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V. D. Bilt

[11] **3,901,138**

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[54] **TURN TABLE DEVICE**

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Related U.S. Application Data

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[52] **U.S. Cl.** **100/4;** 100/7; 100/14; 100/26

[51] **Int. Cl.**[2] **B65B 13/06**

[58] **Field of Search** ..... 100/4, 7, 14, 25, 26; 198/235, 239, 241; 214/6 P

[56] **References Cited**

UNITED STATES PATENTS

2,632,381	3/1953	Buckland	100/26 UX
2,870,922	1/1959	Thomson	214/6 P
3,045,802	7/1962	Miller	198/235
3,174,631	3/1965	Swihart et al.	100/26 UX
3,182,586	5/1965	Armington et al.	100/14 X
3,330,205	7/1967	Smith	100/14 X
3,442,410	5/1969	Solomonson	198/241 X
3,589,275	6/1971	Van de Bilt	100/4
3,667,378	6/1972	Van de Bilt	100/26
3,783,773	1/1974	Willard	100/7

Primary Examiner—Billy J. Wilhite

Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

A pair of strapping machines with a turn table device therebetween by means of which objects, such as bundles of news papers, can be strapped in one direction rotated about a vertical axis over an angle of e.g. 90°, and then strapped in another direction. The turn table has the form vertically a vertical movable and rotatable cross having its wings below the plane of conveying means when retracted and above said plane when in operation. The device has switches and abutments to space the objects and to make sure that only one object at a time can be brought above the cross of the turn table device and that no feed or discharge can take place when this is not desired by the presence of objects downstream.

