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STACKING DEVICE

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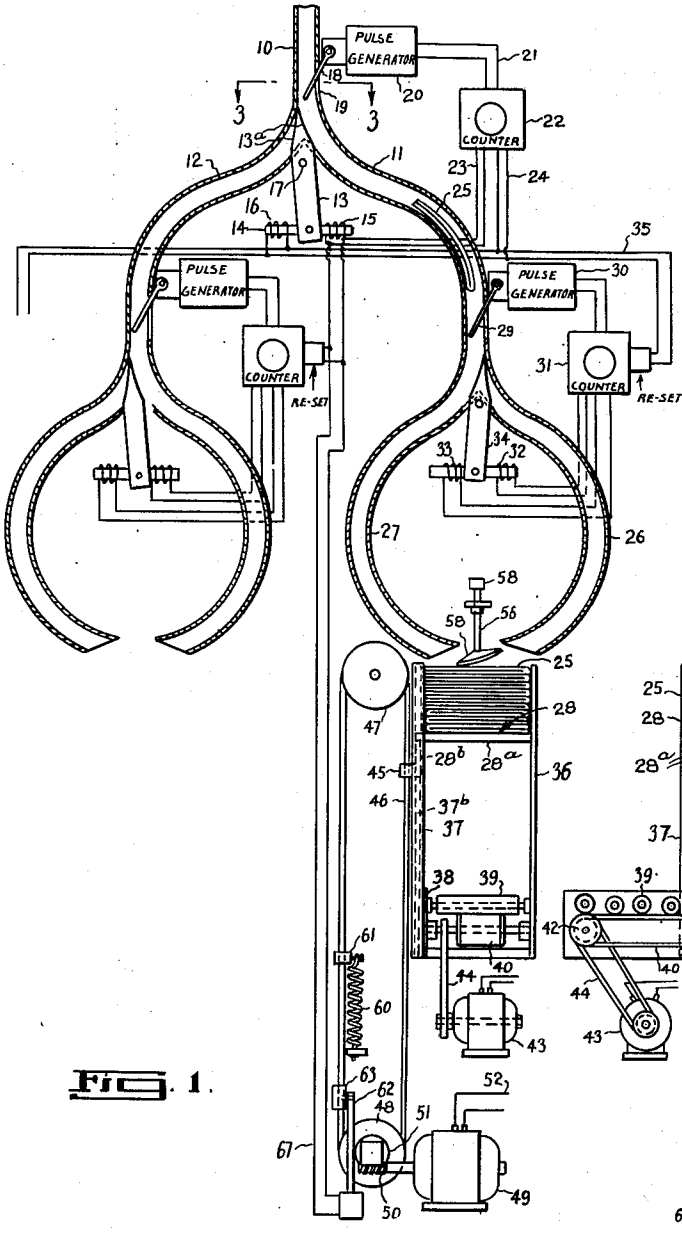


Fig. 1.

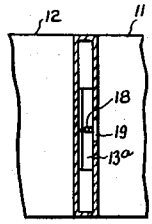


Fig. 3.

Fig 2

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STACKING DEVICE

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This invention relates to a device for delivering articles to a support, and more particularly to a stacking device for newspapers and the like.

Newspapers coming from a press, conveyor, or feeder normally are all folded in the same direction. If they are stacked one above the other with their folded edges at one side of the stack, the top of the stack is not level because the papers are thicker along their folded edges, and the newspapers at the top of the stack tend to slide off. It is therefore desirable to stack newspapers in groups, alternate groups having their folded edges at opposite sides of the stack. It has been proposed to direct the newspapers onto a table which, after a predetermined number of newspapers have been stacked on it, is rotated through 180 degrees so that the newspapers on the table will be folded in an opposite direction to those which are subsequently added. This has the disadvantage that the flow of newspapers must be stopped while the table is being reversed, and it is therefore not feasible to alternate the newspapers in small groups.

It is therefore an object of this invention to construct a stacking device which will receive a continuous flow of newspapers and reverse their folds as it stacks them.

It is a further object of this invention to construct a device for arranging newspapers in stacks comprised of a predetermined number of newspapers folded in one direction and a predetermined number folded in the opposite direction, with any group having a lesser number of newspapers placed at the top of the stack.

According to this invention, these objects may be achieved by a device comprising a pair of conveyors which have adjacent entrances to which newspapers or other articles are delivered. A diverter is placed near the entrances and may be actuated or moved to direct the articles to one or other of the conveyors. The conveyors have individual discharge exits for the articles, and the conveyors converge towards their discharge exits so that they are oriented differently with respect to the support to which the articles are to be delivered, and articles from one conveyor are delivered to the support from a different direction than articles from the other conveyor. Thus, newspapers travelling fold first along one conveyor land on the support with their folds in one direction, and newspapers travelling fold first along the other conveyor land on the support with their folds in another direction.

