

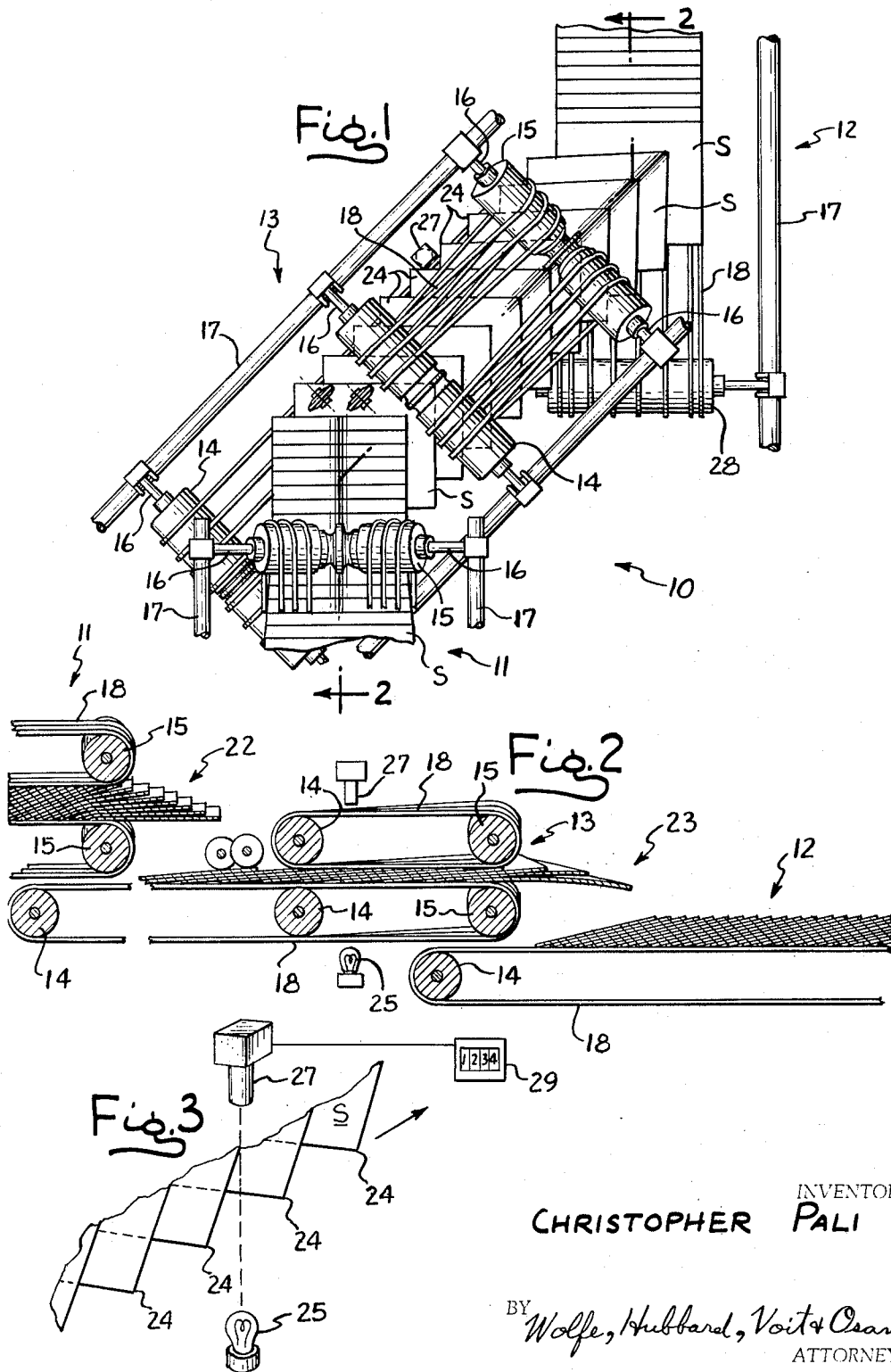
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APPARATUS FOR COUNTING OVERLAPPING SIGNATURES

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APPARATUS FOR COUNTING OVERLAPPING SIGNATURES

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2 Claims. (Cl. 250—223)

This invention relates generally to a method and apparatus for counting relatively flat, sheetlike articles and, more particularly, to devices for counting such articles when in overlapped relationship and flowing in a continuous stream as, for example, printed signatures or newspapers.

