United States Patent

[11] 3,586,866

[72] Inventor **Tomoshi Kawata**
935 Shinmarako, Higashi 3-Chome, Kawasaki, Japan

[21] Appl. No. **857,111**
[22] Filed **Sept. 11, 1969**
[45] Patented **June 22, 1971**

[54] **APPARATUS FOR COUNTING SHEET-SUBSTANCES TRANSFERRED IN ROW OF LAPPING**
2 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** ..... **250/222,** 250/219 F, 250/223
[51] **Int. Cl.** **G06m 7/10**
[50] **Field of Search** ..... 250/219 R, 223, 221, 222, 219; 198/40

[56] **References Cited**
UNITED STATES PATENTS

2,908,825	10/1959	Frankle et al.	250/223
3,330,962	7/1967	Colombo	250/223
3,396,280	8/1968	Knudsen	250/223
3,446,978	5/1969	Leavens, Jr.	250/223

Primary Examiner—James W. Lawrence
Assistant Examiner—D. C. Nelms
Attorney—John Lezdey

ABSTRACT: In combination with an apparatus for counting sheet substances transferred in a row with any pitch of lapping, a partition plate for shutting rays having an edge touching the surfaces of the transferred substances and set in the direction of transference, a light source positioned at one side of said partition plate and a photoelectric converter positioned at the other side of said partition plate, so that rays filtering through the gap formed by the step at the lapping part of the transferred substances are sensed by said photoelectric converter which activates a counter.

