United States Patent [19]

Bottcher

[11] **3,716,227**

[45] **Feb. 13, 1973**

[54] SHEET CONVEYING DEVICE

[75] Inventor: **Rolf Bottcher,** Markkleeberg-Ost, Germany

[73] Assignee: **VEB Polygraph Leipzig Kombinat fur Polygraphische Maschinen und Austrustungen**

[22] Filed: **Feb. 8, 1971**

[21] Appl. No.: **113,468**

[52] **U.S. Cl.**.....**271/79,** 271/50
[51] **Int. Cl.**.....**B65h 29/28,** B65h 9/14
[58] **Field of Search**.....271/49, 50, 60, 79, 46, 47

[56] **References Cited**

UNITED STATES PATENTS

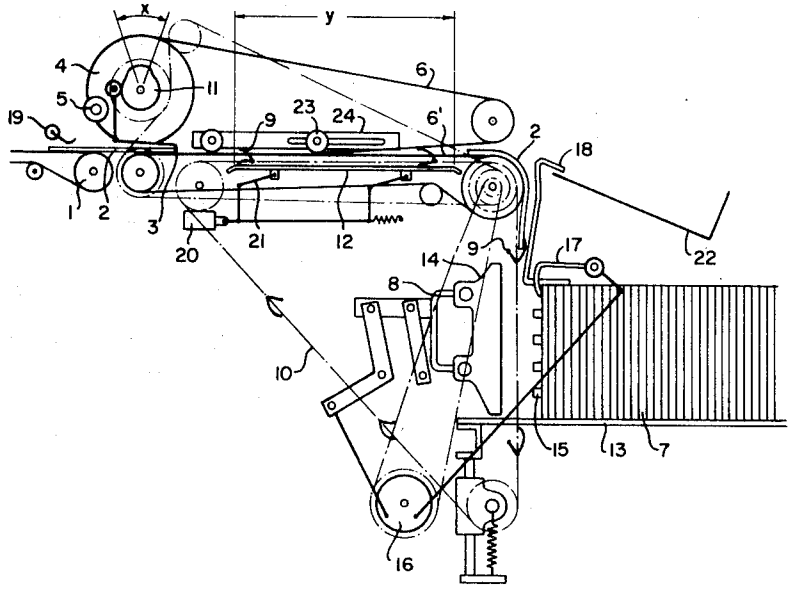
3,388,905	6/1968	Nash	271/50
2,406,006	8/1946	Eckhard	271/50
2,996,982	8/1961	Alm	271/79

Primary Examiner—Richard E. Aegerter
Attorney—Nolte and Nolte

[57] **ABSTRACT**

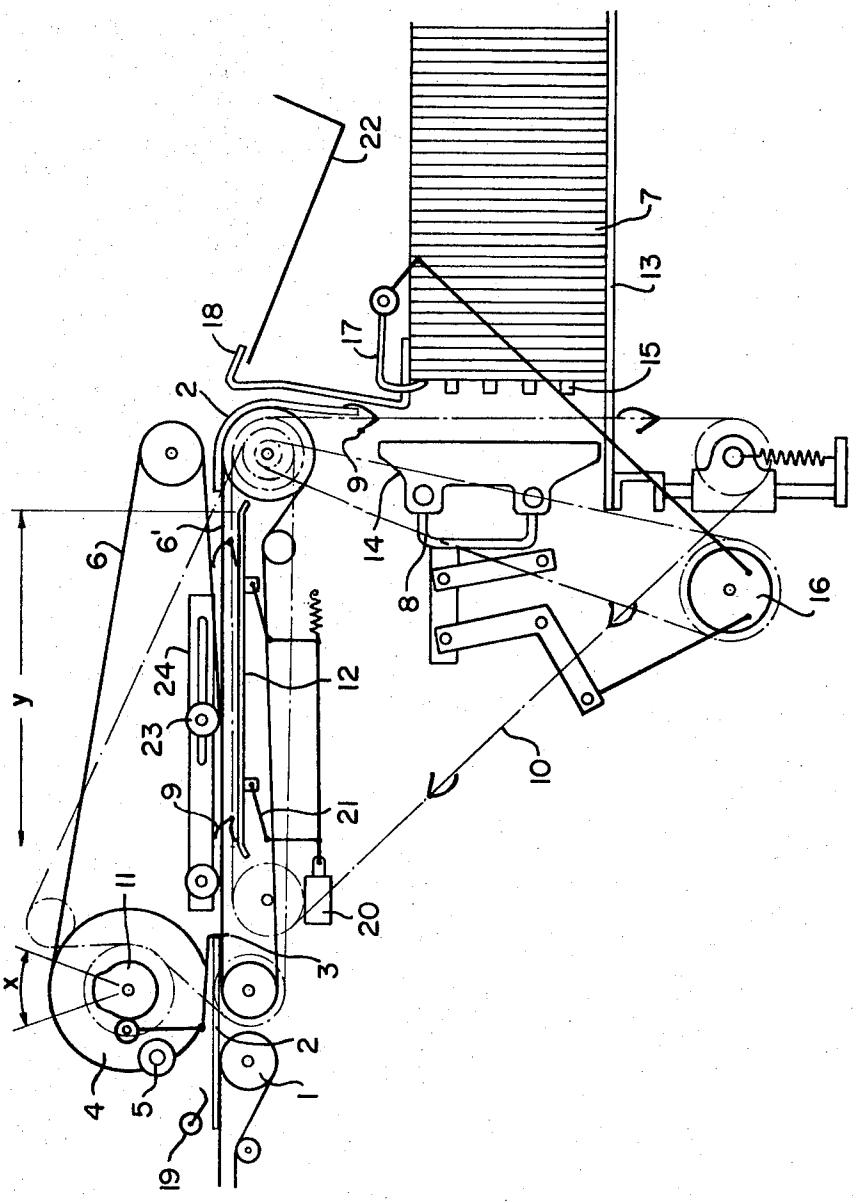
Control system for the conveying of sheets, comprising sheet conveying means defining a sheet conveying path, means in the sheet conveying path for stopping and releasing the sheets with a predetermined periodicity and means for equalizing the distance between consecutive sheets subsequent to the release of the sheets from the sheet stopping and releasing means.

