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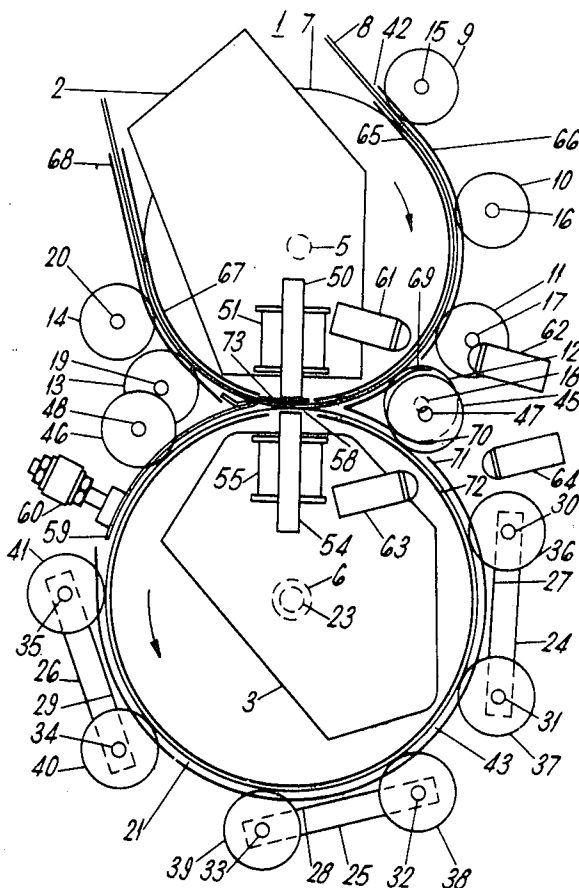
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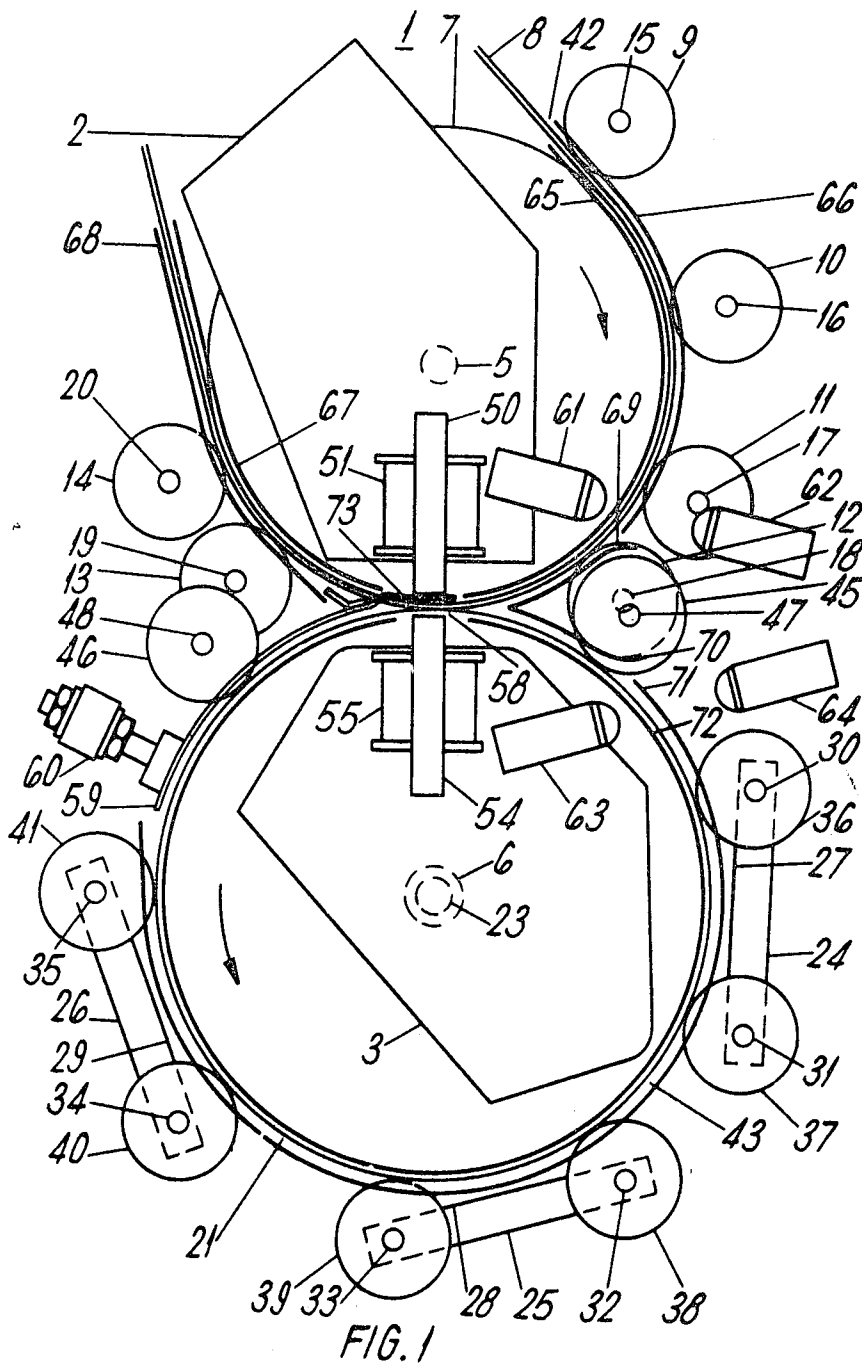
[54] **ARTICLE-CONVEYING DEVICE**
 7 Claims, 2 Drawing Figs.