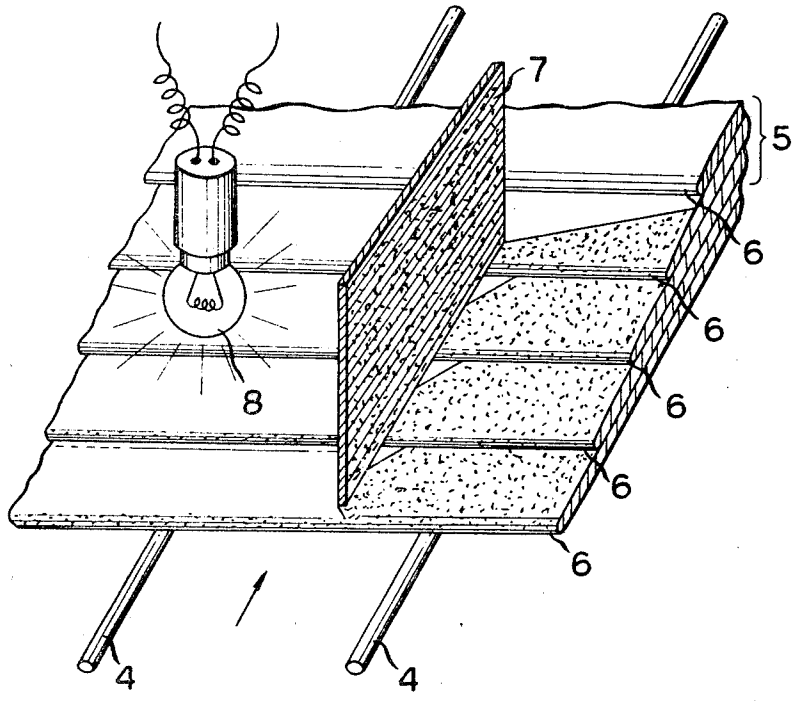


FIG. 1

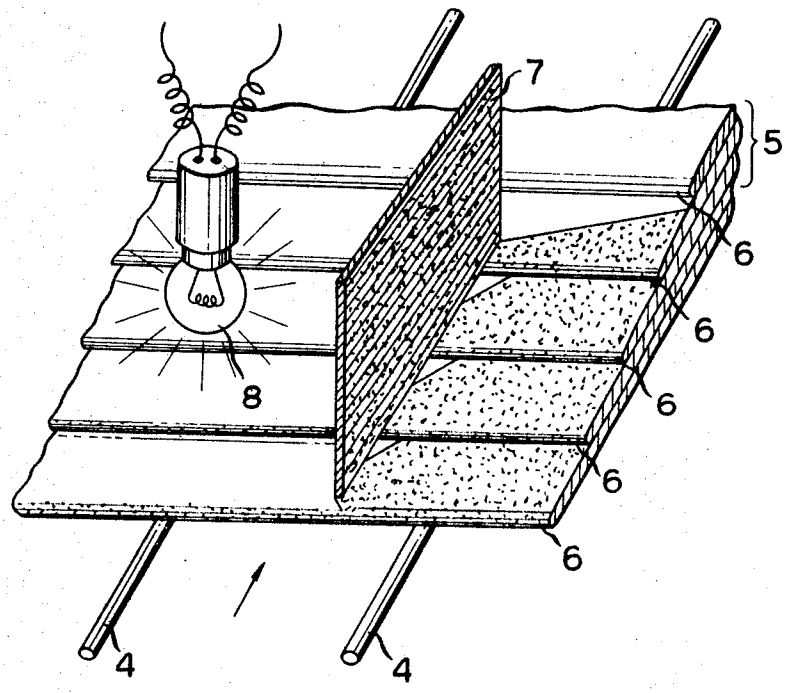


FIG. 2

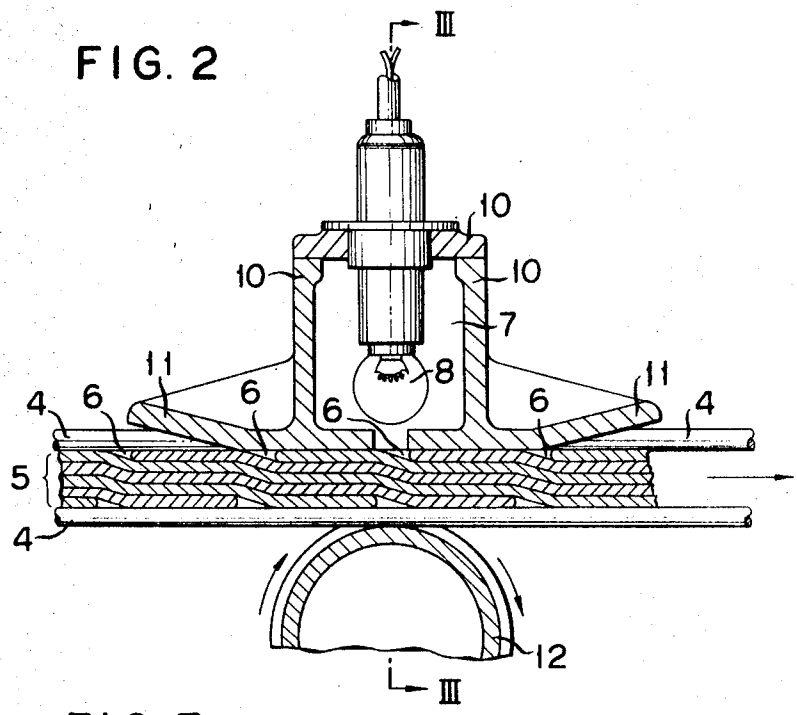
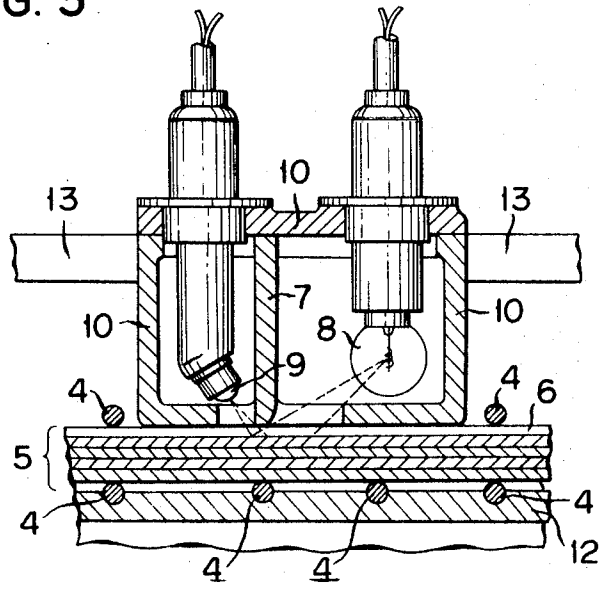

III
10
10
10
7
11
8
11
4
6
6
6
6
4
5
4
12
III

FIG. 3


13
10
13
7
10
10
8
9
4
4
6
5
4
4
4
4
12

APPARATUS FOR COUNTING SHEET-SUBSTANCES TRANSFERRED IN ROW OF LAPPING

This invention relates to an apparatus suitable for counting the number of sheet-substances transferred in a row with any pitch of lapping, as for counting folded sheets of newspaper, and the like.