4 Claims, 7 Drawing Figures

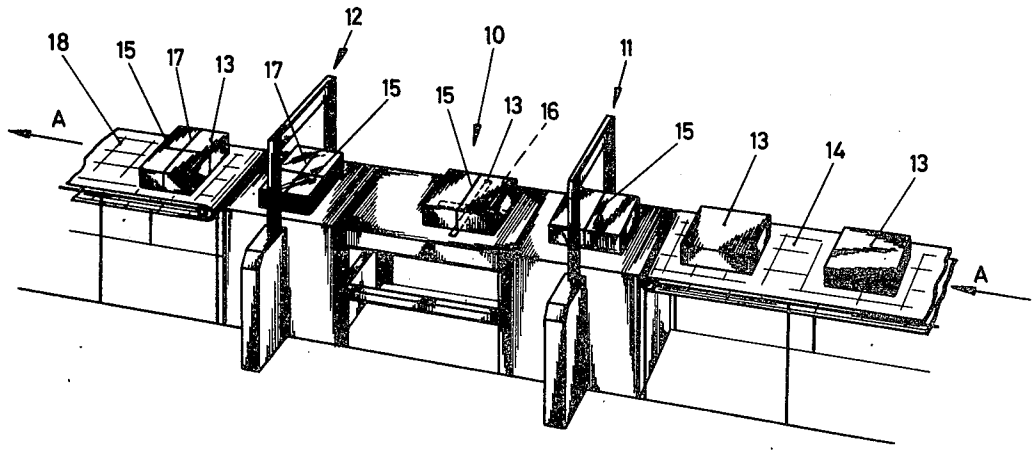


Fig. 1

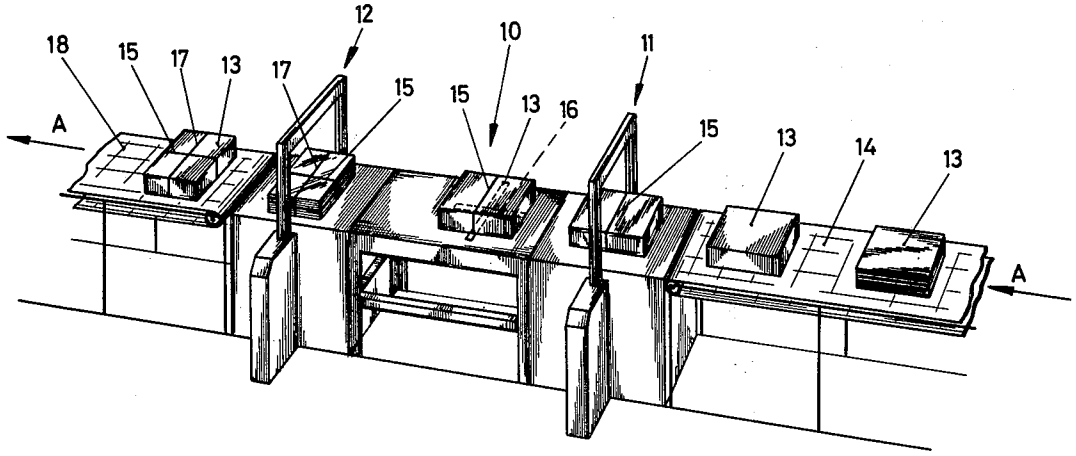

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Fig. 3

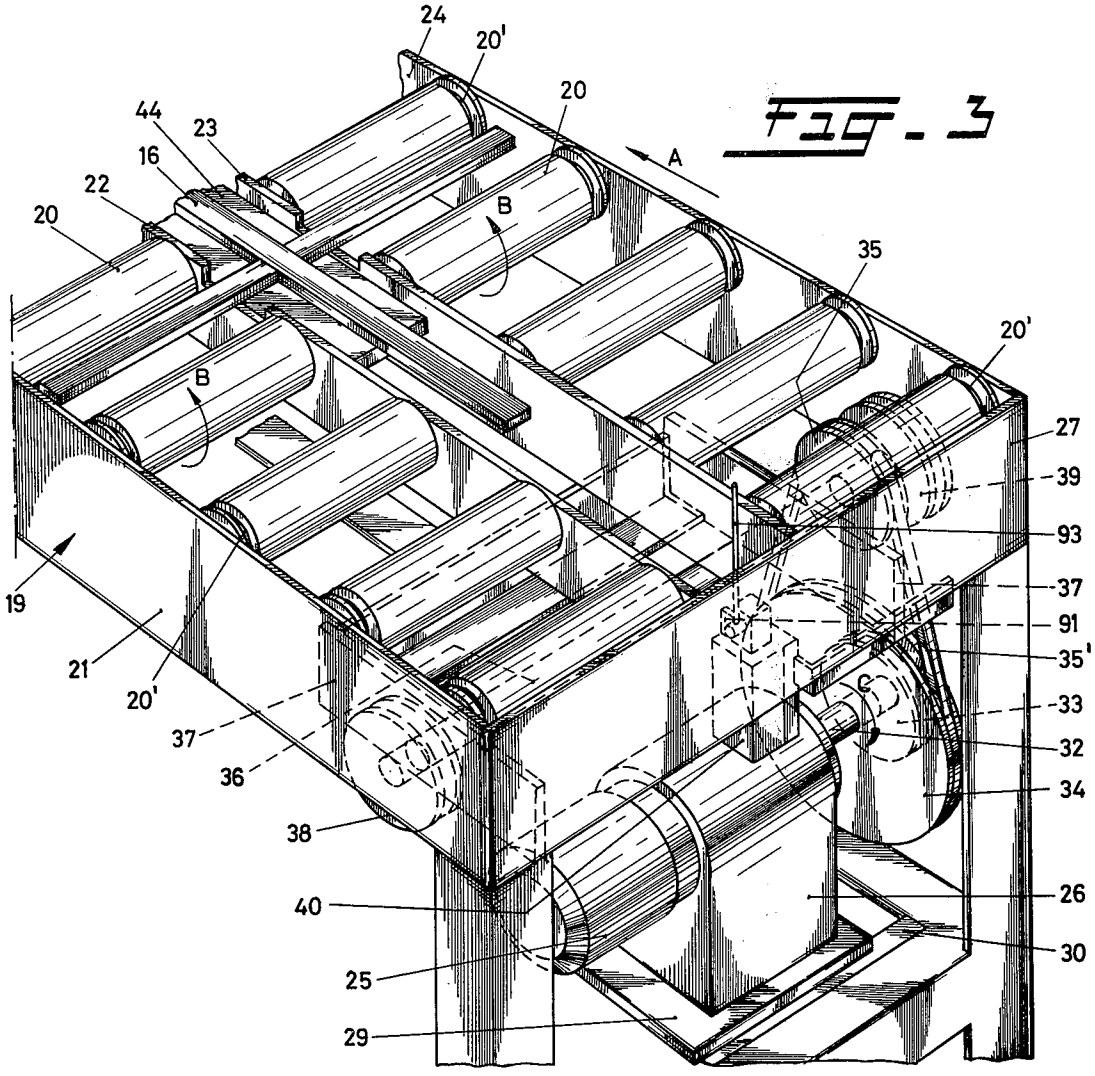

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Fig. 2