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 271/52
 [51] Int. Cl. B65h 5/26,
 B65h 9/16
 [50] Field of Search 217/64, 51,
 52

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ABSTRACT: An article-conveying device for providing delay in the conveyance of an article when necessary without interrupting the speed of that article. The invention provides a regular circular path and an auxiliary circular delay path tangent thereto in FIG. 8 form with means to select which path an article is to follow. Detection of the presence of articles in either path is by photocells which relay information to a central control which controls the path-selection means. An article which is to be delayed is taken out of the regular path and guided into the auxiliary path to remain therein for at least one revolution of that path, and is returned to continue its journey in the regular path whenever the central control so directs.





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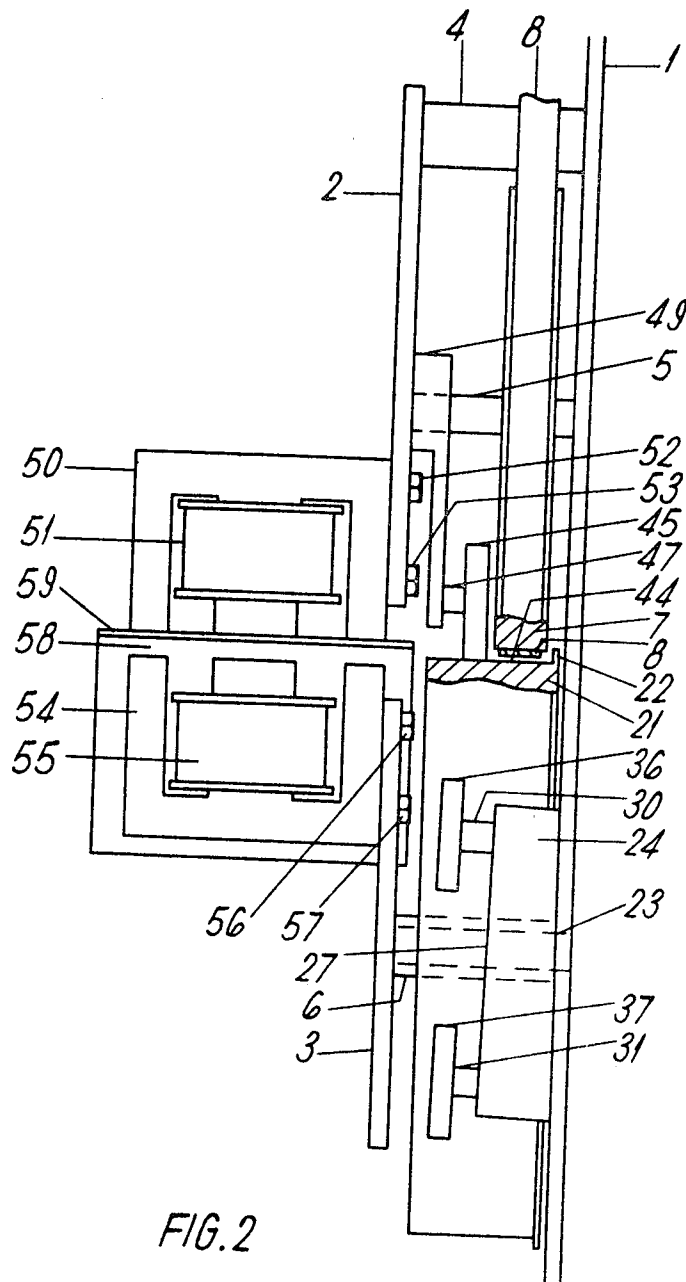


