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SWITCHING MECHANISM FOR CONVEYORS

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Fig. 1

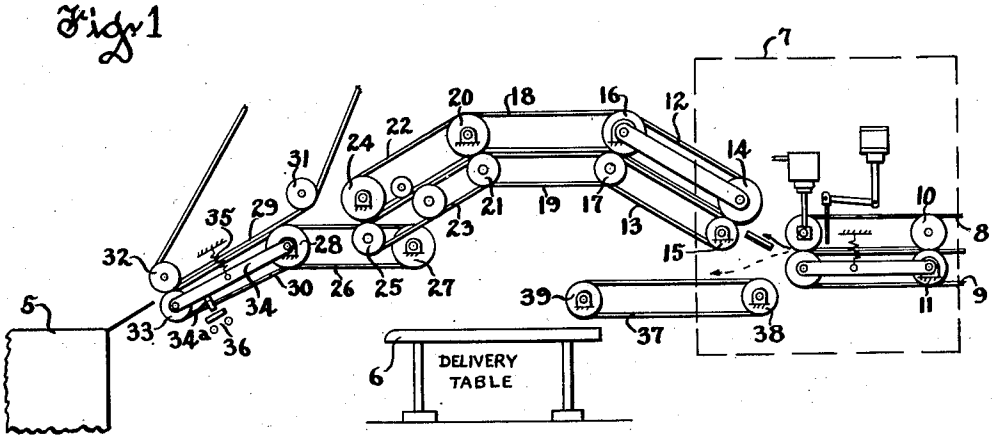
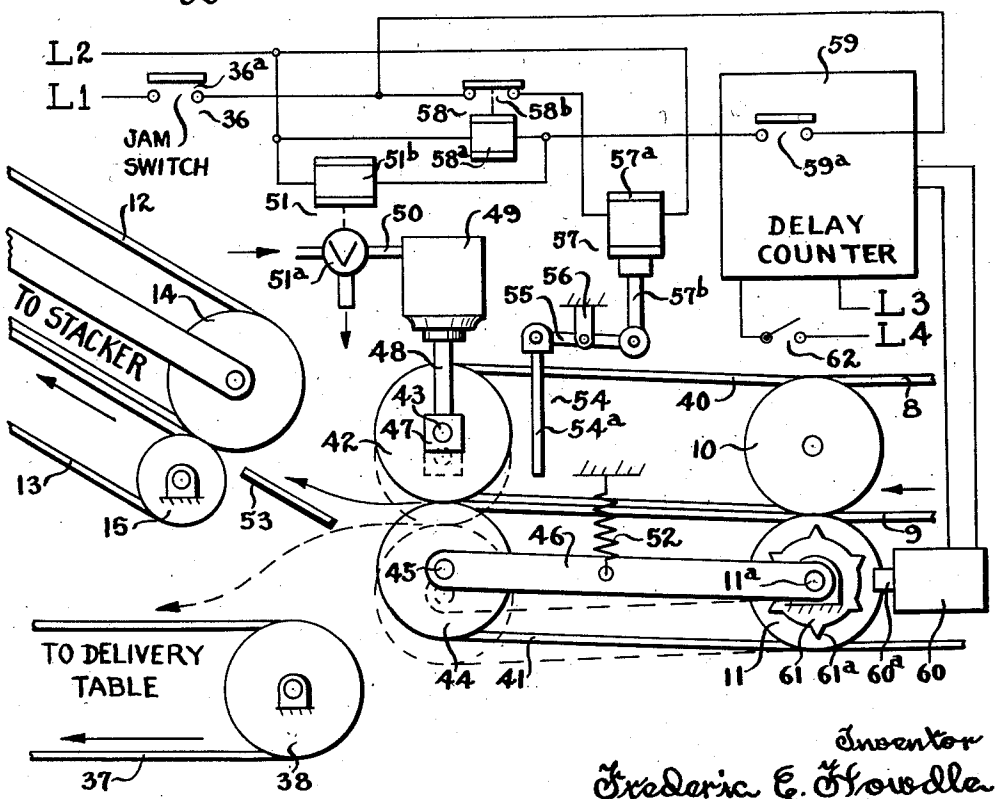


Fig. 2



Inventor
Frederic E. Howdle
By H R Rather
Attorney

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SWITCHING MECHANISM FOR CONVEYORS

Frederic E. Howdle, Milwaukee, Wis., assignor to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

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5 Claims. (Cl. 198—31)

This invention relates to an improved switch mechanism for conveyors.