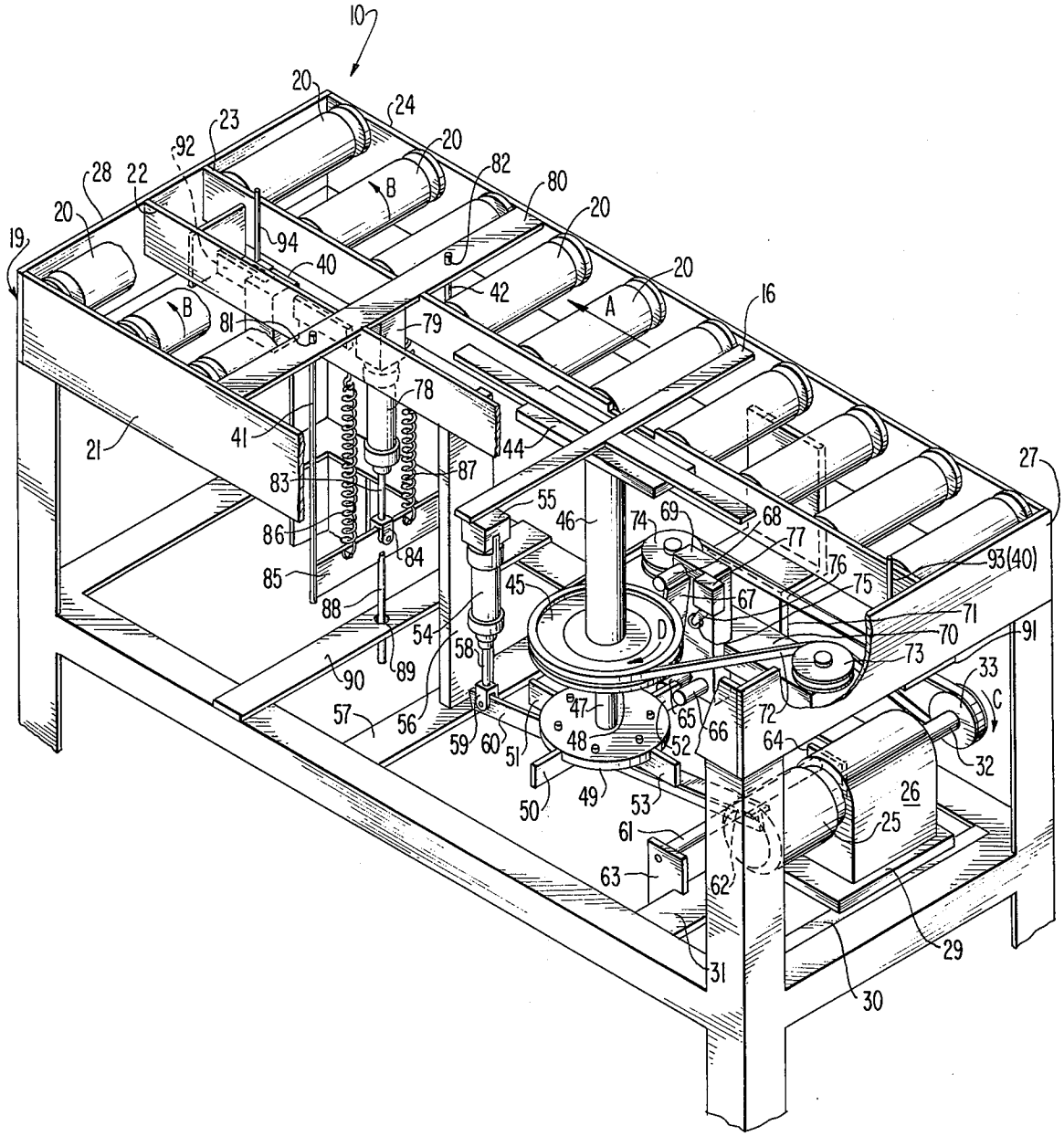

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93(40)
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Fig_5

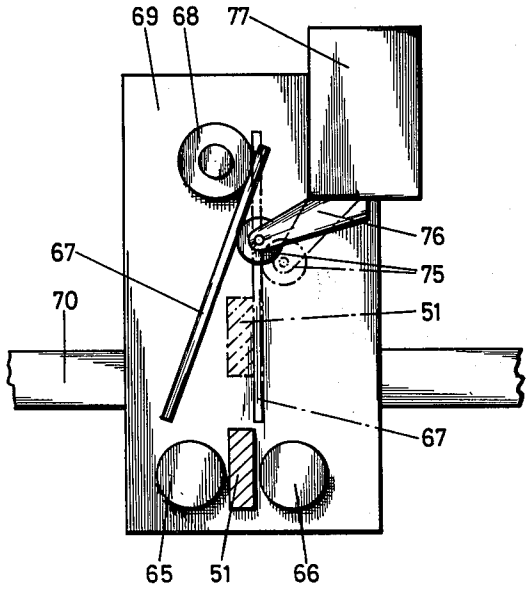
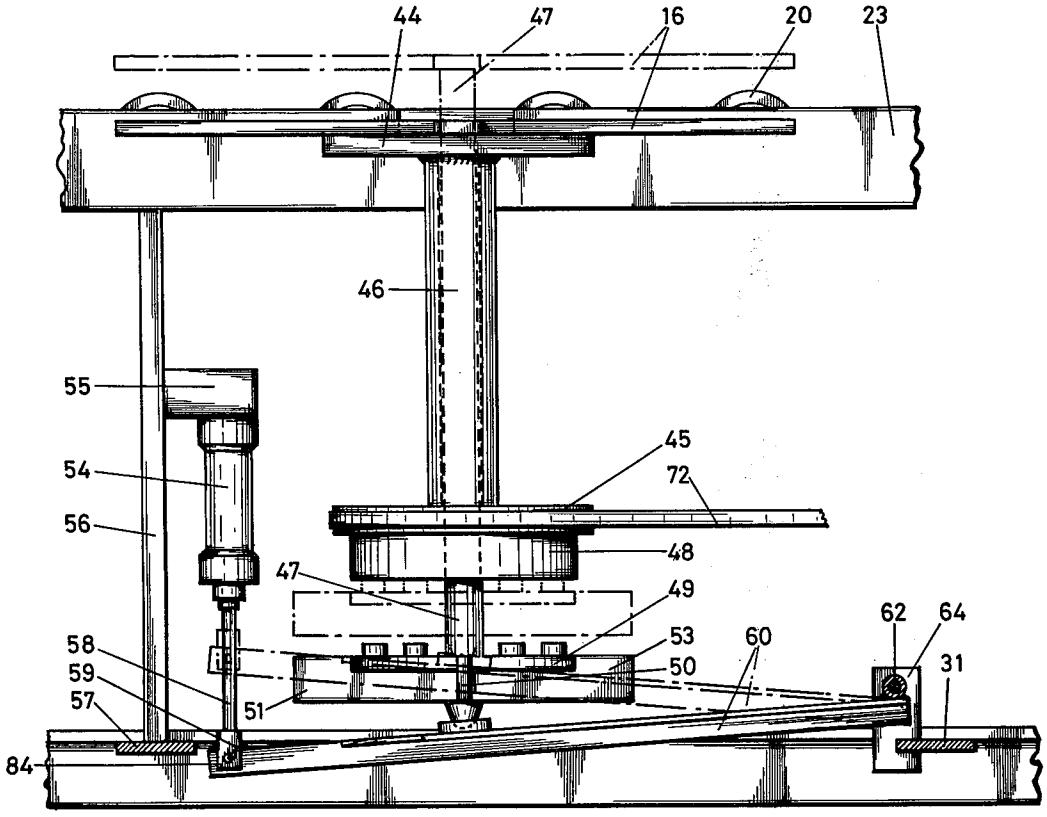