FIG. 2

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ARTICLE-CONVEYING DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to an article-conveying device.

In article-handling systems, and more particularly document-handling systems, it often happens that during the travel of a document at a constant speed from one position to another position along a path, operations must be performed in parallel in a processing unit in order to obtain information to be used at the moment the document arrives in this other position. If the time required to perform these operations is smaller than the travel time of the document this information is temporarily stored into memory, but when this operation time is larger than this travel time, one may delay the arrival of the document in the second position by temporarily stopping it between the first and second positions, or by stopping it in this second position. Drawbacks of these solutions are: that it is very difficult, if not impossible, to stop documents without damaging them, especially when they are light; and to bring stopped documents in motion in such a way that they immediately have the same speed as that at which they were previously conveyed, since there always occurs slippage during this acceleration movement. Moreover, while the time needed to return the document to its steady traveling speed may be without importance in some cases, it may be of considerable concern in other cases. In principal, in case the document is stopped before reaching the second position, if the time of arrival in the second position is predetermined, the acceleration time may be taken into account. But if the time of restart is determined by a random event there will always be an undesirable delay due to the acceleration time.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an article-conveying device which does not present these drawbacks.

The article-conveying device according to the present invention is particularly characterized in that it includes means to impart movement to the article along a closed loop path and to selectively direct the article in and out of the path.

The present conveying device is further characterized in that the means for imparting movement to the article include a rotatable cylindrical drum with an associated holding arrangement to hold the article in contact with the peripheral surface of the drum thus imparting movement to the article along a circular path.

The present invention also relates to an article conveying device including means to convey a document along a path.

A preferred embodiment of the article-conveying device according to the present invention includes a continuously rotating cylindrical drum which has at one side a peripheral collar and the peripheral surface of which makes contact with a number of freely rotatable rollers which are so mounted with respect to the drum that a document introduced in the path delimited by these rollers and the peripheral surface is urged towards said collar. This drum is arranged tangentially to a main path, and a points mechanism mounted at the point of tangency is able to deflect a document from this main path into the bypath between the drum and the rollers.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other objects and features of the invention will become more apparent and the invention itself will be best understood by referring to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a front view of a conveying device according to the invention; and FIG. 2 is a side view from right to left of FIG. 1 with a plurality of parts removed for clarity.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to these figures, the article and more particularly document-conveying device shown therein includes a main mounting plate 1. Auxiliary mounting plates 2 and 3 are parallel to mounting plate 1 and are secured thereon by means of bracket 4 and axle 5, a hollow cylindrical sleeve 6, and a not shown bracket respectively.

