Jan. 16, 1968 K. REHM 3,363,783

DOCUMENT PROCESSING DEVICE

Filed Dec. 17, 1965

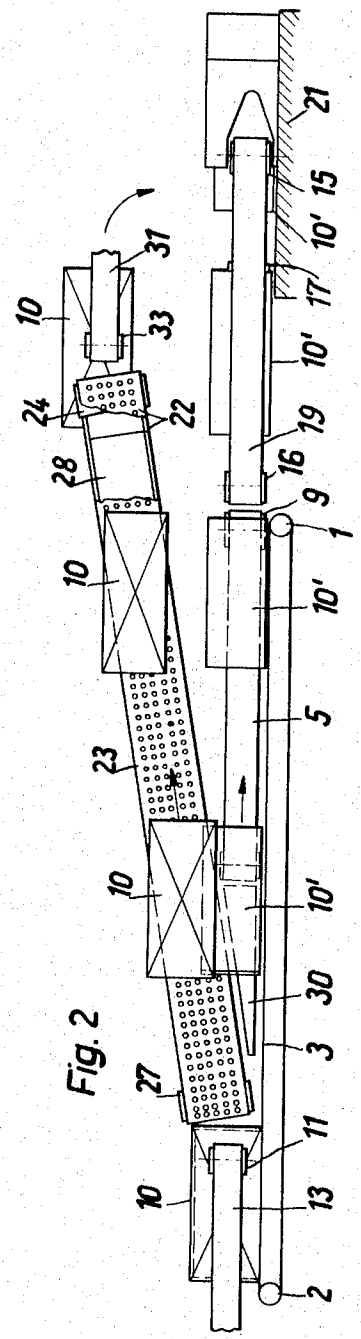


Fig. 2

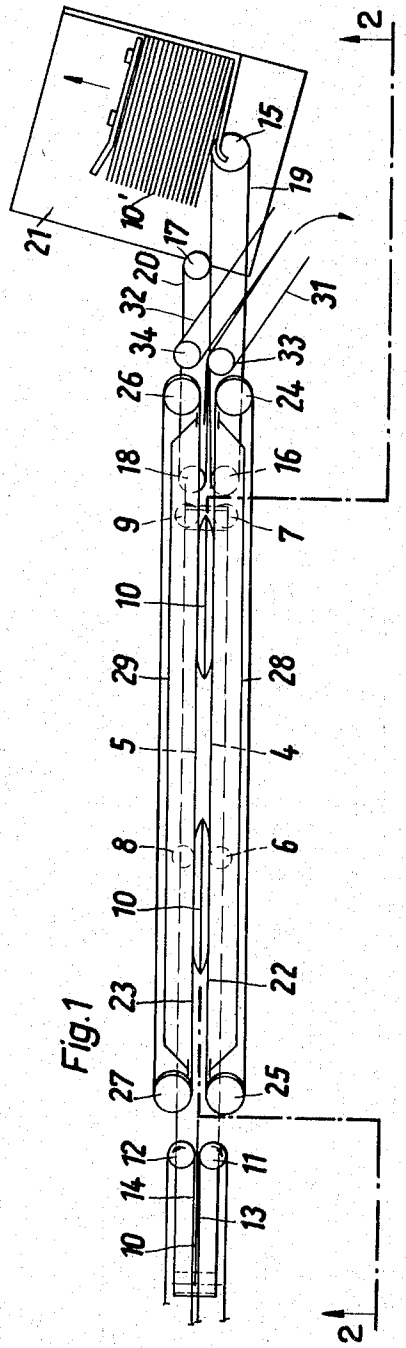


Fig. 1

INVENTOR

Karl Rehm

BY Spencer & Kaye

ATTORNEYS

United States Patent Office 3,363,783 Patented Jan. 16, 1968

3,363,783

DOCUMENT PROCESSING DEVICE

Karl Rehm, Constance, Germany, assignor to Telefunken Patentverwertungsgesellschaft m.b.H., Ulm (Danube), Germany

Filed Dec. 17, 1965, Ser. No. 514,469
Claims priority, application Germany Dec. 28, 1964, T 27,721
4 Claims. (Cl. 214—7)

ABSTRACT OF THE DISCLOSURE

The contents of opened envelopes are removed and stacked by means of (1) an inclined suction conveyor which transports the opened envelopes upside down and spreads the sides of the envelopes to allow the contents to fall out, (2) a conveyor for receiving the contents of the envelopes and for holding them in a vertical position while they are being conveyed horizontally, and (3) a stacker for receiving and stacking the contents of the envelopes.

The present invention relates to a document processing device, and particularly to a device for automatically removing the contents of opened envelopes.

Various types of automatic devices are already known for removing the contents of opened envelopes. Opened envelopes are fed to these devices with their opened longitudinal edges facing downwardly and as each envelope passes through the device its sides are pulled away from each other by means of two suction units, such as suction conveyor belts, to enable their contents to fall out under the influence of gravity. In these prior art devices, the envelope contents fall onto a horizontally positioned collector conveyor belt and are conveyed to a collection station.