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Fig_4


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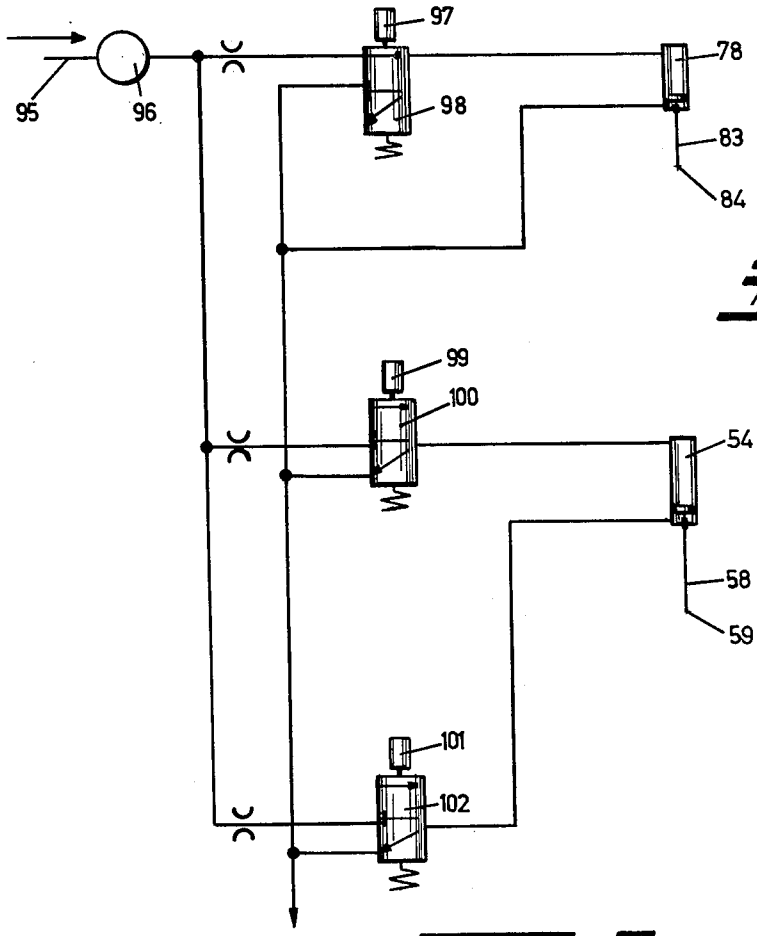
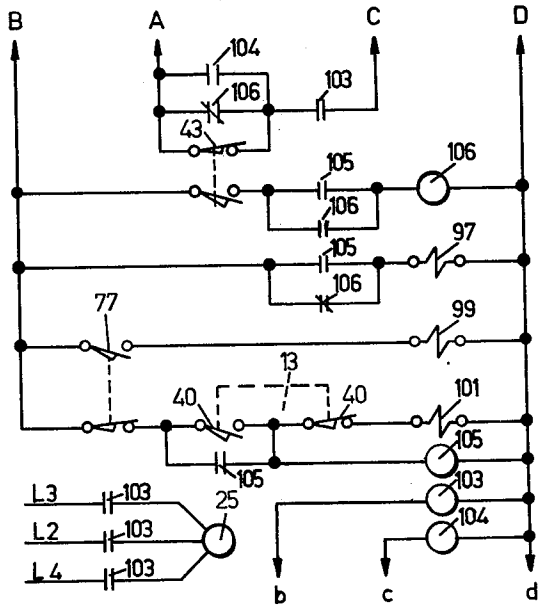

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Fig_6

Fig_7


B
A
C
D
104
106
103
43
105
106
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77
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13
40
40
101
L3
L2
L4
25
b
c
d

TURN TABLE DEVICE

This is a division, of application Ser. No. 286,681, filed Sept. 6, 1972 now U.S. Pat. No. 3,799,320.

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to two wire or band strapping machines in line to cross-tie bundles of news papers or magazines with a turntable device therebetween. Thus the device can successively receive a single tied bundle of news papers or magazines from the first strapping machine, turn the bundle 90° about a vertical axis and feed the turned bundle onto the second strapping machine which completes the cross-tie operation by applying a second crosswire band or wire around each turned bundle.