As newspapers or other printed signatures leave the pressroom, they are typically forwarded to stacking and bundling machines where they are bound into bundles for delivery. It is common practice to count the printed signatures as a means of determining the production of a press or presses during a run. Since it is necessary to keep the papers moving relatively rapidly, often in excess of 300 feet per minute, and in a continuous stream, it is impractical to employ workmen as counters. Attempts to obtain an accurate count automatically include a mechanical feeler-finger mounted over the stream of signatures so that as each successive signature passes beneath the feeler-finger it "bobs" slightly, actuating a counting mechanism. However, since the thickness of the printed signatures or newspapers may be expected to vary substantially from day to day and even from edition to edition, according to the number of pages in each, the mechanical feeler must be continuously adjusted if a reliable count is to be obtained. In addition, the feeler-finger and its associated linkage must all be precisely balanced so that the finger will not skip or bounce as it is actuated by the rapidly moving overlapped articles.

Another method has also been developed to count overlapped newspapers which does not rely on the mechanical response of a feeler-finger or the like. This system employs a light source which is directed at the stream of newspapers so as to cast a shadow adjacent each overlapped fold. A sensing device is positioned to detect the change in light intensity as each shadow passes the light source and a signal is transmitted to a counter. However, due to the wide variations in lighting conditions within the pressroom during both day and night operation, as well as variations in intensity of reflection from the papers, this system has also proved unreliable.

Accordingly, it is an object of the present invention to provide both method and apparatus for counting individual signatures flowing on a conveyor in overlapping relation in a stream which will give an accurate and reliable count. It is a more particular object to provide method and apparatus for presenting a corner of each signature in a stream to be counted.

It is an additional object to provide such a method and apparatus for counting signatures which may be successfully operated with either a mechanically actuated or a photoelectric-actuated counting mechanism.

It is a further object to provide method and apparatus, as described above, which is effective, notwithstanding variations in lighting intensity or changes in article thickness.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings, in which:

FIGURE 1 is a plan view of an apparatus for conveying overlapped signatures embodying the counting method and apparatus of the present invention;

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FIG. 2 is a side elevation of the apparatus shown in FIG. 1, taken along line 2—2 of FIG. 1; and

FIG. 3 is an illustration of one way of counting corners using the apparatus shown in FIGS. 1 and 2.

While the invention will be described in connection with a preferred method and embodiment, it will be understood that I do not intend to limit the invention to this method and embodiment, but, on the contrary, I intend to cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention, as defined by the appended claims.

Referring now particularly to the drawings where there is illustrated a portion of a conveyor system indicated generally at 10, embodying the present invention, the system is of a type which is adapted to handle printed signatures received from a press and, as shown comprises a plurality of conveyor sections 11, 12, and 13. The sections are of a generally well-known construction, and comprise a number of belts or bands extending between rotatable rollers, such as receiving and terminal rollers, indicated at 14 and 15, respectively. The rollers 14 and 15 are rotatable on axle shafts indicated at 16, and one or both may be powered for driving the same. The shafts are supported by a side frame 17 in any suitable fashion. The endless bands 18 may be conveniently formed of helical springs and stretched between the associated rollers 14, 15, one or more of which is powered to provide motion to the bands in a path which is transverse to the axes of the rollers. Bands 18 may be conveniently mounted to provide parallel conveyors, one above the other, to provide greater control over the movement of signatures. As indicated by the construction of section 11 of the conveyor system 10, it is desirable to provide terminal rollers 15 mounted so as to form a slight angle with one another, giving the rollers a V-shaped profile. This causes the signatures passing through them to be bowed or troughed slightly as they leave the section. Such an arrangement enhances the uniformity with which the signatures, as they are dropped from a "waterfall," as indicated at 22, land on a conveyor or other area disposed at a lower level.

In keeping with the present invention, conveyor sections 11 and 12 are interconnected by the relatively short conveyor section 13. As shown in FIG. 1, sections 11 and 12 are offset slightly, although parallel in their disposition. Conveyor section 13 is disposed diagonally at a suitable acute angle approximating 45° to the sections 11 and 12. The conveyor section 13 likewise comprises upper and lower conveyors. The section 13 is disposed below the waterfall 22, where it is adapted to receive signatures discharged from section 11. It then conveys such signatures to a second waterfall 23 (as seen in FIG. 2) where they are transferred to section 12, disposed below the waterfall 23.

