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(71) Applicant: **Bianco, Mario**
Loc. Vaccheria, 7/2
I-12051 Alba (CN)(IT)

(72) Inventor: **Bianco, Mario**
Loc. Vaccheria, 7/2
I-12051 Alba (CN)(IT)

(74) Representative: **Lotti, Giorgio**
c/o Ing. Barzanò & Zanardo Milano S.p.A. Via Cernaia 20
I-10122 Torino(IT)

(54) Equipment for the detection and correction of the sideways movement of a belt advancing along a processing line.

(57) An equipment for the detection and correction of the sideways movement of a belt advancing along a processing line comprises a light source and a receiver oriented toward said source and between them the advancing belt is interposed; the receiver is equipped with sensors which generate signals in accordance with the quantity of light picked by said receiver and control the devices which restore the sideways movement of the belt; the receiver consists of at least one optical fiber or similar device able to transmit the light towards the ends, extending substantially for the entire length of the light source and the sensors are located exclusively at the ends of said optical fiber.

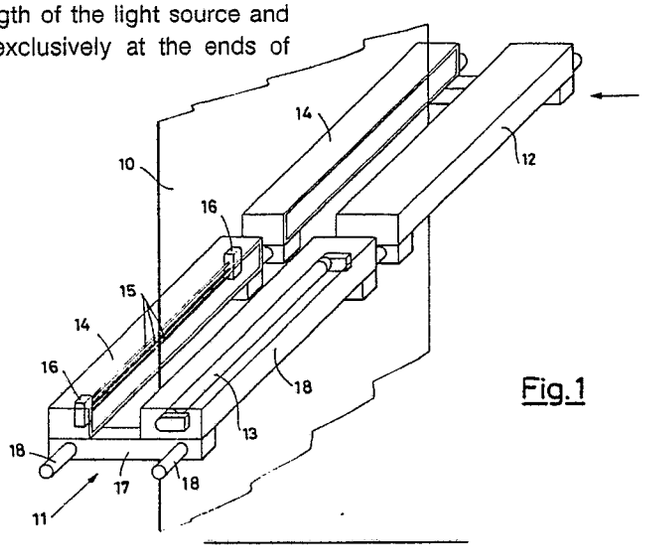

Fig.1

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EQUIPMENT FOR THE DETECTION AND CORRECTION OF THE SIDEWAYS MOVEMENT OF A BELT ADVANCING ALONG A PROCESSING LINE

The invention refers to an equipment for the detection and the correction of the sideways movement of a paper, fabric, or similar, belt advancing along a processing line.

Some sideways movements of the belts normally occur during the advancement in paper or fabric belt processing lines when the advancing speed is remarkable. Said lines must have equipments able to feel the sideways movement of the belt and restore it to a centered position.

Said devices for the restoration of the belt sideways movement traditionally consist of photocells combined with hydraulic or pneumatic means acting on cylinders placed upward or downward to the section of the belt in consideration; said means are oriented by the action of the photocells to bring the belt back in the centered position. However, said systems always require manual movement of the photocells depending on the width of the belt, as said photocells must always be placed in correspondence with the side edges, no matter how wide is said belt.

The French Patent 2545925 to an optoelectronic system utilizing a receiver oriented toward a light source, said receiver bears a focusing element generating signals according to the quantity of picked up light.

The receiver of the above Patent is a fluorescent plastic plane sheet having convergent properties (LISA plastic).

However, the above is a rather complex system as the LISA plastic sheet sends the light along its outer outline so it must be equipped with a piurality of photoelectric elements placed at various distances on its outer surface or emergency thickness of the light, sideways to the incidence surface of said light.

Said material is quite costly and it requires a rather complex equipment for the assembly and the detection of the light signals as there must be a good number of said signals along the edges of the sheet so as to ascertain exactly the light variations which occur depending on the sideways movement of the belt.

Purpose of this invention is to propose a device for the detection of the sideways movement of the belt utilizing an optical fibers system, or similar devices, having a preset length, by means of which any sideways movement of the belt in both directions may be detected at its ends with great precision and swiftness. The optical fibers device of the invention offers advantages of simplicity, high reliability standard and comparatively low cost. Furthermore, as the optical fiber may have a remarkable length, when assembling an optical fiber on one side of the device or two optical fibers on both sides, it will not be necessary to move said fibers according to the width of the belt as it is possible to assemble optical fibers of such length to contain both very narrow and very wide belts in their field of operation.