Accordingly, in the specification and claims to follow the present invention will be disclosed with respect to a turn table device for turning bundles of news papers or magazines positioned in line between two band or wire strapping machines, but it should be understood that the device according to the invention is not limited thereto and can be employed or adapted for other uses as well, such as for turning stacks of sheet material, bundles of envelopes or forms, packages, containers or the like, whereby the turn table device can be installed between machines or conveyors of any suitable type or even form a part of a single conveyor or machine.

Turn table devices of this type are known which operate in a similar manner as the device according to the invention in that they successively can receive objects to be turned from a supply source such as a conveyor feeder belt or a processing machine, turn said objects one by one 90° about their vertical axis or another vertical axis and feed the turned objects onto another processing machine or a suitable discharge conveyor. However, the embodiments of such known devices differ substantially from the particular embodiment of the turn table device according to the present invention. The essential difference is the fact that the known devices comprise relatively complicated conveying means such as push and pull mechanisms to convey the objects to be processed onto and from a generally circular turn table, which means are positioned externally of the work table containing the turn table, whereas in the present invention the embodiment is such that the turning and conveying means are suitably and completely arranged inside the work table of the turn table device.

Such known devices suffer from various disadvantages, a principal disadvantage being the complexity of the device due to the particular arrangement of the conveying means, which in turn is a main cause of other drawbacks, such as heavy weight, expensiveness, complicated control systems, diminished surveyability, decreased accessibility for maintenance and repair. Furthermore, the complexity of the known devices and the particular arrangement of the conveying and turning means substantially influence the reliability, effectiveness and capacity of the devices. it has been found that the transfer of objects or bundles onto and from the turn table in the known devices is difficult to properly execute due to bundle obstructing machine surfaces or inaccurate functioning of the conveying means. Consequently the chance of jamming or clogging is relatively high. In addition, it sometimes causes a faulty turn angle of the objects or bundles which in turn can lead to improper further processing. Furthermore, it often

damages the objects or bundles being handled and sometimes produces relatively heavy wear of machine-parts involved. As the conveying and turning machine parts wear, the reliability of the device rapidly decreases as a result of changing dimensions which affect the accuracy and smooth execution of the conveying and turning operation. Generally the positioning of the handled objects or bundles on the turn table is difficult to carry out accurately and is coupled with several time-consuming movements of parts of the conveying means, thereby substantially limiting the capacity of the known devices. Another important disadvantage of known turn table devices is that such devices normally cannot easily be adjusted to permit handling of different sizes of news papers or other objects. In addition, the thickness of the bundle or the height of other objects to be handled often has to be limited due to the particular external arrangement of the conveying means.

Accordingly, it is an object of the present invention to provide improved strapping apparatus including turn table devices which have a novel and simple arrangement of the conveying and turning means in the work table whereby these problems are eliminated.

It is also an object of the present invention to provide strapping apparatus including turn table devices in which wear of moving surfaces generally does not affect the reliability and effectiveness of the device.

Another object of the present invention is to provide strapping apparatus including turn table devices which can easily be adjusted in order to accomodate different sizes of news papers or magazines or other objects.

A further object of the present invention is to provide turn table devices in which simple stop means are provided apparatus including in the work table in order to effectively block the flow of bundles or other objects when necessary.

Briefly, these objects are achieved by providing a pair of strapping machines with a turn table device therebetween comprising a frame, a work table at the top of said frame, conveying means defining the top plane of said work table and adapted to convey an object from one end of the work table towards the other end, said work table further comprising a vertically movable cross stepwise rotatable about a vertical axis said cross in its lower retracted position having its wings below the said top plane and in its upper operative position above said top plane, drive means being provided for the stepwise rotation of said cross, said drive means being controlled by a switch having an actuating lever extending above said top plane.

These and other objects, features and advantages of the present invention will become apparent from a consideration of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the course of this description, reference will be made to the accompanying drawings in which:

FIG. 1 is a schematic perspective view of a machine line showing a turn table device according to the present invention installed in line between two wire or band strapping machines;

FIG. 2 is a detailed schematic perspective view of a preferred embodiment of the turn table device according to the present invention;

FIG. 3 is a detailed schematic perspective view of the entrance portion of the turn table device of FIG. 2 showing the conveying means drive arrangement;

FIG. 4 is a schematic side elevational view of some details of the turn table device of FIG. 2;

FIG. 5 is a schematic side elevational view of another detail of the turn table device of FIG. 2 and drawn to an enlarged scale;

FIG. 6 shows the pneumatic diagram; and

FIG. 7 shows the electrical circuit diagram of the turn table device according to the present invention.

DETAILED DESCRIPTION OF THE DISCLOSED EMBODIMENT

In the drawings which are shown schematically, certain parts which are not important or which are generally known have been broken away or omitted for the purpose of clarity and need not be further described as will be readily understood by those skilled in the art.