In order that predetermined numbers of newspapers may be placed in different stacks on different supports without interrupting the flow of

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newspapers, a pair of main conveyors may be provided, the main conveyors having adjacent entrances, and each main conveyor feeding a pair of branch conveyors. The discharge exits of each pair of branch conveyors are oriented differently with respect to a support, as described in the preceding paragraph. A primary diverter is placed near the entrances to the main conveyors, and secondary diverters are provided for the branch conveyors. The primary diverter is actuated or moved by a primary article counter, and the secondary diverters are likewise actuated by secondary counters, so that predetermined numbers of articles are directed to each of the conveyors. Each secondary counter has re-set means operating upon movement of the primary diverter. Mechanisms associated with each support comprise unloading means and suitable control means which co-ordinate unloading operations with movements of the primary diverter.

In drawings which illustrate diagrammatically one embodiment of this invention in which the conveyors are in the form of chutes, and in which like reference numerals indicate corresponding parts in the several views:

Fig. 1 is a front elevation, partly in section, of a device constructed in accordance with this invention for stacking newspapers, only one support and its associated mechanisms being shown;

Fig. 2 is a side elevation, partly in section, of a support and its associated mechanisms; and

Fig. 3 is a section taken along line 3—3 in Fig. 1.

The device shown in Fig. 1 has an entrance chute 10. Two main chutes 11 and 12 diverge from entrances in chute 10 to the right and to the left respectively. As shown in Fig. 3, the chutes in cross section have a long dimension and a short dimension and are large enough so that a newspaper or the like will slide easily in them with its folded edge downward. The pointed end of a primary diverter 13 extends into the entrance chute 10. The point of the diverter has flat faces 13a as shown in plan in Fig. 3. The other end of the primary diverter carries a cross rod 14 of magnetic material which extends into solenoids 15 and 16 on either side of the diverter. The diverter is pivoted between its ends on a shaft 17 and is thus movable to the right and to the left in the entrance chute 10.

Above the primary diverter, one end of a trip 18 extends into the entrance chute 10 through a slot 19. The other end of the trip 18 is operatively mounted on an electric pulse generator 20, and the pulse generator 20 is electrically connected by wiring 21 to a primary counter 22. Counter 22 contains a relay having a double

throw switch (not shown) to connect the counter through wiring 23 or 24 to solenoids 15 or 16 respectively. In the position shown, counter 22 is connected to solenoid 15, and solenoid 15 is thereby energized and moves the point of the primary diverter to the left. The pulse generator and counter may be of any standard type and will not be described in detail.

Newspapers 25, coming in a stream, one after the other, with their folds down, enter the entrance chute 10 from a press, conveyor or feeder. Each newspaper moves trip 18 and, for the position shown, is then diverted into main chute 11 by diverter 13. Trip 18 operates pulse generator 20 which sends a pulse to primary counter 22, stepping the counter ahead one count. When a predetermined count is reached, the relay in the counter disconnects solenoid 15 and connects solenoid 16, which moves the point of the diverter to the right. Subsequent papers are diverted into main chute 12 until a second predetermined count is reached, at which time solenoid 16 is disconnected and solenoid 15 re-energized. The process continues so that predetermined numbers of papers are alternately diverted, in groups, into each main chute.

The predetermined count may be set in any conventional way, and may be a fixed setting, a count set by an operator from a keyboard, or a count set automatically, for each group of newspapers, from a punch card system.

Main chute 11 is divided into two branches 26 and 27 which diverge to the right and to the left respectively from the main chute, and then converge at their lower ends so as to be differently oriented with respect to a support which is generally indicated by reference numeral 28. A trip 29 extends into main chute 11 and operates pulse generator 30 which sends pulses to a secondary counter 31. Secondary counter 31 alternately energizes solenoids 32 and 33 which move the point of a secondary diverter 34 to the left or to the right respectively, in order to direct newspapers selectively into either the right or the left branch chute.

Various predetermined settings are possible for the secondary counter 31, but normally the setting would be such as to direct consecutive groups of say five newspapers alternately into branch chutes 26 and 27.

All newspapers originally enter the chutes with their folds down, and they therefore emerge fold first from chutes 26 and 27, successive papers landing one on top of another to form a stack on support 28. Since the newspapers in chutes 26 and 27 are directed from different directions onto support 28, the newspapers which pass through chute 26 are oriented differently in the stack than those which pass through chute 27, and alternate groups are readily identified for counting by newsboys.