For these and other purposes which will be better appreciated as the description follows, the invention proposes to realize an equipment for the detection and the correction of the sideways movement of a plane belt advancing along a processing line comprising a light source and a receiver oriented toward said source and between them the advancing belt is interposed; the receiver is equipped with sensors which generate signals in accordance with the quantity of light picked up by said receiver and control the devices which restore the sideways movement of the belt, characterized in that the receiver consists of at least one optical fiber or similar device extending substantially for the entire length of the light source and the sensors are located exclusively at the ends of said optical fiber.

The description of the device now follows and reference is made to the enclosed drawings:

Fig. 1 is a perspective view of the equipment of the invention;

Fig. 2 is an horizontal section of the equipment of the invention;

Fig. 3 is a side view of the equipment of Fig. 2.

Two units 11 are assembled on both sides of the belt 10 advancing along the processing line; each unit comprises a body 12 containing a lamp 13 and a body 14 containing one or more fluorescent optical fibers 15 (for instance, three of them are illustrated in the figures); the respective sensors 16 are placed at the end of the optical fibers. Units 12 and 14 are assembled integral to each other on a crosspiece 17 sliding on guides 18 assembled crosswise with respect to the advancing direction of the belt and parallel to the plane of said belt.

The fluorescent optical fibers are subject to the following phenomenon: the energy absorbed in the optical fibers by the fluorescent material at the passage of an incident ray of light of a given wave length is converted to photons of higher wave length. For the principle of optical fibers, said photons are transmitted exclusively to the two ends of the optical fiber subjected to outer light rays.

As it may be observed in Fig. 2, only the rays

19 of the section X of Fig. 2 hit directly optical fibers 15, as there is no belt 10 between the lamp 13 and said optical fibers; whilst the rays 20 of section Y are partially dimmed by the belt 10 placed between lamp 13 and optical fibers 15. The sensors 16 will consequently detect the total quantity of light hitting the optical fiber, as the sum of the one hitting it entirely along section X plus the one hitting it partially along section Y through the belt 10.

The same argumentation applies to lamp 13 - optical fibers 15 unit assembled on the other side of the belt 10: in this case, when the belt is perfectly centered, the lengths X and Y will be identical to those of the above described unit; the entity of said lengths X and Y will vary, above all, between one unit and the adjacent one, when the belt will move sideways. The sensors 16 will be combined to means which will bring back the belt to the centered position to restore equal lengths X and Y between the two abreast units and thus the centered position of the belt.

It may be noted from the above description that the width of the belt is indifferent, as the difference between the lengths X and Y of each unit, depending on the width of the belt, is not important; however, said lengths have to be equal on the two adjacent units otherwise sensors 16 will ascertain possible differences and will operate known correction means to restore the belt centered position.

In case one only optical unit 12-14 is wanted to be assembled, a standard value according to the centered position of the belt relating to its width will be preset on the sensors 16; in said standard value the difference between the distances X and Y will have to determine a given wave length value to the ends of the optical fiber 15. When the sensors 16 will detect a different value from the one corresponding to the centered position of the belt 10, they will correct the movement depending on the direction.

Claims

1) An equipment for the detection and correction of the sideways movement of a plane belt advancing along a processing line comprises a light source and a receiver oriented towards said source and between them the advancing belt is interposed, the receiver is equipped with sensors which generate signals in accordance with the quantity of light picked up by said receiver and control the devices which restore the sideways movement of the belt, wherein the receiver consists of at least one optical fiber or similar device extending substantially for the entire length of the light source and the sensors are located exclusively at the ends of said optical fiber.

2) Equipment according to claim 1 wherein there are two optical fiber-light source units and are assembled at the two sides of the advancing belt.

3) Equipment according to claim 2 wherein three parallel optical fibers facing the light source are assembled in each unit.

4) Equipment according to claim 2 wherein each pair of optical fiber and light source of the two units is assembled slideable on guides concentric to each other and perpendicularly to the advancement direction of the belt.

