May 30, 1967 R. G. WAMPACH ET AL 3,322,258

CARD TRANSPORTING AND STACKING APPARATUS

Filed Sept. 23, 1964

2 Sheets-Sheet 1

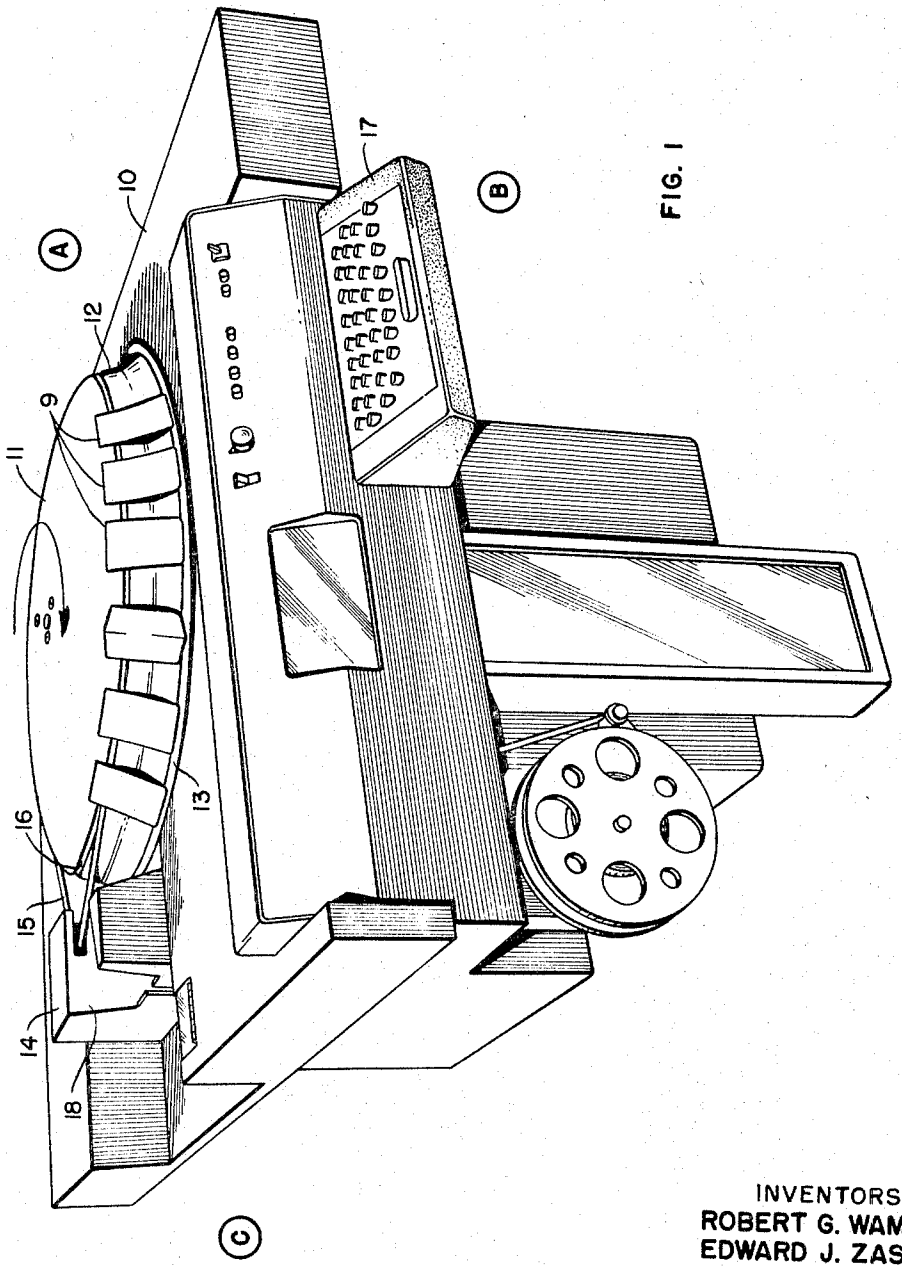


FIG. 1

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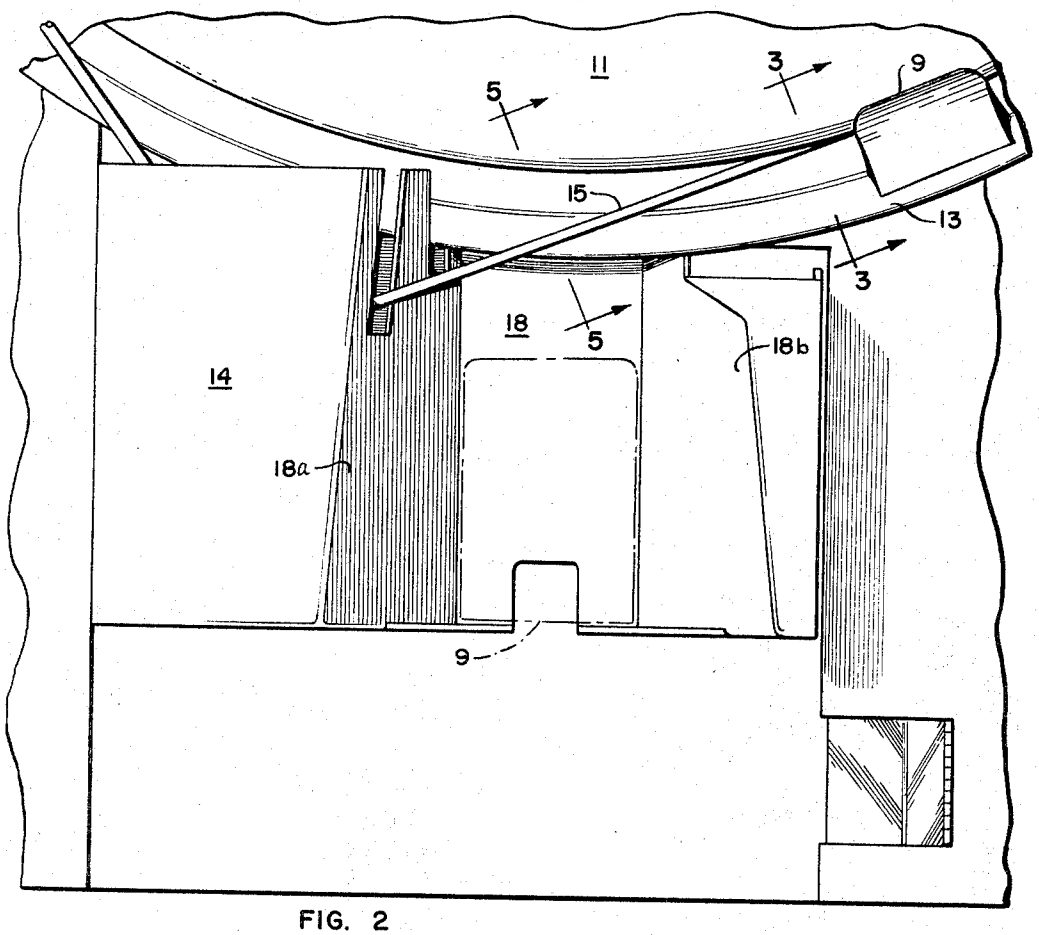


FIG. 2

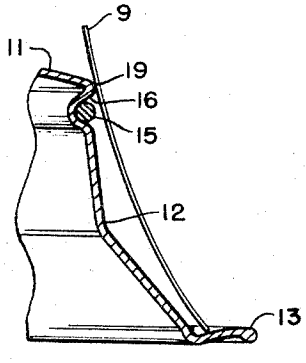


FIG. 3

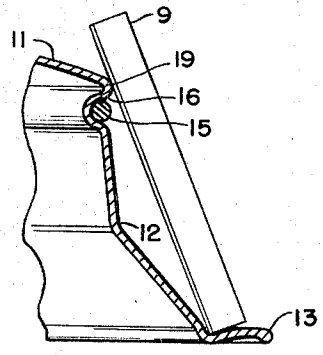


FIG. 4

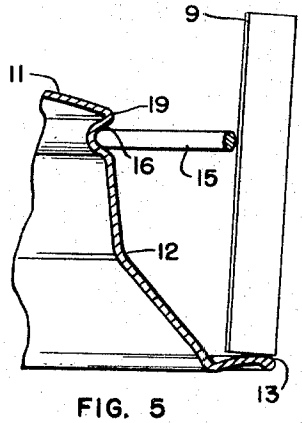


FIG. 5

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3,322,258

CARD TRANSPORTING AND STACKING APPARATUS

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3 Claims. (Cl. 198—209)

This invention relates to conveying apparatus and more particularly to a rotary conveyor for transporting and stacking flexible cards.

In some special applications, such as in a stock or commodity exchange, a need arises for transporting flexible cards past an operator, who copies the information carried by the cards on a telegraph keyboard, after which the cards must be stacked in the same sequence in which they passed the operator for a subsequent comparison of the information on the cards with the information transmitted by the telegraph apparatus. A special problem arises in the conveying and stacking of these cards since they normally are made of relatively flexible paper of the order of 16 to 20 pound bond. Due to the manner in which the cards are handled, they may be slightly curled or may be creased vertically so that the conveying and stacking apparatus must be able to handle both types of cards, that is, curled or creased, without the cards falling off the conveyor or being stacked improperly. At the same time, the cards must be fully visible to the keyboard operator as they pass her position.

