in order to cope with a different paper size or to alter the sensing position, the holes must have the form of elongated ones or of slots, so that a sheet of paper sliding on the insertion guide plate may be hooked at its corner into the elongated hole and bent to operate the sensor thereby, thus stopping feeding of the sheet of paper. The provision of such an elongated hole would weaken the strength of the end portion of the insertion guide plate.

Summary of the Invention

Therefore, it is the task of the present invention to provide an improved abnormal-paper sensing apparatus in a printing machine solving the aforementioned problems without essentially weakening the strength of the insertion plate's end portion.

To this end, according to the present invention, the insertion guide plate has recesses, which may preferably be arranged pairwise therein, defining sensing points at positions in the guide plate surface where such recesses can face transverse edges of the sheet of paper which passes over the recesses, each of the recesses having a cross-section

When a sheet of paper fed correctly onto the insertion guide plate hits against the front lays and stops thereat, the sensor receives light emitted by the sensor itself and reflected by the sheet of paper, so that normal paper feeding continues. When any corner folding occurs and the sheet of paper is stopped by the front lays, the light projected by the sensor reaches the exposed slanted bottom of the recess and is reflected diffusively due to such slanted shape of the exposed bottom. Thus the sensor does not receive the reflected light. As a result, a signal is generated to stop the paper feeding.

Brief Description of the Drawings

The drawings show an embodiment of an abnormal-paper sensing apparatus in a printing machine according to this invention: More specifically

Fig. 1 shows a plan view of the left half of an insertion guide plate;

Fig. 2 shows an enlarged plan view of such portion of the insertion guide plate which includes a recess;

Fig. 3 shows a cross-section view taken along line A-A of Fig. 2; and

Fig. 4 shows a cross-section of a sensor including

the vicinity thereof.

Detailed Description of the Preferred Embodiment

As shown in Figs. 1 to 4, an abnormal-paper sensing apparatus according to this invention and appropriate for being used in a not shown printing machine includes an elongated strip-like insertion guide plate or feedboard 1 which extends across the feeding direction of such printing machine. As becomes apparent from Fig. 4, the feedboard 1 is also supported to slant slightly between a paper feeder (not shown) and a printing unit (not shown). A plurality of leaf springs 2 are disposed parallel to each other across the machine and supported by stays 4 above the front end of the feedboard 1 by means of brackets 3. The front ends of the leaf springs 2 abut slidably onto an upper surface of the front end of the feedboard 1. A plurality of front lays 5 are supported in parallel with each other across the printing machine by a shaft 6 supported above the front end of the feedboard 1. The front lays 5 are received in corresponding grooves 1a provided at the front end of the feedboard 1 whereby a reciprocating rotation of the shaft 6 through a predetermined angle at a predetermined timing causes the front lays to fall and rise vertically relative to the feedboard 1 so that they are withdrawn therefrom, as shown. A sheet of paper 7 fed onto the feedboard 1 through a feeder board (not shown) from a paper feeder (not shown) is decelerated by the leaf springs 2 and hits against the front lays 2 to stop.

A pair of right and left recesses 8 are provided between right and left grooves 1a several millimeters 6 upstream of the front end of the feedboard 1. Each recess 8 has the form of a rectangle extending across the feedboard 1 and also a right-angled triangle in cross section having a longer side 8a positioned on the side of the front end of the feedboard 1 and a shorter side 8b positioned on the side of the rear end of the feedboard 1.

The inner surface of each recess 8 is coated with a black material. These recesses 8 are positioned and sized such that the end edge of a sheet of printing paper having any width between the maximum and minimum ones may pass over those recesses. Reference numeral 7 denotes a dash-dotted line showing one of several standard sizes of paper. A pair of brackets 11 are split-tightened in correspondence to the recesses 8 onto the stays 10 supported above the front end of the feedboard 1. Each bracket 11 has a reflection type sensor 12 fixed thereto through a holder 13 opposite to the corresponding recess 8. The sensor 12 is of the type which emits light and receives the light reflected by an object. In this embodiment, when the

sensor receives no reflected light, it generates a signal which is delivered via a lead 14 to a controller (not shown) thereby to stop the paper feeding. In other words, when a sheet of paper 7 covers the recesses 8, light will be reflected, so that no signal is generated. The arrangement is such that when a sheet of paper 7 is folded at one of its front corners, the corresponding recess 8 is exposed, so that the projected light is reflected diffusively by the bottom surface of the recess 8. Thus, the diffused light is not received by the sensor 12, so that the sensor 12 generates a signal.