In the prior art, there is described a method in which a wing wheel such as a water wheel is used, wherein the wheel is placed in the way of transference, rotated in one direction to accept the transferred substances one by one into every interval of the wings. The number of sheets is calculated indirectly from the number of rotation of the wing wheel. The defect of this method is that there are inevitable conditions that the rotating speed of the wing wheel must be precisely synchronous with the speed of transference and further the pitch of the transferred substances must be exactly uniform and definite. This makes the mechanism complicate and of large scale.

Another method of counting is to use a feeler set along the way of transference so as to touch the row of transferred substances and to activate a microswitch whenever the edge of the lapped substances passes the feeler. This can be used for low speed transference only and can not be used for high speed transference such as newspaper handling because the make and break action of the switch can by no means accurately follow the high speed running transference.

The object of this invention is to provide a counting apparatus which removes all defects mentioned above and is more suitable for high speed transference as well as for simple and small sized operation. It is a further object of this invention to provide a counting apparatus that can be set at any desirable position of the transferring belt, and provide easy maintenance and repair.

A still further object of this invention is to provide a counting apparatus which can be worked constantly in a good condition for any size and indefinite pitch of lapping of the transferred substances, and which action can regulate itself automatically.

According to this invention, there is provided a partition plate which lightly touches the surfaces of the transferring substances and is situated to the direction of movement of the transferring substances. At one side of the plate there is a light source, while at the other side of said plate there is a unit of a photoelectric converter such as a photocell which is made to receive the rays leaked instantaneously from the gap formed between the lower straight edge of the partition plate and the upper surface of the lapped part of the transferred substances whenever the latter passes the front of the photoelectric unit, and to convert an electric pulse.

With the object and fundamental concepts stated above, the characteristic features and special merits of this invention will be easily understood by one skilled in the art from the following description made in connection with the accompanying drawings, in which:

FIG. 1 shows a perspective view for explaining the principles of this invention,

FIG. 2 is a vertical section of a working example, and

FIG. 3 is the vertical section taken along the line 3–3 in FIG. 2.

In the drawing, there is shown conveyor belts 4 with a row of transferred substances 5, such as folded newspapers. The transferred substances 5 form a step at the lapping part as shown by 6 where the light from a light source 8, though shut out by the partition plate 7, leaks from one side to the other where the phototransistor 9 is located. The partition plate 7, is positioned in the direction of movement of the transferred substances 5 and lightly touches their surfaces. In FIG. 2 there is shown the guide member 11 which causes the transferred substances 5 smoothly touch to the partition case 10. A roller 12 supports the transferred substances upward from beneath to make the leaking rays distinct. Member 13 is the support of this counting apparatus.

The operation of the apparatus of this invention is as follows:

With the light source 8 light the row of substances 5 in any lapping pitch upon the conveyor belt 4 are transferred. Then although the rays from the light source 8 are shut off by the partition plate 7, rays leak filtering from the gap formed by the step at the lapping part of the transferred substances and are sensed by the phototransistor 9 and converted to an electric pulse which is put in a counting circuit to count the number of pulses for record or signal.

Since the apparatus in accordance with this invention is so constituted and operated as stated above, it can be made simple as well as small so that it can easily set at any desired part of the conveyor belt and make its maintenance and repair simple. Further, since there is no need for moving or mechanical members, it can attend to any high speed transference. Another important feature of this invention is that the accuracy of the lapping pitch of the substances is no longer asked and it works constantly in good condition at any indefinite pitch of lapping.

Any light source such as infrared rays can similarly be used instead of visible light, and also the apparatus can be set at the lower side instead of the upper side of the transferred substances.

Obviously, the embodiment shown is exemplary only and a wide variety of embodiments may be devised without departing from the spirit and scope of the invention.

What I claim is:

1. In combination with an apparatus for counting sheet substances transferred in a row with any pitch of lapping, a partition plate for blocking rays having an edge touching the surfaces of the transferred substances and set in the direction of transference, a light source positioned at one side of said partition plate and a photoelectric converter positioned at the other side of said partition plate, whereby rays filtering from the gap formed by the step at the lapping part of the transferred substances and said plate are sensed by said photoelectric converter thereby activating a counter.

2. A method for counting sheet substances transferred in a row with any pitch of lapping by means of a light source and a photoelectric cell connected with a counter, which comprises the steps of: positioning a partition plate so as to lightly touch the surface of the substances being transferred; in the direction of transference positioning said light source on one side of said plate and said photoelectric cell on the other side of said plate, and then detecting with said photoelectric cell the light rays leaked from the gap between said plate and the upper surface of the lapped part of said transferred substance.