Accordingly, it is an object of this invention to transport and stack flexible data cards.

It is a further object of this invention to use a single means to drive a rotary conveyor and to strip and stack flexible data cards carried by the conveyor.

It is another object of this invention in a rotary conveyor to transport and stack flexible data cards irrespective of whether the cards are slightly curled about a horizontal axis or are creased vertically.

In a preferred embodiment of the invention, the card transporting and stacking mechanism includes a turntable or rotary conveyor drum which is rotated about a vertical axis at approximately one to four revolutions per minute by means of a drive belt driven through a drive pulley located outside the turntable. A groove for the belt is provided near the upper edge of the rim of the turntable, and the drive belt strips the cards from the turntable at a predetermined position established by the location of the drive pulley. At this position, the belt tilts the cards forward causing them to be stacked on their faces in the sequence in which they were carried by the turntable. The rim of the turntable has a concave cross-sectional configuration so that slightly curled cards will not fall off, and a lip or flange having a convex upper surface extends radially from the lower rim edge of the turntable to support the bottom of the cards. The convex upper surface of the lip prevents vertically creased cards from tipping over, especially during the stacking operation.

Other objects and features of this invention will be apparent to those skilled in the art upon consideration of the following detailed specification taken in conjunction with the drawings in which:

FIG. 1 is a general view of the card transporting and stacking mechanism mounted on an operator's table;

FIG. 2 is a top view of a portion of the device shown in FIG. 1, and

FIGS. 3, 4 and 5 show cross-sectional views of a portion of the conveyor drum or tuntable with horizontally curled and vertically creased cards being carried thereon.

Throughout the drawings the same reference numbers are used to designate the same elements.

Referring now to FIG. 1 the card transporting and stacking mechanism of this invention is shown mounted on an operator's table **10** of the type utilized in a preferred application of the invention. When orders are taken on the trading floor of an exchange they are written on a slip of paper or a card approximately 3 x 5″ in size made of approximately 16 to 20 pound bond. The cards then are rolled up and transported to the operator's table **10** in a market quotation transmitting center by way of pneumatic tubes. The slips are removed from the pneumatic tubes by an operator designated as a "loader" who stands behind the table **10** at the position designated A. The "loader" unrolls the cards and places them on a turntable or rotary conveyor drum **11** having an outer rim **12** with a lower lip or flange **13** for supporting the cards **9**. The turntable **11** is rotated in the direction of the arrow at approximately one to four revolutions per minute by means of a pulley and drive motor located in a housing **14**. The necessary driving force is applied to the turntable **11** through a drive belt **15** which rides in a groove **16** located near the upper edge of the rim **12** of the turntable **11**.

After the cards **9** have been placed on the turntable **11** by the "loader" at position A, they are slowly rotated by the turntable **11** past the operator's position B where the operator keyboards the information from the cards **9** into a punched paper tape on a keyboard **17**. The operation of the telegraph apparatus for the transmission of the information keyboarded by the operator at position B forms no part of this invention and will not be further discussed. From position B the cards **9** continue to be carried by the revolving turntable **11** to a position C where the belt **15** tips the upper edges of the cards **9** forward causing the cards to pivot on the flange **13** which supports their lower edges. The cards then fall face down into a storage bin **18** where they are stacked in their proper sequence for subsequent utilization by an operator at position C in checking the information transmitted by the telegraph apparatus.

FIG. 2 shows in greater detail the relative positions of the turntable **11** and the drive belt **15** which causes the cards **9** to be tipped and stacked into the storage bin **18**. It may be seen in FIG. 2 that the belt **15** extends radially beyond the outer edge of the lower lip or flange **13** as it enters the motor housing **14**. As the belt enters into the housing **14**, it contacts the cards **9** above their center of gravity and causes them to be stripped from the turntable **11** and tipped forward until the cards finally fall on their faces into the bin **18** as indicated by the dotted lines in FIG. 2.

The sides of the bin **18** are not vertical but are approximately the same width as the cards **9** at the bottom and flair outwardly so that the top of the bin **18** is approximately twice as wide as its base. These tapered sides cause the cards **9** to be stacked properly whether the turntable **11** is revolving rapidly or slowly. When the turntable **11** revolves at its maximum speed, the momentum of the cards **9** causes them to be carried against the wall **18***a* of the bin **18**. As stated previously, the stripping and tipping action of the belt **15** causes these cards to be tipped forward; and the angle of the side **18***a* then causes the cards **9** to slide down that side to be stacked in the proper face down position. On the other hand, if the turntable **11** is revolving at its lowest speed, the cards **9**, as they are stripped off and tipped forward, fall near the side **18***b* and the angle of that side guides the cards to cause them to be stacked properly at the bottom of the bin **18**.