Referring now to the drawings in greater detail and, more particularly first to FIG. 1, a turn table device 10 according to the invention is shown installed in line between two wire or band strapping machines 11 and 12 of a known type, for example such as disclosed in U.S. Pat. No. 3,589,275 or No. 3,667,378 both in name of Van de Bilt, which machine line is adapted to cross-tie bundles of newspapers or magazines 13. Bundles of newspapers or magazines 13 to be strapped enter the machine line by means of, for example, a conveyor 14 of any known type and are fed onto the work table of the first strapping machine 11 which machine is adapted to apply a wire or band 15 tightly around each bundle in a direction transversely with respect to the conveying direction, the latter being indicated by arrows A. After being strapped, the single tied bundle 13 is then conveyed onto the work table of turn table device 10 which device is adapted to successively receive the bundle 13, turn the bundle by means of a cross-shaped turn table 16, 90° about its vertical axis and feed the turned bundle 13 onto the second strapping machine 12. Machine 12 in turn provides a second wire or band 17 tightly and crosswise around each turned bundle 13 also in the transverse direction in order to complete cross-tieing of the bundles 13. After thus being cross-tied, the bundles 13 are then conveyed onto, for example, a conveyor 18 of any known type located in line downstream of machine 12 in order to leave said machine line. Subsequently the bundles 13 can be stacked, distributed or otherwise handled by any suitable known means (not shown) as desired. In FIG. 1 the bundles 13 are shown in subsequent stages of processing. The bundle conveying means of the turn table device 10 are disposed in the work table of the device 10 are disposed in the work table of the device 10 and will be described below in detail. The operation of the turn table device 10, the strapping machines 11 and 12, and the conveyors 14 and 18 is coordinated, as will be described below so that no piling up or jamming can occur anywhere between the feed conveyor 14 and the discharge conveyor 18 in order to ensure the orderly and uninterrupted processing of the bundles 13 without clogging said machine line. The strapping machines 11 and 12 are dimensioned to permit processing of any size of newspaper or magazine in bundles of any manageable thickness. In a preferred embodiment of the invention the turn table device 10 can be adjusted in accordance with the size of newspaper or magazine to be handled.

FIG. 2 shows a preferred embodiment of the turn table device 10 according to the present invention. The device 10 has a conventional framework 19 constructed of structural members such as plates, beams and sections. The work table of device 10 contains turning means in the form of a cross-shaped turn table 16 as well as conveying means, respectively for turning and conveying of the bundles 13. The bundle conveying means consist of two longitudinal parallel rows of each ten rollers 20, one row being located at the left hand side of the work table and the other row at the right hand side when seen in the conveying direction A. The rollers 20 are transversely positioned and rotatably mounted between longitudinal beams 21 and 22, respectively 23 and 24 of frame 19, the beams 22 and 23 being suitably spaced in the transverse direction in order to accomodate various machine parts, among which turn table 16, as will be described below. The rollers 20 are continuously rotated in a direction indicated by arrows B by means of a machine drive unit consisting of an electric motor 25 combined with a reduction gear 26 located below the work table of device 10, as shown in FIGS. 2 and 3. By engaging the bottom surface of the bundles 13, the upper surface of rollers 20 can convey the bundles 13 over the work table of device 10 in the conveying direction A. For that purpose all fixed machine parts are suitably located below the horizontal plane tangent to the roller upper surfaces, as is best seen in FIG. 2 and FIG. 4, in order to ensure unobstructed conveying.

Referring more particularly to FIG. 3, the electric drive motor 25 and reduction gear 26 are mounted in the entrance portion of the device 10, the entrance end of device 10 being indicated by 27 and the exit end by 28, on a mounting plate 29, which is secured to transverse plates 30 and 31 of frame 19. Electromotor 25 provides a continuous driving force for the rollers 20 by means of a drive shaft 32, the direction of rotation being indicated by arrow C, to which a small drive pulley 33 and a larger drive pulley 34 are fixed, the large drive pulley 34 driving a pulley 35, as shown in FIG. 3 by means of a belt 35' which extends around pulleys 34 and 35. Pulley 35 is mounted on a rod 36 rotatably supported in a support structure 37 which is located below the conveying rollers 20 in the entrance portion of machine 10. At its free ends, rod 36 carries drive rollers 38 respectively 39, which are rigidly secured to it. Rollers 38 and 39 carry belts (not shown) adapted to drive the rollers 20 by engaging the grooves 20' of said rollers 20 at the underside, said belts running over intermediate and end discs (not shown). The rollers 20 in each row are interconnected by the friction drive of said belts so that all rollers in a row rotate continuously in a direction of rotation indicated by arrows B in order to convey bundles 13 in the direction A when necessary. When bundles 13 have to wait, for reasons described below, while being carried by the driven rollers 20, the relatively smooth outer surfaces of the rollers 20 will permit slipping without damaging the bundles.