6 Claims, 1 Drawing Figure



PATENTED FEB 13 1973

3,716,227



INVENTOR.
ROLF BÖTTCHER

BY Nolte & Nolte

ATTORNEYS

SHEET CONVEYING DEVICE

This invention relates to a sheet conveying device for connecting an uncadenced machine or device to a following cadenced machine or device for the treatment or processing of sheets, with sheet conveying means arranged between the machines or devices and with a cadence-controlled sheet stopping device stationed therebetween.

The known devices have a cadence-controlled sheet stopping device arranged between the machines or devices, which blocks the sheet feeding path and opens it in the cadence of the subsequent machine or device. Preferably the sheet stopping device is controlled by a revolving cam plate, and the angle of rotation of the cam plate corresponding to the sheet release time, i.e., the time during which the sheet opening device permits passage of a sheet, is about 75°. Although this period of time is relatively short, it is nevertheless possible that one sheet pass at the beginning of the opening of the sheet stopping device and a second sheet, that is, the sheet intended for the next work cadence, pass the sheet stopping device shortly before the closing thereof. In the cadenced delivery stream, therefore, a scatter, i.e., a deviation, may occur which may have an adverse effect on the subsequent treatment or processing of the sheets.

The purpose of the invention is to compensate such deviations in the cadenced sheet delivery.

It is an object of the invention to provide an apparatus such as according to my copending application Ser. No. 113,466, filed on even date herewith and entitled "Method and Apparatus for Connecting an Uncadenced Apparatus to a Following Cadenced Apparatus for the Handling of Sheets," which permits connecting an uncadenced machine or device to a cadenced machine or device for the treatment or processing of sheets and excludes the feeding of two sheets during one cadence release, with means eliminating the scatter.

According to the invention, stationary or running abutment members, known in themselves, working staggered in time relative to the sheet release of the sheet stopping device, are coorelated to the sheet conveying means located after the sheet stopping device. The members may be in the form of endless gripper chains having articulated grippers, moving more slowly than the sheet conveying means and correlated with the rhythm of the following machine.

It is expedient to arrange below the upper track of the gripper chains opener rails, which in turn are lowerable by solenoid means actuated by a feeler element located in the sheet conveyor track. Alternatively, it is possible to initiate the lowering of the opener rails by a hand switch.

By this invention a complete compensation of the scatter is achieved. Besides, on subsequent release of each sheet at an abutment, by the pulling off of the grippers from the sheet, a bouncing back of the sheet is avoided. Thus, the device is very suitable for high working speeds.

The invention will now be further described by reference to a specific embodiment as illustrated in the drawing comprising a side elevation partially diagrammatic of the system of the invention.

The sheets **2**, supplied by means of a sheet transport device or conveying means **1** from an upsetting folding machine (not shown), having been brought by a cadence device provided with a sheet stopping and releasing device **3**, in this case a sheet abutment, and cadence disc **4** having a rubber element **5**, into the cadence of a following known stacker **7** having a slide **8**, possess a distribution in time which depends on the curve form of cam plate **11**, in particular on the opening time of the device **3**. In the particular embodiment illustrated, the portion of the cam plate **11** of angular dimension *x* opens the sheet stopping device **3**. The sheets **2**, released by the device **3** with a predetermined periodicity, are conveyed at the speed of the cadence disc **4**, which is equal to the speed of sheet conveying means **6**, **6'**. A pair of gripper chains **10**, running parallel and at the same level and equipped with spring-loaded grippers **9** shown diagramatically in the FIGURE, run more slowly than the sheet conveying means **6**, **6'**, namely so that to each cadence of the cadence discs **4** there is correlated a pair of grippers **9**. These grippers are open on the upper part of their path as clearly seen in the FIGURE along the conveying path, where they cooperate with the sheet conveying means **6**, **6'**. For holding open the grippers **9** there are arranged below the gripper chains **10** opener rails **12**. The sheets **2** are inserted into the opened grippers **9**, transfer distance *y* being so dimensioned that the individual sheets catch up with the grippers **9** in the distance *y*.