As stated previously, because of the flexible nature of the cards **9** coupled with the fact that the cards may be either slightly rolled along a horizontal axis or may have

sharp vertical creases placed in them by the "loader," the rim **12** and lip **13** of the turntable **11** must be designed to transport properly such cards as well as cards which are not rolled or creased. FIGS. 3, 4 and 5 show cross-sections of the turntable **11** at the rim **12**, with FIGS. 3 and 4 being cross-sectional views taken along the line **3—3** in FIG. 2 and with FIG. 5 being a cross-sectional view taken along the line **5—5** in FIG. 2.

FIG. 3 shows the turntable **11** carrying a card **9** which is slightly rolled about a horizontal axis. As may be seen in FIG. 3 the lower edge of the card rests on the upper convex surface of the lip or flange **13** with the upper edge of the card being carried by a ridge **19** formed just above the groove **16** in which the belt **15** rides. In order to prevent such slightly rolled cards as that shown in FIG. 3 from pitching forward off of the turntable **11**, the cross-section of the rim **12** is made concave to a greater amount than the concave shape likely to be imparted to a slightly rolled card **9**. As a consequence, the card **9** is supported only by the lower lip or flange **13** and the ridge **19** until the card is stripped from the turntable at the desired position over the bin **18**.

It should be noted that if the rim **12** did not have such a concave cross-section but instead had a straight or linear cross-section, the middle portion of a slightly rolled card **9** possibly would rest against the rim **12** at or below its center of gravity causing the card to be carried in an unstable manner; so that it very likely would be pitched or thrown off of the turntable prior to the time of reaching the bin **18**. The concave cross-sectional configuration of the rim **12** eliminates such a possibility.

In order to overcome the natural tendency for the cards **9** to remain rolled after their removal from the pneumatic tube, the "loader" often imparts a slight vertical crease to the cards prior to placing them on the turntable **11**. Such a vertically creased card **9** is shown in FIG. 4, which in all other respects is identical to FIG. 3. If the lower lip or flange **13** were flat, such a vertically creased card **9** might tend to ride on the lower lip **13** resting only on the point formed in the card by the crease. As a consequence, such a vertically creased card would tend to be quite unstable and would be very likely to tip over, especially at the time that the belt **15** strips the cards from the turntable **11** and tips them forward over the bin **18**. By constructing the upper surface of the lip **13** in a beveled or convex cross-sectional configuration, the vertically creased cards **9** always rest on two points of support, one on either side of the vertical crease formed in the card (see FIG. 4). Thus, the cards **9** are supported in a stable manner; and there is less likelihood that they will tip over as they are transported past the operator's position B (FIG. 1).

When such a vertically creased card **9** is transported by the turntable **11** to the card stacking position C (FIG. 1), the belt **15** causes the cards to be stripped and tipped forward into the bin **18** as shown in FIG. 5. The convex lip **13** continues to support the vertically creased cards **9** at two points on either side of the crease at all times until the card is dumped forward on its face into the bin **18**. If a flat surface were used for the lip **13**, a vertically creased card **9** would be tipped forward on the point formed by the crease and most likely would tip over sideways causing it to fall into the bin **18** in the wrong position.

It should be noted that the belt **15** used in the preferred embodiment of this invention performs two functions, namely, it transmits the driving power from a motor in the housing **14** to the turntable **11** to rotate the turntable at the desired speed; and it also is used to strip and tip the cards **9** forward to stack them in the bin **18**. The card transporting and stacking mechanism of this invention is a simple, reliable and inexpensive conveyor system particularly suitable for conveying and stacking flexible cards.

Although the invention has been described in conjunction with a single preferred embodiment thereof, it is not to be considered limited to the embodiment chosen for purposes of disclosure, but covers all changes and modifications which may be made in the structure of the apparatus to fit various design requirements without departing from the true spirit and scope of the invention.

What is claimed is:

1. A rotary card transporting and stacking device including:

a rotary conveyor drum;

a lower support member mounted on the conveyor drum and including means for supporting the bottom of a card and for preventing the bottom of the card from slipping inwardly toward the center of the conveyor drum;

an upper support member positioned above and at a lesser distance from the center of the conveyor drum than the lower support member for preventing cards supported on the lower support member from falling inwardly toward the center of the conveyor drum;

an endless belt carried by the conveyor drum; and

means for causing the belt to extend outwardly from the drum along a chord of the circle formed by the outer periphery of the lower support member so that a card carried on the lower support member is rotated about its bottom surface away from the upper support member to a point at which the center of gravity of the card is farther from the center of the conveyor drum than the lower support member causing the card to fall off the lower support member under the action of gravity.

2. A device according to claim **1** where the lower support member is a flange having an upper surface of substantially convex cross-section.

3. A device according to claim **1** wherein the periphery of the conveyor drum between the upper and lower support members is of substantially concave cross-section.

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