Such arrangements find a wide variety of uses. For example, they are of great value in expediting the handling of postal check vouchers. For such an application, the vouchers, after having been removed from the envelopes, should preferably be finally stacked in such a way that further automatic processing can be carried out by removing individual vouchers in succession from the stack. While the presently known envelope emptying devices perform their intended function reasonably well, they require a substantial amount of additional apparatus to place the envelope contents in a readily usable stack because it is necessary, in order to obtain such a result, to provide substantially the same elements, such as guiding paths, separating belts, etc., as are used for the input units of letter separating arrangements. As a result, a considerable expenditure is required for the provision of apparatus for stacking the vouchers removed from envelopes by these known removal devices.

It is an object of the present invention to eliminate these drawbacks.

It is a more specific object of the present invention to eliminate the need for a large number of additional units for stacking the documents automatically removed from opened envelopes.

It is another object of the present invention to permit the automatic removal of documents from envelopes and the precise stacking of the removed documents with the aid of relatively simple and inexpensive apparatus.

It is another object of the present invention to place the documents in readily usable stacks immediately after their removal from the envelopes.

Specifically, the present invention contemplates a novel device for automatically removing the contents of a succession of opened envelopes and for stacking the contents thus removed. Such an arrangement primarily includes means defining a substantially horizontal conveyor path having an initial portion for conveying the envelopes in an upright manner with their opened edge directed downwardly and a second portion for conveying the envelope contents as they leave their envelopes, with the conveyor path transporting the envelopes and contents at a predetermined speed. A device according to the present invention also includes suction conveyor means for drawing the sides of each succeeding envelope away from each other to permit its contents to readily slip out of the envelope, the conveyor means being arranged in the path of the envelopes being transported by the initial portion of the conveyor path and being oriented to move the envelopes in an upward direction which forms an acute vertical angle with the direction of travel of the envelope contents being transported on the conveyor path. The suction conveyor means are arranged to convey the envelopes at a speed whose component parallel to the direction of travel of the envelope contents on the second portion is equal to the above-mentioned predetermined speed.

In accordance with a particular embodiment of the present invention, the suction conveyor means is constituted by two opposed, parallel suction conveyor belts which are spaced apart from each other by a sufficient distance to ensure an adequate separation of the sides of each envelope and which are oriented to branch off upwardly from the conveyor path to a sufficient height to permit the complete separation of each envelope from its contents.

According to one novel feature of the present invention, the conveyor path maintains the envelope contents in an upright position as they travel over the second portion.

Additional objects and advantages of the present invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a plan view of a preferred embodiment of the present invention.

FIGURE 2 is an elevational view, partly in cross section taken along the plane defined by the line 2—2 of FIGURE 1.

As may be seen in the figures, the device according to the present invention includes a horizontal conveyor path for conveying the envelopes 10 and their contents 10′ in a horizontal direction while maintaining the envelopes and contents in an upright position. This conveyor path includes a horizontal conveyor belt 3 which is driven by a drive roller 1 and a return roller 2 in the direction of the horizontal arrow. The conveyor path further includes a pair of upright conveyor belts 4 and 5 which are arranged on either side of the envelope contents 10′ for maintaining these contents in an upright position and which are driven at the same speed as the belt 3 by the rollers 6, 7 and 8, 9, respectively.

The envelopes 10, which have previously had their lower edge slit opened, are delivered to the initial portion

of the conveyor belt 3 from some preliminary positioning or processing unit by a pair of upright delivery conveyor belts 13 and 14 which are driven at the same speed as the belt 3 by drive rollers 11 and 12, respectively. Only a portion of each of the belts 13 and 14 is shown and the return rollers for these belts are not visible in the figures. Rollers 11 and 12 are driven in the direction indicated by the arrows in FIGURE 1. At the output end of the conveyor path defined by belts 3, 4 and 5 there are disposed a pair of upright, opposed conveyor belts 19 and 20 driven by rollers, or pulleys, 15, 16 and 17, 18, respectively. These belts are disposed relatively close to the output end of belts 3, 4 and 5 for receiving the envelope contents 10′ in an upright position, for maintaining these contents in such a position, and for delivering them in that position to a conventional stacking device 21, with the front roller 15 of belt 19 acting as a stacking roller for these contents.

The illustrated device also includes suction conveyor means constituted by two opposed parallel suction conveyor belts which are spaced apart from each other by a sufficient distance to assure an adequate separation of the sides of each envelope. These conveyor belts are oriented to branch upwardly away from the substantially horizontal conveyor belt at an acute angle with respect to the latter conveyor belt. Belt 22 is driven by rollers 24 and 25, while belt 23 is driven by rollers 26 and 27. Each of the suction conveyor belts is perforated in a conventional manner and is associated with a respective one of the suction enclosures 28 and 29 which are, in turn, connected to a low pressure, or suction, source in a manner which is well known per se. At the output end of the path defined by belts 22 and 23 there is disposed an arrangement for conveying the empty envelopes 10 to a suitable collector. This arrangement includes a pair of substantially upright conveyor belts 31 and 32 each of which is driven by a respective one of the rollers 33 and 34. The other roller for each of these belts, as well as portions of these belts, are not shown in the figures. The belts 31 and 32 can convey the empty envelopes 10 to any suitable collector container.