Alternatively, the gripper chains **10** provided with grippers **9** may be substituted by, in a manner not shown in the drawing, stationary abutments, controlled up and down, working staggered in time with the sheet release of the sheet stopping device. It will be appreciated that in any event this portion of the system comprises means for equalizing the distance between consecutive sheets subsequent to the release of the sheets from the sheet stopping and releasing means.

The grippers **9** convey the sheets **2** in vertical position against the table rails **13**, by which the sheets **2** are pulled out of the grippers **9** which are then biased to a completely closed position as seen in the FIGURE in and following the lower part of the vertical leg of the chain path. Known pushing element **14** and lateral dogs **15** serve for stacking. The falling back of especially large sheets is prevented by retaining finger **17** controlled by eccentric **16**. Guide rod **18** serves to guide the sheets.

Feeler element **19** arranged in the sheet conveying path monitors the sheets, and when a defective sheet occurs, feeler element **19** lowers the opener rails **12** by a solenoid **20** and a rod system **21**, so that such a sheet is not gripped by the grippers **9** but drops onto a catch plate **22** by way of the guide rod **18**. The same arrangement, but provided with a manual switch or with an automatic safety switch (not shown) instead of the feeler element **19**, serves to remove sample sheets or to take up additional arriving sheets upon stoppages in the stacking system.

Belt roll **23**, adjustably displaceable in supporting rod **24**, limits the range of action of the sheet conveying means **6**, **6'** as desired; beyond the belt roll **23** the sheets **2** are not advanced by the conveying means **6**, **6'**.

While the invention has been described with reference to certain preferred embodiments thereof, it

is to be understood that these are not intended to limit the scope of the invention as defined by the appended claims.

What is claimed is:

1. Control system for transporting consecutive sheets to a subsequent sheet receiving means, such subsequent means being timed for receiving the consecutive sheets with a predetermined periodicity, comprising sheet conveying means defining a sheet conveying path, means spaced from and, when operative, extending into and out of the sheet conveying path at the upstream end thereof for initially stopping and then releasing the sheets to travel along the path, said stopping and releasing means including means for timing the stopping and releasing of sheets with a predetermined periodicity corresponding to the predetermined periodicity of the subsequent sheet receiving means and means downstream of said stopping and releasing means traveling, when operating, in the conveying path and parallel to said conveying means and having means for receiving and equally spacing the leading and trailing edges of consecutive sheets released from the sheet stopping and releasing means.

2. Control system according to claim 1, in which said equalizing means comprises an endless chain carrying equidistantly spaced gripper elements parallel to but at a slower speed than the sheet conveying means and means are provided for opening the gripper elements to receive the sheets from the conveying means and for closing the gripper elements upon the received sheets.

3. Control system according to claim 2, further comprising means in said conveying path for detecting a defective sheet and means for inactivating said gripper opening means in response to said detecting means thereby to prevent receipt by the gripper elements of the defective sheet.

4. Control system according to claim 2 wherein said equidistantly spaced gripper elements are spring loaded and the means for opening the gripper elements comprises rail means engageably aligned with said gripper elements for acting against the spring force holding the gripper elements closed and for opening the same.

5. Control system for transporting consecutive sheets delivered thereto in untimed relationship, comprising, sheet conveying means defining a sheet conveying path, means spaced from and, when operative, extending into and out of the sheet conveying path at the upstream end thereof for initially stopping and then releasing the sheets to travel along the path, said stopping and releasing means including means for timing the stopping and releasing of the sheets with a predetermined periodicity, means downstream of said stopping and releasing means travelling, when operating, in the conveying path and parallel to said conveying means and having means for receiving and equally spacing the leading and trailing edges of consecutive sheets released from the sheet stopping and releasing means, and means for receiving the spaced sheets consecutively with a periodicity corresponding to the periodicity of said stopping and releasing means.

6. Control system of claim 3, wherein said gripper opening means comprise rail means aligned with said gripper elements for engaging and opening the same, said rail means being movable from the aligned position, said means for inactivating said gripper opening means comprising magnetic means for moving said rail means from the aligned position and means are provided for linking said magnetic means to said rail means.

* * * * *