The primary counter and diverter determine the number of newspapers in each stack, and the secondary counter and diverter determine the arrangement of the newspapers in the stack. When the predetermined number of newspapers for a stack on support 28 has been directed down main chute 11, the point of primary diverter 13 is moved to the right. As will be described in more detail hereafter, the stack on support 28 is then removed from the support so that a new stack may be placed on the support when the point of primary diverter 13 is again moved to the left. It is desirable that in each stack the differently oriented groups be laid in regular order from the bottom of the stack, and that all or any odd newspapers be placed at the top of the stack. Consequently, it is necessary to re-set counter 31 to zero after each stack is formed, regardless of how many newspapers were in that stack. To this end, counter 31 is provided with a re-set means of any conventional construction, and this re-set means is connected in parallel with solenoid 14 by wiring 35. The re-set means is thus operated upon actuation by primary counter 22 of solenoid 14 to move the point of the diverter to the right.

For stacking and unloading it is convenient to have support 28 movable vertically in a shaft. In the embodiment shown, one side of the shaft is a wall 36 (which is broken away in Fig. 2), and the shaft has a pair of corner-posts, 37 secured together at their upper ends by a tie rod 37*a*. The posts have channels or guides 37*b* which face each other and extend lengthwise of the posts. The shaft has a short wall 38 which has a number of notches along its upper edge. Walls 33 and 38 extend beyond the shaft, and supported between them on suitable bearings are a plurality of rollers 39. These rollers are driven continuously by a belt 40 mounted on pulleys 41 and 42, the latter being driven by a motor 43 through a belt 44.

Support 28 comprises forks 28*a* rigidly attached to a supporting plate 28*b* which is adapted to slide vertically in the guides 34*a* and 35*a*. A clasp 45 secures plate 28*b* to a chain 46 mounted on pulleys 47 and 48. A motor 49 is coupled to the support through a worm gear 50, a clutch 51, the pulleys 47 and 48, and the chain 46. The motor 49 is electrically connected through wiring 52 and a switch 53 to suitable supply mains. When motor 49 is coupled to the support 28 but disconnected from the supply mains, the support is locked in a stationary position by the worm gear 50.

Also connected to the supply mains by wiring 54 is a motor 55 which continuously drives a vertically disposed shaft 56 through belting 57. Shaft 56 has bearings 58 and 59 in which it is free to translate vertically. In its lowest position it holds switch 53 open and thereby disconnects motor 49 from the supply mains so that support 28 is stationary. Shaft 56 carries a spiral vane 58 which revolves over the stack of papers 25 on support 28. As more papers are added to the stack, the shaft is moved upwardly, switch 53 is closed, and motor 49 drives support 28 downwardly until the level of the top of the stack is lowered sufficiently for shaft 56 to re-open switch 53. In this way the elevation of the top of the stack is maintained substantially constant.

When the support 28 is to be unloaded, clutch 51 is disengaged, by means described hereinafter, and the weight of the stack of newspapers causes support 28 to fall until forks 28*a* rest in the notches in wall 38, as shown in phantom in Fig. 2. The stack of newspapers is then rolled off the forks by rollers 39. On moving down, support 28 causes chain 46 to stretch a spring 60 which is fastened to the chain by a clamp 61, and when the newspapers are removed from the support by the rollers 39, the support is sufficiently light in weight for spring 60 to pull it back up to the top of the shaft where it is ready to receive a new stack of newspapers.

The unloading operation for support 28 should take place when newspapers are being directed into main chute 12, and consequently means must

be provided for disengaging and engaging clutch 51 to co-ordinate unloading operations with movements of the primary diverter 13. In the embodiment shown, an arm 62 is pivotally mounted at one end to a fixed support 63, and is connected near its middle to one part of clutch 51 and at its other end to an armature 64 which is movable in a solenoid 65. A spring 66 is connected to the armature and tends to pull it out of the solenoid. Solenoid 65 is connected in parallel with solenoid 15 by wiring 67, and is therefore energized when the point of primary diverter 13 is moved to the left. When the point of the primary diverter is moved to the right, solenoid 65 is de-energized, spring 66 pulls armature 64 out of the solenoid, and arm 62 disengages clutch 51.

The operation and construction of only the right-hand side of the stacking device have been fully illustrated and described herein. It will be understood that the left-hand side of the device is exactly similar in construction and operation, and is co-ordinated in a similar way, so that a stack is being formed on the left-hand side while a stack is being unloaded on the right-hand side, and conversely a stack is being unloaded on the left-hand side while one is being formed on the right-hand side. The operation is continuous and the flow of newspapers need never be stopped.