In operation, when the sheet of paper 7 fed from the feed device via the feeder board onto the feedboard 1 hits against the front lays 5 and stops thereat, the sheet of paper 7 normally shields the recesses 8, so that the light projected by the sensors 12 is reflected by the sheet of paper 7. Thus, the reflected light arrives at the sensors 12, so that the sensors 12 generate no signal and paper feeding continues. This means that when the sheet of paper 7 hits against the front lays and stops thereat, the shaft 6 is rotated clockwise in Fig. 4, the front lays 5 move away from the feedboard 1 and, at the same time, a pawl of a swing device (not shown) swings diagonally upwardly, captures the sheet of paper 7 and carries it to the printing unit.

When a sheet of paper having its corner folded is fed onto the feedboard 1 and hits against the front lays 5 and stops thereat, the folded corner of the sheet of paper does not shield so that the corresponding recess 8 is exposed. In this case, each recess 8 has a slanted inner surface asymmetrical with regard to a transverse plane therein and coated with a black material, so that the light projected from the sensors 12 is reflected diffusively by the bottom surface of the recess. Therefore, the reflected light does not arrive at the sensors 12, so that the sensors 12 produce a signal to stop the paper feeding. Thus the abnormal-sheet of paper with the folded corner is removed and printing is then resumed.

When a sheet of paper having a different size is used, the tightened brackets 11 are loosened and the sensors 12 are moved so as to cope with the different paper size.

As will become apparent from the aforementioned description, according to this invention, the insertion guide plate has a pair of recesses provided in a front end portion thereof so as to extend thereacross at positions where the recesses can face front corners of the sheet of paper which passes over the recesses, the recesses each having a triangular cross section with a longer side positioned on the side of the front end of the insertion guide plate and with a shorter side positioned on the side of the rear end of the insertion

guide plate. When a sheet of paper with a folded corner hits against the front lays and stops thereat, the corresponding recess is exposed, the light projected from the sensor to the exposed recess is securely reflected diffusively by the asymmetrically slanted notch-like bottom surface of the recess. In addition, even when a sheet of paper having a different size is used, which has a folded corner, it does not cover the corresponding recess, so that the reflected light does not reach the sensor. Therefore, corner folding is reliably sensed, irrespective of the paper size, so as to stop the paper feeding to improve the sensing accuracy thereby. The front-side portion of the recess bottom is gently inclined, so that a corner of a normal sheet of paper is not hooked, thereby reducing the quantity of wasted paper. In addition, the recesses do not extend through the insertion guide plate, so that it has a strength greater than the conventional one. If the recess bottom is coated with a black material, sensing will be improved even further.