The signatures being transported by conveyor section 11 present aligned edges in the direction of travel and are in overlapping relation. Such an arrangement of signatures is typical of newspapers coming from the delivery mechanism of a printing press.

In the practice of the invention, the signatures, as they leave the waterfall 23, land on the diagonal conveyor section 13, and are rearranged as a result of the angular alignment of the section, so as to assume modified overlapping positions relative to adjacent signatures as contrasted with the aligned lateral edges in the direction of travel previously presented in conveyor section 11.

As a further aspect of the invention, and in order to increase the amount of lap between each signature in the direction of travel, the conveyor section 13 may be operated at a relatively higher speed than the speed of section 11. By so doing, each signature dropped from

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section 11 onto the conveyor section 13 will move a greater distance before the succeeding paper falls on it, thus spreading the signatures out. Thus, each successive signature on conveyor section 13 presents a corner 24 which gives the row of moving signatures a sawtooth edge appearance. The corner 24 of each individual signature extends outwardly and there is a clear space between each preceding and succeeding signature on the conveyor. Thus, a portion of each individual signature is individually and distinguishably presented from adjacent signatures on the conveyor section, and all such portions are aligned, thereby making each signature susceptible of being accurately counted.

To this end, a suitable counting device may be provided, such, for example, as a light-sensitive counter. As shown in the drawings, a light source 25 is provided below the conveyor section 13 in any convenient position, but so positioned that each individual corner 24 of the signatures on the conveyor section 13 passes over the constant beam from the light source, interrupting the same. Accordingly, a photoelectric cell 27 is provided in line with the beam of the light source 25 above the conveyor section 13. The photoelectric cell is connected in any suitable fashion well known in the art, through an appropriate counting device 29, which is adapted to indicate the number of pulses detected by the photoelectric cell. It will be apparent that appropriate means may be coupled with the counting device for transmitting a signal when a desired number of signatures have passed the counter, when such an arrangement is needed. It is also apparent that the foregoing arrangement will count signature moving in any direction as long as the light source and photoelectric cell are on opposite sides of the plane of the moving signatures.

At the end of section 13, each signature drops onto section 12 which is moving at the approximate speed of section 11, thereby causing the signatures to be realigned in the manner of conveyor section 11. However, other devices may be employed at the end of section 13 to receive the signatures after they have been counted for transferring them to other processing devices.

Though the preceding discussion has been keyed mainly to the use of the present invention in the newspaper art in the conveyance of signatures from the folding area to the bundling area, it will be appreciated that the device is susceptible of use in the counting of any relatively flat sheetlike articles and is not restricted to newspapers or the like.

I claim as my invention:

1. In a device for counting rectangular sheetlike articles

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disposed in overlapping relation, conveyor means for moving said articles in a continuous stream with the planes of the articles substantially parallel, means on said conveyor for temporarily disposing said articles in angled relation such that a corner of each article is exposed and the planes of the articles remain substantially parallel so that corners of successive articles define a sawtooth edge, a photoelectric cell disposed on one side of the parallel planes of the moving articles, and a light source disposed on the other side of the parallel planes of the moving articles for directing a beam of light substantially at right angles to the planes of the moving articles with the beam being focused on said photoelectric cell, said cell and said light source being positioned so that the beam of light is repetitively interrupted by the exposed corners of successive articles, hereby repetitively actuating said photoelectric cell for automatically counting the moving articles.

2. In a device for counting rectangular sheetlike articles disposed in overlapping relation, the combination of first conveyor means for advancing said articles along a first predetermined path in a continuous stream in overlapping relationship with each other with the side edges of the articles extending in the direction of article movement, second conveyor means for receiving said articles from said first conveyor means and advancing the articles along a second predetermined path intersecting said first path at an acute angle with the side edges of the articles extending angularly across said second path so as to expose the corners of said articles in a sawtooth pattern along the sides of the second conveyor means and the planes of the articles are substantially parallel, a photoelectric cell disposed on one side of the parallel planes of the moving articles, and a light source disposed on the other side of the parallel planes of the moving articles for directing a beam of light substantially at right angles to the planes of the moving articles with the beam being focused on said photoelectric cell, said cell and said light source being positioned so that the beam of light is repetitively interrupted by the exposed corners of successive articles, thereby repetitively actuating said photoelectric cell for automatically counting the moving articles.

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