In large newspaper publishing plants finished papers are commonly delivered from the press folder to mail and delivery rooms in a continuous lapped stream by double wire belt conveyors. Stacking machines, such as that disclosed in the Howdle and Otto application Serial No. 360,674, filed June 10, 1953, are used in some of these mail or delivery rooms to effect stacking of the papers in alined bundles, and these stacking machines are connected to be fed directly from the aforementioned conveyors. While occurrence of jams in these stacking machines is rare, it is desirable in the event of such an occurrence to be able to instantaneously divert the flow of papers to an auxiliary delivery table in a mail or delivery room, without need for shutting down the press and press folder.

It is the object of the present invention to provide an improved switch mechanism for conveyor apparatus which affords switching the flow of a lapped stream of articles, such as newspapers and the like, from one conveyor course to another while the conveyor apparatus and source of articles are in operation.

In carrying out the invention I provide a switch mechanism including a double wire belt type switching section which is shiftable to aline with one or the other of two delivery conveyor courses, a mechanism affording momentary delay in such shifting, until any article therein or just entering the transfer zone between the switching section and a delivery course has cleared such zone, and a mechanism which prevents following articles entering the transfer zone pending the shifting of the delivery section.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates a preferred embodiment of the invention which will now be described in detail, it being understood that the same may be modified in respect of details without departing from the scope of the appended claims.

In the drawings:

Figure 1 is a schematic showing in side elevation of a portion of a conveyor system embodying the improved switch mechanism, and

Fig. 2 is an enlarged view in side elevation of the switch mechanism shown in Fig. 1, together with certain control apparatus therefore.

Referring to Fig. 1, it shows a portion of a stacker designated 5 and an auxiliary delivery table 6, both of which may be assumed to be located in a delivery room. The broken line rectangle 7 generally designates a conveyor switch mechanism which may be considered as being connected to a press folder through the medium of a double belt conveyor circuit comprising belts 8 and 9 running on end pulleys 10 and 11, respectively. An upper delivery course has its entering end within the area of rectangle 7 and comprises upper and lower belts 12 and 13 running on right-hand end pulleys 14 and

15 respectively. Belts 12 and 13 also run on left-hand end pulleys 16 and 17, respectively. Upper and lower belts 18 and 19, forming extension of belts 12 and 13, respectively, run on right-hand end pulleys concentric with pulleys 16 and 17, and on left-hand end pulleys 20 and 21, respectively. Belts 22 and 23 which form extensions of belts 18 and 19, respectively, run on right-hand end pulleys concentric with pulleys 20 and 21 and run on left-hand end pulleys 24 and 25. Belts 26 running on right-hand end pulleys 27 and on left-hand end pulleys 28 transfer articles from belts 22 and 23 to upper and lower belts 29 and 30. A portion of the belts 29 run on pulleys 31 and 32, and the belts 30 run on end pulleys concentric with pulleys 28, and on end pulleys 33 mounted on a shaft which is journaled in the ends of members 34. Members 34 are pivotally supported on the shaft on which the pulleys 28 are mounted. A tension spring 35 urges members 34, and consequently belts 30, toward the belts 29. It will be noted that the pulleys 32 and 33 terminate just to the right of stacker 5. A normally open switch 36 is operable to closed position by an operator 34a fixed to a member 34 when the latter is pivoted sufficiently in the counterclockwise direction as viewed in Fig. 1. Switch 36 constitutes a "jam" detector switch, and as will be hereinafter more fully described controls the operation of the switch mechanism 7.

A belt 37 running on a right-hand end pulley 38 within the area of broken line rectangle 7, and on a left-hand end pulley 39 comprises a lower delivery conveyor course which terminates over the auxiliary delivery table 6.