Claims

1. An abnormal-paper sensing apparatus in a printing machine, which apparatus includes an insertion guide plate (1) for receiving and inserting a sheet of paper (7) into a printing unit and associated at its front end with front lays (5) for adjusting the position of the sheet of paper, and at least one sensor (12) for sensing the presence of a front folded corner of a sheet of paper (7) which hits against said front lays (5) and stops, following the absence of reflected light due to the folded corner, **characterised in** that said insertion guide plate has recesses (8) defining sensing points at positions in the guide plate surface where such recesses can face transverse edges of the sheet of paper which passes over the recesses, each of said recesses having a cross-section such that said sensor senses no reflected light if the sheet is in an abnormal state and thus not present at a sensing point.
2. An apparatus as claimed in claim 1, **characterised by**
 - a pair of recesses (8) provided along that side of said insertion guide plate which neighbours said front lays, such that the recesses can face the corresponding corners of the sheet which passes thereover, the recesses having a structure for creating diffused reflection;
 - a pair of sensors (12) for projecting light against the recesses and for receiving light reflected by the recesses;
- the arrangement being such that when a sheet of paper having a front folded corner passes over the recesses, the light projected by said sensors is reflected in a diffused manner by said recess and not received by said sensors, thus stopping the paper feeding.
3. An apparatus as claimed in claim 1 or 2, **characterised in** that the cross-section of said recesses (8) has a shape having a longer side (8a) positioned on the side of the front end of said insertion guide plate (1) and a shorter side (8b) positioned towards the rear end of said insertion guide plate.
4. An apparatus as claimed in any one of claims 1 to 3, **characterised in** that each recess (8) has a triangular cross-section.
5. An apparatus as claimed in claim 4, **characterised in** that said triangular cross-section is right-angled.
6. An apparatus as claimed in any one of claims 1 to 5, **characterised in** that the inner surface of the recesses (8) is coated with a black material for absorbing light which is received thereon.
7. An apparatus as claimed in any one of claims 1 to 6, **characterised in** that said recesses (8) have a transverse length enough to permit the sensing of an abnormal sheet of paper having a width of a predetermined range.

Revendications

1. Appareil de détection de papier anormal dans une machine à imprimer, lequel appareil comporte une plaque de guidage d'insertion (1) destinée à recevoir et à insérer une feuille de papier (7) dans une unité d'impression et associée à son extrémité frontale avec des repères frontaux (5) pour ajuster la position de la feuille de papier et au moins un détecteur (12) pour détecter la présence d'un coin frontal replié d'une feuille de papier (7) qui vient frapper contre lesdits repères frontaux (5) et s'arrête, à la suite de l'absence de lumière réfléchie, en raison du coin replié, caractérisé en ce que ladite plaque de guidage d'insertion comporte des cavités (8) définissant des points de détection en des positions dans la surface de la plaque de guidage où lesdites cavités peuvent se trouver en face de bords transversaux de la feuille de papier qui passe sur les cavités, chacune desdites cavités comportant une sec-

tion telle que ledit détecteur détecte l'absence de lumière réfléchie si la feuille se trouve dans un état anormal et ainsi ne se trouve pas présente en un point de détection.

2. Appareil tel que revendiqué à la revendication 1, caractérisé par le fait qu'il comporte une paire de cavités (8) prévues le long du côté de ladite plaque de guidage d'insertion, laquelle se trouve au voisinage desdits repères frontaux, de telle sorte que les cavités puissent se trouver en face des coins correspondants de la feuille qui passe à travers la machine, les cavités comportant une structure pour créer une réflexion diffusée;
une paire de détecteurs (12) pour projeter de la lumière contre les cavités et pour recevoir la lumière réfléchie par les cavités;
la disposition étant telle que lorsqu'une feuille de papier comportant un coin frontal replié passe sur les cavités, la lumière projetée par lesdits détecteurs est réfléchie d'une façon diffuse par lesdites cavités et n'est pas reçue par lesdits détecteurs, ce qui a pour effet d'interrompre l'alimentation en papier.
3. Appareil tel que revendiqué dans l'une des revendications 1 ou 2, caractérisé en ce que la section desdites cavités (8) a une forme telle qu'elle comporte un côté plus grand (8a) positionné sur le côté de l'extrémité frontale de ladite plaque de guidage d'insertion (1) et un côté plus petit (8b) positionné vers l'extrémité arrière de ladite plaque de guidage d'insertion.
4. Appareil tel que revendiqué dans l'une quelconque des revendications 1 à 3, caractérisé en ce que chaque cavité (8) présente en coupe la forme d'un triangle.
5. Appareil tel que revendiqué dans la revendication 4, caractérisé en ce que ladite coupe triangulaire est à angle droit.
6. Appareil tel que revendiqué dans l'une quelconque des revendications 1 à 5, caractérisé en ce que la surface interne des cavités (8) est revêtue au moyen d'un matériau noir destiné à absorber la lumière qui s'y trouve reçue.
7. Appareil tel que revendiqué dans l'une des revendications 1 à 6, caractérisé en ce que lesdites cavités (8) ont une longueur transversale suffisante pour permettre la détection d'une feuille anormale de papier ayant une largeur située dans une gamme prédéterminée.