In order to ensure that the contents 10′ will remain in an upright position before reaching the belts 4 and 5, a pair of vertical, triangular guide panels 30 are disposed in the triangular gap existing between the conveyor belt 3, the suction conveyor belts 22 and 23, and the rollers 6 and 8. The suction belts 22 and 23 are driven at a speed whose component parallel to the direction of travel of the envelope contents on the second portion of the conveyor path, which portion is defined by the region occupied by panels 30 and belts 4 and 5, is equal to the speed at which the conveyor belts 3, 4 and 5 convey the contents 10′.

In operation, envelopes whose lower edge has been preliminarily opened are delivered by the conveyor belts 13 and 14 onto the horizontal belt 3. Their advance brings them into the region between belts 22 and 23 where the suction produced by these belts draws the sides of each envelope away from each other, as is best seen in FIGURE 1, and also causes these envelopes to move upward along the belts. Because the envelope sides are drawn away from each other and the envelopes are moved progressively upwardly, the envelope contents 10′ are permitted to easily slip out of their associated envelopes 10 until the latter move upwardly to such a height that they are completely separated from their contents. Prior to the complete separation of the contents 10′ from the envelopes 10, the contents 10′ have moved in the region between belts 4 and 5 so that they will be maintained in an upright position after their complete separation from the envelopes 10. As a result, if a particular envelope 10 contains several sheets, the edges of these sheets will remain aligned with one another, thereby facilitating the subsequent stacking of the contents 10′. The contents are then fed to the stacking device 21 by the conveyor belts 19 and 20. The empty envelopes 10 are simultaneously conveyed to a suitable collector container by the belts 31 and 32. The stacked documents 10′, which may be constituted by vouchers, are then properly stacked in the stacking device 21 and are in a condition to be transferred to suitable apparatus where they can undergo further processing.

It will be understood that the above description of the present invention is susceptible to various modifications, changes, and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

What is claimed is:

1. A device for automatically removing the contents of a succession of opened envelopes and stacking the contents thus removed, comprising, in combination:

(a) means defining a substantially horizontal conveyor path having an initial portion for conveying the envelopes in an upright manner with their opened edge directed downwardly, and a second portion for conveying the envelope contents as they leave their envelopes, said means defining a conveyor path transporting the envelopes and contents at a predetermined speed; and

(b) laterally spaced coacting suction conveyor means for drawing the sides of each succeeding envelope away from each other to permit its contents to readily slip out of the envelope, and for conveying the envelopes at a speed whose component parallel to the direction of travel of the envelope contents on said second portion is equal to said predetermined speed, said conveyor means being arranged in the path of the envelopes being transported by said initial portion of said conveyor path and being oriented to move the envelopes in an upward direction which forms an acute vertical angle with the direction of travel of the envelope contents being transported on said conveyor path.

2. A device for automatically removing the contents of a succession of opened envelopes and stacking the contents thus removed, comprising, in combination:

(a) means defining a substantially horizontal conveyor path having an initial portion for conveying the envelopes in an upright manner with their opened edge directed downwardly, and a second portion for conveying the envelope contents as they leave their envelopes, said means defining a conveyor path transporting the envelopes and contents at a predetermined speed; and

(b) suction conveyor means for drawing the sides of each succeeding envelope away from each other to permit its contents to readily slip out of the envelope, and for conveying the envelopes at a speed whose component parallel to the direction of travel of the envelope contents on said second portion is equal to said predetermined speed, said conveyor means being arranged in the path of the envelopes being transported by said initial portion of said conveyor path and being oriented to move the envelopes in an upward direction which forms an acute vertical angle with the direction of travel of the envelope contents being transported on said conveyor path, said suction conveyor means including two opposed, parallel suction conveyor belts which are spaced apart from each other by a sufficient distance to assure an adequate separation of the sides of each envelope, and which are oriented to branch off upwardly from said conveyor path to a sufficient height to permit the complete separation of each envelope from its contents.

3. An arrangement as defined in claim 1 wherein said means defining a conveyor path maintains the envelope contents in an upright position as they travel over said second portion.

4. An arrangement as defined in claim 3 further com-

prising: a stacking device for stacking the contents removed from the envelopes; a first auxiliary conveyor disposed between the outlet end of said second portion of said conveyor path and said stacking device for conveying the envelope contents, while maintaining them in their upright position, to said stacking device; and a second auxiliary conveyor disposed at the outlet end of said suction conveyor means for conveying the empty envelopes away from said suction conveyor means to a collection container.

References Cited

UNITED STATES PATENTS

2,683,560	7/1954	Keller.	
3,022,912	2/1962	Vincent	214—305
3,051,332	8/1962	Richert et al.	214—7

HUGO O. SCHULZ, *Primary Examiner.*