Referring to Figs. 1 and 2, the improved switch mechanism comprises a switching section having upper belts 40 and lower belts 41. Belts 40 run on right-hand end pulleys concentric with pulleys 10 and on left-hand end pulleys 42 mounted on a shaft 43. The lower belts 41 run on right-hand end pulleys concentric with pulleys 11, and on left-hand end pulleys 44 mounted on a shaft 45 journaled in the ends of members 46. Members 46 are pivotally supported at their other ends on the shaft on which the pulleys 11 are mounted. The shaft 43 is journaled in a bearing block 47 attached to a connecting rod 48, which is connected at its other end to a piston (not shown) which is movable in the air cylinder 49. A spring (not shown) may be assumed to normally bias such piston to an upper extreme position. At its upper end cylinder 49 has a conduit 50 connecting interiorly therewith, and a normally closed, electromagnetically operated valve 51 has its valve body 51a connected in the conduit 50 for control of admission of air under pressure to the cylinder 49 in accordance with the energization of operating coil 51b. Whenever coil 51b is deenergized air will be exhausted from above the piston in cylinder 49, and the aforementioned spring will drive connecting rod 48, and hence shaft 43 and pulley 42, upwardly to the normal position shown in full lines in Fig. 2. A tension spring 52 secured to the member 46 urges the same upwardly to afford following movement of pulleys 44 and belts 41 with respect to pulleys 42 and belts 40, respectively, and such spring 52 aids the aforementioned spring in cylinder 49 in bearing the piston upwardly. Whenever coil 51b is energized, the valve 51 will be operated to admit air under pressure to cylinder 49 to drive connecting rod 48, shaft 43, pulleys 42, and also members 46, pulleys 44 and belts 41 to the lower, broken line positions depicted in Fig. 2.

A glider plate 53 disposed in a stationarily fixed position with its upper surface in line with the belts 13 of the upper conveyor course, and with its right-hand end terminating above an imaginary horizontal line tangent to the contacting points of the pulleys 42 and 44 when in their lowermost broken line position, cooperates with the switching section to direct the stream of papers to the

upper conveyor course when the switching section is in its upper position.

A gate 54, having a plurality of parallel spaced fingers 54a disposed between the belts 40 across the width of the switching section, is pivotally secured along its top edge to one end of a lever 55. Lever 55 is centrally, pivotally supported on a bracket 56, and at its other end has pivotal connection with the armature 57b of an electromagnetic operator 57 which has an operating coil 57a. When coil 57a is deenergized gate 54 assumes the position depicted in the drawing, and when coil 57a is energized, it moves downwardly so that the lower ends of its fingers 54a lie slightly below the lower run of the belts 40 for a purpose that will hereinafter be explained.

The operating coils 51b and 57a of valve 51 and operator 57, respectively are connected in a control circuit which also includes the jam switch 36, a relay 58, a delay counter 59 and an impulse coil 60, which has a toothed wheel 61 associated therewith and fixed on shaft 11a. Electrical power for the control circuit is supplied by lines L1 and L2, coil 57a is connected at one end through normally closed contacts 58b of relay 58 and normally open contacts 36a of switch 36 to line L1 and is connected at its other end to line L2. The operating coils 51b and 58a of valve 51 and relay 58 are connected in parallel and corresponding ends thereof are connected to line L2 and the other corresponding ends are connectable, upon closure of normally open contacts 59a of delay counter 59, to line L1. Main operating electric power is supplied to counter 59 through lines L3 and L4 which may be connected to the same source as line L1 and I2, and a switch 62 which will be closed whenever this system is operating.

Impulse coil 60 is electrically connected to delay counter 59, and it may be assumed that when switch 36 closes delay counter 59 is thereupon "gated" to be responsive to the voltage impulses generated in coil 60 by the passage of each tooth 61a of wheel past its associated core 60a. It may further be assumed that delay counter 59 is thereafter responsive upon receiving a preselected number of impulses from coil 60 to close its contacts 59a to energize coil 51b, of valve 51 and deenergize coil 57a of operator 57.

The operation of the switch mechanism in conjunction with the conveyor apparatus shown in Figs. 1 and 2 will now be described in detail.

Let it be assumed that a continuous stream of newspapers in overlapped, direct delivery relative, with folded edges leading, are being fed to the switch mechanism by belts 8 and 9. With jam switch 36 open, the switching section will assume the upper, normal position depicted in full lines in Fig. 2. Consequently, the leading portion of any papers between pulleys will be disposed above the upper surface of glider plate 53 and thus the leading edges of the papers will engage such upper surface of the plate 54 and be directed between the belts 12 and 13 of the upper delivery conveyor course and will be transported to the stacker 5. In the event a jam should occur in the stacker, the stream adjacent thereto will tend to plug-up and thicken, thus causing arm 34 to be moved downwardly against the bias of spring 35 to close contacts 36a of switch 36. Closure of contacts 36a effects immediate energization of coil 57a to move the gate 54 downwardly so the ends of its fingers 54a engage with the upper surface of the papers. Thus, any paper to the left of, or directly under the ends of the fingers 54a will continue to be moved by the belts 40 and 41 to the left, while all following papers will be prevented from advancing farther. The lap-lead of the latter papers (i. e., distance between the leading edge of one paper and the leading edge of the immediately following paper), will tend to be decreased, but such condition is momentary.