A wheel 7 is mounted on axle 5 so as to be freely rotatable thereon and is driven in the direction shown by means of drive belt 8. A plurality of rollers 9 to 14 are mounted in contact with this drive belt 8, these rollers being freely rotatable about the respective axles 15 to 20 which are fixed on mounting plate 1.

A cylindrical drum 21 having a peripheral collar 22 adjacent to mounting plate 1 is secured to a drive shaft 23 of a motor (not shown), this drive shaft 23 being partially located in the hollow cylindrical sleeve 6 and being rotatable in the direction shown. Drive belt 8 and drum 21 delimit a gap 44. It is to be noted that the axial length of the drum is smaller than the width of the smallest document capable of being handled.

Three blocks 24, 25, 26 are secured to mounting plate 1. The surface 27, 28, 29 facing mounting plate 3 of each of these blocks is oblique with respect to mounting plate 1. Adjacent to each of its two extremities each of these blocks 24, 25, 26 carries an axle 30, 31; 32, 33; 34, 35 on which a roller 36, 37; 38, 39; 40, 41 is mounted in a freely rotatable way, these axles being perpendicular to the surfaces 27, 28, 29 of these blocks respectively.

Two further rollers 45 and 46 are mounted in a freely rotatable way about the respective axles 47 and 48 secured to brackets which are fixed on mounting plate 2. For instance roller 45 is mounted on axle 47 secured to bracket 49 which is fixed on mounting plate 2.

An electromagnet 50, 51 constituted by an E-shaped core 50 and a winding 51 arranged around the middle leg of this core 50 is mounted on mounting plate 1 by means of nuts 52, 53. In a similar way an electromagnet 54, 55 constituted by an E-shaped core 54 and a winding 55 arranged around the middle leg of this core 54 is mounted on mounting plate 3 by means of nuts 56, 57. The E-shaped cores 50, 54 delimit a gap 58 which is located in the prolongation of the gap 44 between drive belt 8 and drum 21. A resilient points blade 59 made of a magnetic material and fixed to a bracket 60 extends into the gap 58 wherein it is in contact either with core 50, as shown, or with core 54.

A lamp 61 and an associated photocell 62 are mounted in front of each other on mounting plates 2 and 1 respectively. Likewise a lamp 63 and an associated photocell 64 are mounted in front of each other on mounting plates 3 and 1 respectively. These lamps and photocells form part of an electric control circuit (not shown).

Finally, a plurality of guide plates 65 to 72 are perpendicularly mounted on mounting plate 1 at a certain distance from the lateral surface of drum 21 nearest to mounting plates 2 and 3. Rollers 9 to 14, belt 8, guide plates 65 to 69, and the end 73 of resilient blades 59, when in contact with core 54, form a partial cylindrical guide channel or main path 42, whereas drum 21, rollers 45, 36 to 41, and 46, guide plates 70, 71, and 72 and the same end 73 of resilient blade 59, when in contact with core 50, form a cylindrical guide channel or bypath 43 which is tangent to the main path 42 and which has a curvature of opposite sign to that of this main path.

It is to be noted that in FIG. 2 parts 9, 10, 11, 12, 38, 39, and 61 to 72 have not been shown for clarity.

OPERATION

Normally drive belt 8, wheel 7, and drum 21 are in motion and the end 73 of points blade 59 is in contact with core 54 of the operated electromagnet 54, 55. Electromagnet 50, 51 is in the released condition. It is supposed that the linear velocities of belt 8 and drum 21 are equal.

When a document enters guide channel or main path 42 it is conveyed along this path between drive belt 8 and idle rollers 9, 10, and 11 successively. At the moment its leading edge interrupts the light beam between lamp 61 and photocell 62 a signal is transmitted to the above-mentioned electric control circuit which decides whether the document must be deflected into by path 43 or not.