The conveying means being completely described, the particular arrangement and operation of the turning means and stop means for the bundles 13 will now be disclosed with reference to FIGS. 2, 4 and 5. Besides rollers 20, the work table of machine 10 comprises, when seen in the conveying direction A, between its en-

trance end 27 and its exit end 28, firstly switch means 40, secondly turn table 16, thirdly stop means in the form of abutment pins 41 and 42, and finally another switch means 43. The turn table 16 is cross-shaped to permit some of the rollers 20 to be positioned close to the transverse portion of cross 16. Turn cross 16 can be raised vertically, turned 90° clockwise about its vertical axis and returned to its initial sunk position in order to accomplish turning of each bundle 13, so that each bundle 13 after being strapped in one direction in the first strapping machine 11 can subsequently be strapped in the other direction in the second strapping machine 12 (vide FIG. 1). Turn table 16 in its inactive sunk position in the work table, as shown in FIG. 2 and FIG. 4 in solid outline, rests upon a supporting member 44 which is mounted between longitudinal beams 22 and 23 at a little distance below the top surfaces of said frame beams. Beams 22 and 23 are locally recessed to accomodate the wings of cross 16. Turn table 16 in this lowest rest position is out of engagement with any bundle 13 carried on the work table of device 10, the turn cross 16 being completely positioned below the horizontal plane tangent to the upper surface of the rollers 20 and having one wing positioned in the longitudinal direction between beams 22 and 23 and the other wing positioned in the transverse direction between some of the rollers 20. From this lowest position, turn table 16 can be raised vertically into an upper position, as shown in FIG. 4 in which the upper position is indicated by dot and dash lines, above the horizontal plane tangent to the roller upper surfaces as soon as a bundle 13 to be turned has been conveyed by the rollers 20 into a position just above the turn table 16. Turn cross 16 will thereby lift this bundle 13 from the rollers 20 and will then turn together with the supported bundle 13 clockwise 90° about its vertical axis and freely above the roller surfaces. Subsequently turn table 16 will be returned to its retracted lowest position so that now the initially longitudinally positioned wing of cross 16 will be located in the transverse direction between the abovementioned pairs of rollers 20. The turned bundle 13 will thereby be transferred onto the rollers 20 which will further convey it onto the second strapping machine 12 (vide FIG. 1) unless it is stopped by abutment piins 41 and 42 when necessary. When a bundle 13 has arrived above cross 16 while cross 16 is situated in its inactive lowest position, this bundle 13 will just have released the first limit switch 40 by its trailing end, which release controls the operation of turn table 16, as will be described below. Consequently turn table 16 will successively be raised vertically, stopped, turned 90° and moved down again, together with the supported bundle 13. When a preceeding bundle 13 depresses and so actuates the second limit switch 43, and turn table 16 at the same time has just returned into its retracted position, the normally retracted abutment pins 41 and 42 will be operated and vertically raised from their retracted position in the work table below the horizontal plane tangent to the roller upper surfaces, a position shown in solid outline in FIG. 2, in order to stop the bundle 13 which is just leaving turn table 16. The abutment pins 41 and 42 will remain raised until switch 43 is deactivated upon passing of the preceeding bundle 13. In this way the flow of bundles 13 can be blocked when necessary in order to create space between the bundles and prevent clogging or piling up of the bundles. In this case the first strapping machine 11 (FIG. 1) at the same time is prevented of delivering a next bundle 13 onto the turn table device 10 by any known obstruction means, and will not deliver a bundle 13 until the bundle 13 stopped against abutment pins 41 and 42 is conveyed beyond these pins upon release of switch 43 by the preceeding bundle 13 which release causes the pins 41 and 42 to be retracted into their inactive lower position.

The operation of the turn table 16 of the turn device 10 is effected by a lift and turn mechanism which will now be disclosed in detail with reference to FIGS. 2, 3, 4 and 5. The machine drive unit comprising electromotor 25 and reduction gear 26 drives, besides rollers 20, continuously a disc 45 which is rotatably mounted at the bottom end of a fixed vertical tubular member 46. Tube 46 is attached to the turn table supporting member 44 at its upper end and is concentrically arranged around a vertical shaft 47 on top of which the turn table 16 is secured. The driven disc 45 is provided with a friction clutch 48 mounted at its lower side. Shaft 47 is rotatable and vertically slidable within tube 46, and extends downward beyond disc 45. A circular clutch plate 49 is mounted at the bottom end of shaft 47 and is provided with a friction surface on its upper side for engagement with clutch 48. Plate 49 at its bottom side comprises four fixed wings 50, 51, 52 and 53, radially projecting from the plate and spaced at 90° with respect to each other along its circumference. A pneumatic retraction cylinder 54 is with its blind end portion mounted to a bracket 55, the bracket 55 being secured to a vertical support plate 56 which is rigidly attached to beams 22 and 23 at its upper end and to base plate 57 of frame 19 at its lower end. The piston rod 58 of cylinder 54 is hingedly connected at 59 to a swivel arm 60 which is pivotally mounted to a pivot rod 61 at 62. Pivot rod 61 is supported by brackets 63 and 64 on base plate 31 of frame 19. Upon actuation of cylinder 54, the piston rod 58 will be retracted and thereby pivots arm 60 upward about pivot rod 61 and lifts the turn table 16 by lifting the unit consisting of wing plate 49, shaft 47 and turn table 16, shaft 47 sliding within tube 46. The vertical movement of said unit is guided by guide pins 65 and 66. Support 69, rigidly attached to a support block 70 which is mounted on a support structure 71 connected to frame 19, carries a plate 67 secured to a hinge pin 68. This plate 67 by its excentric connection to the pin 68 extends downwardly in an inclined position, as shown in FIG. 5. Support 69 further carries a switch 76, 77 which can be actuated by plate 67. The turn table unit will be lifted until friction plate 49 engages friction surface 48 of the driven disc 45 which will cause plate 49 to be rotated in the same direction thereby also turning turn table 16 clockwise about its vertical axis above rollers 20. Disc 45 is driven by means of a belt 72 extending around drive pulley 33 on shaft 32 of the machine drive unit (25, 26), guide pulleys 73 and 74 rotatably mounted on pulley support block 70 and disc 45, as shown in FIG. 2. The direction of rotation of drive pulley 33 is indicated by arrow C and that of disc 45 by arrow D. Upon rotation over nearly 90 degrees the turn table 16 being in its upper position as shown in dot and dash lines in FIG. 4, one of the wings (50, 51, 52, 53) of plate 49, (i.e. wing 51 in FIG. 2) each time hits a plate 67 which plate then will act against a small roller 75 rotatably mounted on the switch operating lever 76. Lever 76 is thereby pivoted which actuates limit switch 77 mounted to the ver-