Closure of switch 36a "gates" delay counter 59 to be responsive to the impulses generated in coil 60. After counter 59 has received a preselected number of impulses, corresponding in number to that required for any paper between belts 40 and 41 and under pulleys 43 and 44 to completely clear the same, and to be gripped between belts 12 and 13 of the upper delivery course, contacts 59a close, thereby completing the energizing circuits for valve 51 and relay 58. Valve 51 opens to admit air under pressure in cylinder 49 to drive the switching section to the lower, dotted line position depicted in Fig. 2, and contacts 58b of relay 58 open to deenergize operator 57, whereupon gate 54 is moved upwardly to permit the stream of paper to again flow under the impetus of belts 40 and 41. With the switching section in its lower position the leading edges of the papers will be below the right-hand edge of plate 53, and consequently the paper stream will be directed under the glider plate to belts 37 for conveyance to delivery table 6.

When the jam condition is rectified, and papers piled up between belts 29 and 30 have been removed, switch 36 can be opened, thereby deenergizing operating coils 51b and 58a of valve 51 and relay 58, respectively, and blocking delay counter 58. As a result, air is exhausted from above the piston in cylinder 49 and the switching section moves upwardly to its normal position, and contacts 59a of counter 59 reopen.

While the operation of the switch mechanism has been shown and described as being initiated by closure of a jam responsive switch, it can of course be alternatively operated at the will of a human operator actuating a manual switch. If it is desired to have its operation initiated by a jam condition, a plurality of such switches, connected in parallel with switch 36, and located at various jam sensitive spots might preferably be used in practice. Preferably, the horizontal distance between the fingers of gate 54 and the point of contact between pulleys 42 and 44 should be slightly less than the normal lap-lead of the papers.

While the system hereinbefore shown and described is particularly well suited to conveyors handling articles flowing in a lapped stream, it will work equally well with articles conveyed in a separated, spaced apart relation.

I claim:

1. In a conveyor system, the combination with a supply conveyor section and two delivery conveyor sections of the belt and pulley type, of a switch interposed between said supply and said delivery sections comprising sets of cooperating switch belts forming extensions of the supply conveyor belts and running on divertible end pulleys which are spaced apart from adjacent end pulleys of said delivery conveyor sections, a member having elements disposed between one set of said switch belts and movable to a position to block flow of articles carried by said switch belts, means normally holding said member in inactive position and energizable to move it to article blocking position, means normally holding said divertible end pulleys in working relation to one of said delivery conveyor sections and energizable to move said divertible end pulleys into working relation with the other of said delivery conveyor sections, and control means operable to initially energize the first mentioned means and thereafter following a delay period acting to energize the second mentioned means and deenergize said first mentioned means.

2. In a conveyor system, the combination with a supply conveyor section and two delivery conveyor sections of the belt and pulley type, of switch means interposed between said supply and said delivery sections comprising sets of cooperating switch belts forming extensions of the supply conveyor belts and running on divertible end pulleys which are spaced apart from adjacent end pulleys of said delivery conveyor sections, a member having elements disposed between one set of said switch belts and movable to a position to block flow of articles carried by said switch belts, means normally holding said member in an inactive position and including first electro-responsive means energizable to move it to article block-

ing position, means normally holding said divertible end pulleys in working relation to one of said delivery conveyor sections and including second electro-responsive means energizable to move said divertible end pulleys into working relation with the other of said delivery conveyor sections, and control means including means operable to energize said first electro-responsive means and further including means responsive at the end of a delay period to energize said second electro-responsive means and de-energize said first electro-responsive means.

3. The combination according to claim 2 together with a member stationarily mounted in the space between said divertible end pulleys and said adjacent end pulleys of said delivery conveyor sections providing a guide for transfer of articles to one of said delivery conveyor sections.

4. The combination according to claim 2 wherein said

control means includes an impulse generator producing voltage pulses synchronized in frequency with the speed of said switch belts for determining the aforementioned delay period.

5. The combination according to claim 4 wherein said control means further includes a delay counter rendered operative coincident with energization of said first electro-responsive means and being responsive thereafter to a predetermined number of voltage impulses to energize said second electro-responsive means and deenergize said first electro-responsive means.

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