In the second case electromagnet 54, 55 is maintained in the energized state so that the document is further advanced towards the outlet of guide channel or main path 42 between drive belt 8 and rollers 12, 13, and 14 successively.

In the first case electromagnet 54, 55 is released and electromagnet 50, 51 is energized so that the end 72 of points blade 59 is displaced into contact with core 50 of this electromagnet. Due to this, and since its width is larger than the axial length of the drum, the document then enters the cylindrical guide channel or bypath 43 along which it is conveyed between drum 21 and rollers 46, 41, 40, 39, 38, 37, and 36 successively. At the moment its leading edge interrupts the light beam between lamp 63 and photocell 64 a signal is transmitted to the above-mentioned electric control circuit which decides whether the document must continue its movement in bypath 43 or not. In the first case the electromagnet 50, 51 is maintained in the energized condition so that the document continues to be advanced along guide channel or bypath 43 by drum 21 and rollers 45, 46, etc. In the second case electromagnet 50, 51 is released and electromagnet 54, 55 is energized so that the document is then advanced in guide channel or main path 42 towards the outlet thereof.

It should be noted that due to the linear velocities of drive belt 8 and drum 21 being equal no slippage of a document handled occurs.

The aim of the obliquely mounted rollers 36 to 41 is to urge the documents conveyed in guide channel 43 towards the peripheral collar 22 of drum 21 and thus to line up these documents. It has indeed been empirically found that when these rollers are parallel to the mounting plate 1 the documents gain a helical movement urging them out of guide channel 43.

It should be noted that the rollers 36 to 41 may be eliminated when using a hollow drum 21 having a perforated surface and an interior coupled to exhausting means.

In the above-described embodiment of an article-conveying device according to the invention main path 42 is tangent to the circular bypath 43. Instead of being circular, bypath 43 may obviously also take other form or may be an open path which communicates with the main path in two positions and which is such that the time required for a document to travel between these positions along this bypath is larger than that required for a document to travel along this main path.

What is claimed is:

1. In this article-conveying device, the arrangement comprising:

a. first means, defining a curved continuous first path for

imparting movement to articles along said first path;

b. second means defining a substantially circular continuous second path, said second means including a drum the peripheral surface of which is positioned proximate said first path so as to provide said first and second paths with a coincident point of tangency; and

c. switch means for selectively guiding articles from said first path into said second path and vice versa, said switch means including a two-position points mechanism positioned between said first and second paths at said coincident point of tangency, said points mechanism being arranged in the one position to permit articles in the first path to remain therein and articles in the second path to return to the first path, and in the other position permit articles in the first path to be conveyed into the second path and for articles already in the second path to remain therein, said switching means further including third means for detecting articles in either path and electromagnetic means responsive to said detecting means for switching said switch means in accordance with the transit time period requirement for each article between the input and output of said first path.

2. An article-conveying device comprising first means for imparting movement to an article along a substantially circular closed loop first path and to selectively direct the article in and out of said first path, said first means including a rotatable cylindrical drum and an associated holding arrangement to hold the article in contact with the peripheral surface of said drum, wherein said peripheral surface of said drum is delimited at one side by a peripheral collar and said holding arrangement includes freely rotatable rollers mounted with respect to said drum such that contact is made by said rollers with said peripheral surface and the article located thereon is urged toward said peripheral collar.

3. The article-conveying device according to claim 2, wherein the axial width of said peripheral surface is smaller than the smallest width of the articles conveyed.

4. The article-conveying device according to claim 2, wherein it includes second means to impart movement to said article along a second path tangent to said closed loop path.

5. The article-conveying device according to claim 4 wherein said first and second means include a common points mechanism which is mounted at the point of tangency of said paths and which is adapted to direct said article into or out of said closed loop path.

6. The article-conveying device according to claim 5 wherein said first and second means impart movement to said article at the same speed.

7. The article-conveying device according to claim 6 wherein the direction of article movement associated with said first and second paths is respectively counterclockwise and clockwise.

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