Ansprüche

1. Einrichtung zum Abfühlen abnormen Papiers in einer Druckmaschine, wobei die Einrichtung eine dem Aufnehmen und Einführen eines Papierblattes (7) in eine Druckeinheit dienende Einführ-Führungsplatte (1), die an ihrem Vorderende Frontanschlügen (5) zum Ausrichten der Lage des Papierblattes zugeordnet ist, und wenigstens einen Sensor (12) zum Abfühlen des Vorhandenseins einer vorderen gefalteten Ecke eines gegen die Frontanschlüge (5) anschlagenden und anhaltenden Papierblattes (7) aufgrund des Fehlens von reflektiertem Licht infolge der gefalteten Ecke umfaßt, **dadurch gekennzeichnet**, daß die Einführ-Führungsplatte Ausnehmungen (8) hat, die Abfühlpunkte an Positionen in der Führungsplatten-Oberfläche definieren, an denen solche Ausnehmungen Querrändern des Papierblattes gegenüberliegen können, das über die Ausnehmungen hinwegläuft, wobei jede der Ausnehmungen einen solchen Querschnitt hat, daß der Sensor kein reflektiertes Licht abfühlt, wenn das Blatt sich in einem abnormen Zustand befindet und damit an einem Abfühlpunkt nicht vorhanden ist.
2. Einrichtung nach Anspruch 1, **gekennzeichnet durch**,
ein Paar Ausnehmungen (8), die entlang derjenigen Seite der Einführ-Führungsplatte angeordnet sind, die den Frontanschlügen benachbart ist, derart, daß die Ausnehmungen den entsprechenden Ecken des Blattes gegenüberliegen können, das darüber hinwegläuft, wobei die Ausnehmungen eine Struktur zur Erzeugung einer Diffus-Reflexion aufweisen;
ein Paar Sensoren (12) zum Projizieren von Licht gegen die Ausnehmungen und zum Empfangen von durch die Ausnehmungen reflektiertem Licht;
wobei die Anordnung so getroffen ist, daß, wenn ein Papierblatt mit einer vorderen gefalteten Ecke über die Ausnehmungen hinwegläuft, das von den Sensoren projizierte Licht von der Ausnehmung diffus reflektiert und von den Sensoren nicht empfangen wird, wodurch die Papierzuführung abgestoppt wird.
3. Einrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß der Querschnitt der Ausnehmungen (8) eine Form hat, die eine längere Seite (8a), auf der Seite des Vorderendes der genannten Einführ-Führungsplatte (1) aufrecht, und eine kürzere Seite (8b), gegen das rückwärtige Ende der Einführ-Führungsplatte hin angeordnet, aufweist.

4. Einrichtung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet**, daß jede Ausnehmung (8) einen dreieckförmigen Querschnitt hat.

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5. Einrichtung nach Anspruch 4, **dadurch gekennzeichnet**, daß der dreieckförmige Querschnitt rechtwinklig ist.

6. Einrichtung nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet**, daß die innere Oberfläche der Ausnehmungen (8) mit einem schwarzen Material zum Absorbieren von Licht, das darauf empfangen wird, überzogen ist.

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7. Einrichtung nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet**, daß die Ausnehmungen (8) in Quererstreckung eine Länge haben, die ausreicht, um das Abfühlen eines abnormen Papierblattes zu erlauben, das eine Breite eines vorbestimmten Bereichs aufweist.