It will further be understood that this invention is not limited to a device for stacking newspapers and the like, but can be adapted to direct a stream of any kind of articles onto a support in such a way that different articles are oriented differently on the support. Also, other types of conveyors, such as belt or roller conveyors, may be arranged in a similar way to that in which the chutes are arranged, in order to achieve the same result.

It is thought that the construction and use of the invention will be apparent from the above description of the various parts and their purpose. It is to be understood that the form of the invention herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, as defined in the subjoined claims.

What I claim as my invention is:

1. A device for stacking newspapers and the like, comprising a pair of supports, a pair of main chutes having adjacent entrances, newspaper directing means comprising a primary diverter movable at the entrances to direct newspapers selectively into each main chute, each main chute having a pair of branch chutes diverging at their upper ends from the main chute and converging at their lower ends towards a support so that they approach the support from substantially opposite directions for delivering newspapers to the support, a secondary diverter for each pair of branch chutes, and unloading means coupled to the newspaper directing means and actuated thereby to remove the newspapers from one support while newspapers are being directed onto the other support.

2. A device for stacking newspapers and the like on a support, comprising a pair of chutes having at their upper ends adjacent entrances for the reception of a stream of similarly oriented newspapers, the chutes diverging downwardly from their upper ends and converging at their lower ends towards the support so that they approach the support from substantially opposite directions for delivering the newspapers to the support, the newspapers from one chute thus being oriented on the support in the opposite direction to the newspapers from the other chute, and a diverter located adjacent the entrances for directing newspapers selectively into each chute.

3. A device for stacking newspapers and the like on a support, comprising a pair of conveyors having adjacent entrances for the reception of a stream of similarly oriented newspapers and spaced apart exits approaching the support from substantially opposite directions for delivering the newspapers to the support so that the newspapers delivered from one conveyor are oriented on the support in the opposite direction to the newspapers delivered from the other conveyor, and a diverter located adjacent the entrances for directing newspapers selectively to each conveyor.

4. A device for delivering articles to a pair of supports, comprising a pair of main conveyors having adjacent entrances for the reception of articles, primary article directing means comprising a primary article counter and a primary diverter actuated by the primary counter and located adjacent the entrances to direct predetermined numbers of articles to each main conveyor, a pair of branch conveyors for each main conveyor, each pair of branch conveyors having adjacent entrances for receiving articles from one of the main conveyors and individual exits for discharging the articles to a support, a secondary counter and a secondary diverter for each pair of branch conveyors for directing predetermined numbers of articles to each branch conveyor, and re-set means for each secondary counter coupled to the primary article directing means, the re-set means being operable by the primary article directing means upon actuation by the primary counter of the primary diverter.

5. A device for stacking newspapers and the like, comprising a pair of main conveyors having adjacent entrances for the reception of a stream of similarly oriented newspapers, primary newspaper directing means comprising a primary newspaper counter and a primary diverter actuated by the primary counter and located adjacent the entrances to direct predetermined numbers of newspapers to each main conveyor, a pair of branch conveyors for each main conveyor, each pair of branch conveyors having adjacent entrances for receiving newspapers from one of the main conveyors and individual exits for discharging the newspapers onto a support to form a stack, the individual branch conveyors in each pair diverging from their entrances and converging towards their exits so that they approach the support from substantially opposite directions and deliver newspapers onto the stack with opposite orientations, a secondary counter and a secondary diverter for each pair of branch conveyors for directing predetermined numbers of newspapers to each branch conveyor, and re-set means for each secondary counter coupled to the primary newspaper directing means for re-setting the secondary counter upon actuation by the primary counter of the primary diverter.

6. A device for delivering articles to a pair of supports, comprising a pair of main conveyors having adjacent entrances for the reception of articles, a primary article counter, a primary diverter coupled electrically to the primary counter and actuated by the primary counter and located adjacent the entrances to direct pre-

determined numbers of articles to each main conveyor, a pair of branch conveyors for each main conveyor, each pair of branch conveyors having adjacent entrances for receiving articles from one of the main conveyors and individual exits for discharging the articles to a support, a secondary counter and a secondary diverter for each pair of branch conveyors for directing predetermined numbers of articles to each branch conveyor, and re-set means for each secondary counter coupled electrically to the primary counter and actuated by the primary counter when the primary diverter is actuated.

7. A device for stacking newspapers and the like on a support, comprising a pair of chutes having at their upper ends adjacent entrances for the reception of a stream of similarly oriented newspapers, the chutes diverging downwardly from their upper ends and converging at their lower ends towards the support so that they approach the support from substantially opposite directions for delivering the newspapers to the

support, the newspapers from one chute thus being oriented on the support in the opposite direction to the newspapers from the other chute, a newspaper counter, and a counter actuated diverter located adjacent the entrances to direct predetermined numbers of newspapers into each chute.

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