Tav.I

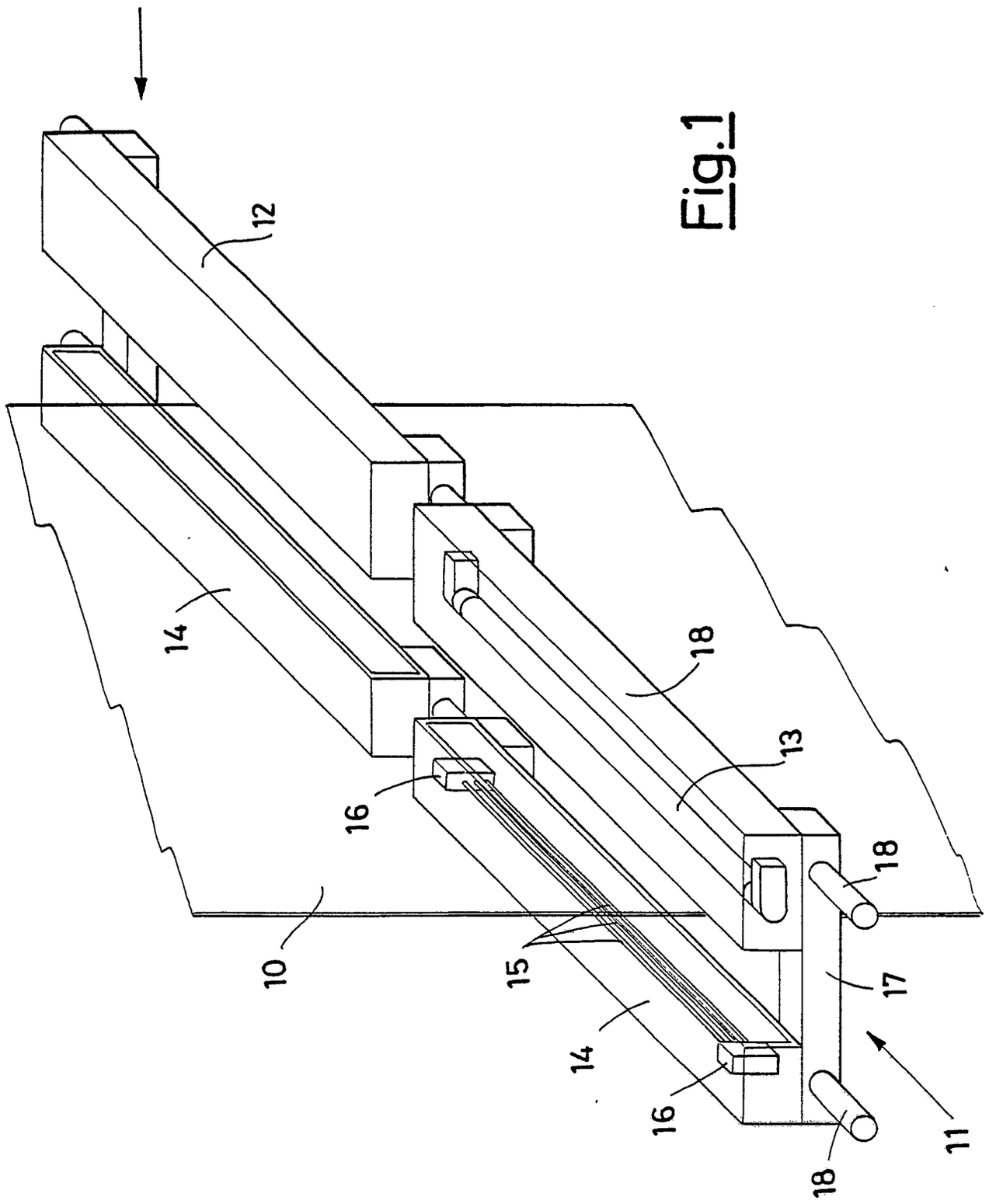

Fig.1

Tav. II

Fig.3

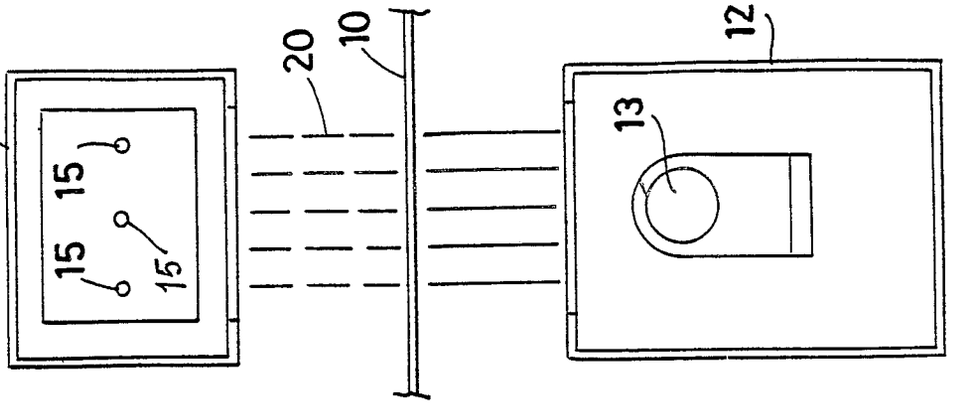

Fig.2