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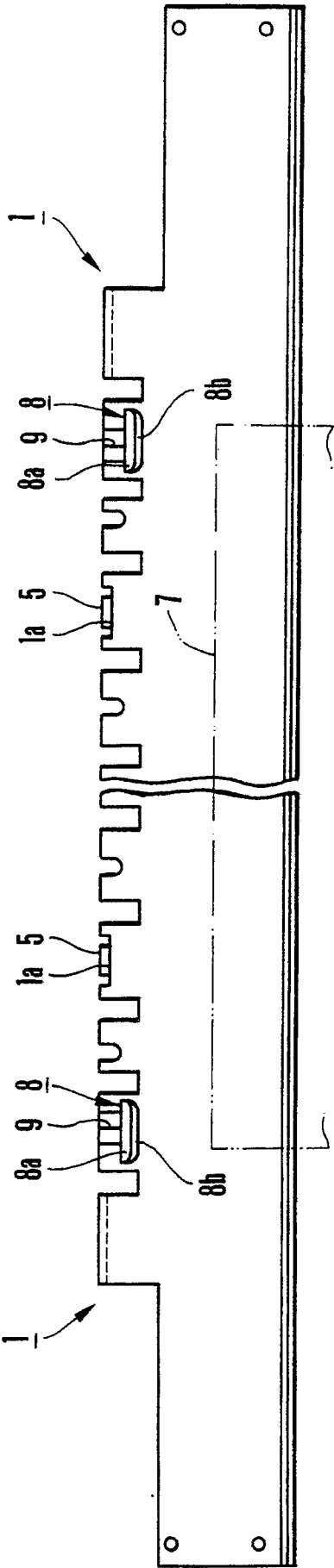


FIG. 1

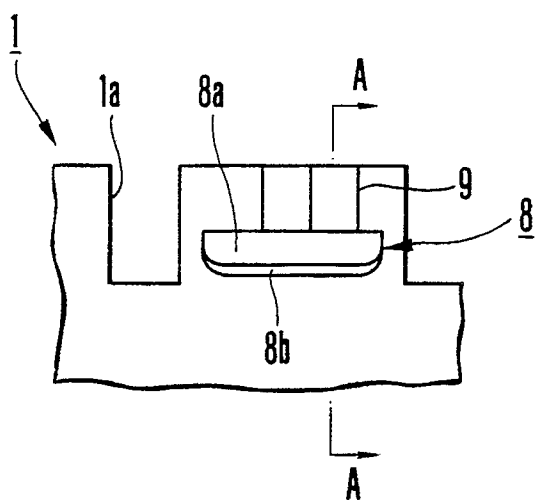


FIG. 2

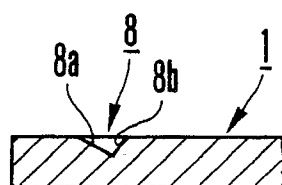


FIG. 3

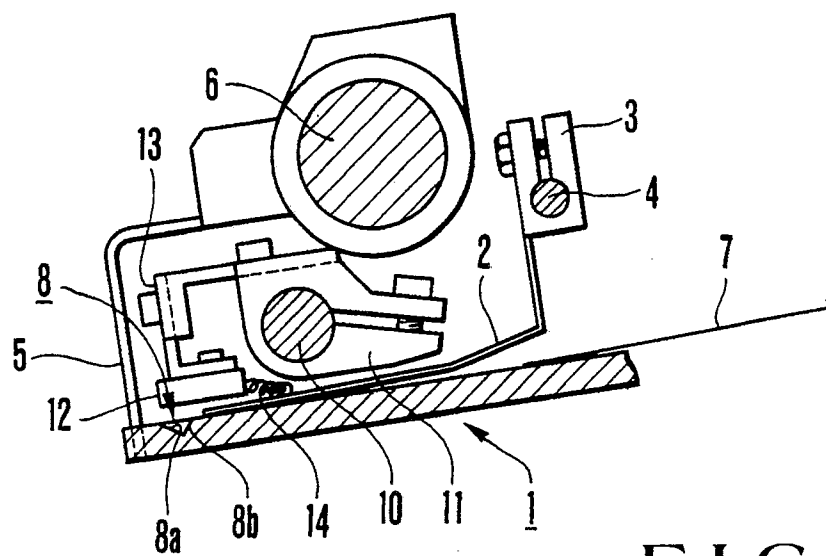


FIG. 4