tical support 69. As is best seen in FIG. 5, lever 76 has a limited stroke, the initial position of parts 67 and 75 being shown in solid lines and the actuated position being shown in dot and dash lines, and thus provides a stop for the engaging wing of plate 49 thereby limiting the rotation of turn table 16 to exactly 90°. The depressed lever 76 trips switch 77 which controls the vertical movement of turn table 16. The actuated switch 77 causes cylinder 54 to be provided with air in its blind end which causes the arm 60 to be pivoted down again. This allows the unit comprising turn table 16, shaft 47 and wing plate 49 to move down by its own weight, shaft 47 sliding within tube 46, until turn table 16 reaches its retracted position on supporting member 44. Lever 76 is thereby released into its initial position, shown in solid lines in FIG. 5, by the descending wing (51 in FIGS. 2 and 5) the movement of the descending wing (indicated by arrow E) being guided by the guide pins 65 and 66 on member 69 in order to maintain the angular rotation of turn table 16 at exactly 90° so that cross 16 is permitted to return into its initial retracted starting position. When the turned bundle 13 has been conveyed beyond pins 41 and 42, the turn table 16 is then ready to receive and turn a next bundle 13. Wing 51 when lifted again, will then move upward until clutch 49 engages clutch 48. Due to the fact that plate 67 returned to its inclined free downwardly hanging position the raised wing (e.g. 51) does not engage said plate 67 and will upon operation of the friction clutch 48, 49 pass below roller 75.

The stop means in the work table of device 10, in the form of simple abutment pins 41 and 42, are normally maintained in their retracted position, as described above, by means of a pneumatic cylinder 78. Cylinder 78 is with its blind end portion mounted to a support 79 which is secured to transverse plate 80 of frame 19. Plate 80 is provided with two openings 81 and 82 through which pins 41 and 42 respectively extend upward. Piston rod 83 of cylinder 78 is at 84 connected to a yoke 85 on which abutment pins 41 and 42 are mounted. Cylinder 78 normally keeps pins 41 and 42 in their retracted inactive position, as shown in solid lines in FIG. 2, against the bias of tension springs 86 and 87 disposed between yoke 85, and beam 22 and beam 23 respectively. Guide rod 88 mounted at the bottom side of yoke 85 extends downward through opening 89 in transverse plate 90 of frame 19 to vertically guided the movement of pins 41 and 42 and also functions to keep cylinder 78 in place by carrying some of the load when the pins 41 and 42 have to stop a bundle 13. Tension springs 86 and 87 will pull the pins 41 and 42 upward into their raised abutment position upon deactivation of cylinder 78 by exhausting its blind end and will maintain them in their blocking position as long as cylinder 78 remains retracted.

Switch means 40 and 43 can be slidably adjusted in the longitudinal direction along their supports 91 and 92 respectively, which supports are fixed to frame 19, in order to be positioned as necessary to permit device 10 to handle a particular size of newspaper or magazine. The limit switched 40 and 43 have pivotable levers 93 and 94 respectively, normally projecting vertically from the work table beyond the horizontal plane tangent to the roller upper surfaces. When a bundle 13 passes a switch lever, the lever will be depressed into a substantial horizontal position and released upon passing of the trailing end of the bundle 13 into its initial vertical position. This depressing and release provides control signals for the machine operation, as will be described hereinafter.

It will be understood that the arrangement of the pneumatic and electrical control systems of the present invention is decisive for a correct functioning of device 10. Referring now to FIGS. 6 and 7 of the Drawings, the pneumatic and electrical systems will be described in detail. As shown in FIG. 6, the pneumatic system mainly comprises a pressure supply source (not shown) adapted to continuously supply air under pressure into the system through an air entrance conduit 95 and a lubrication device 96 to lubricate air entering the system, various air conduit means, the turn table cylinder 54 (vide also FIG. 2), the abutment cylinder 78, and solenoid operated air valves 98, 100 and 102, the solenoid of each generally being indicated at 97, 99 and 101 respectively. As shown in FIG. 7, the single phase control circuit power for the electrical system is obtained from the upstream installed strapping machine (machine 11 as shown in FIG. 1) by connections B and D. An electrical obstruction circuit is provided (connections A and C) to prevent the feeder belt drive motor of the upstream installed strapping machine 11 from being restarted as long as feeding a new bundle 13 to the turning device 10 is not desirable. The electric drive motor 25 (vide also FIG. 2) is connected to the power source (connections L1, L2 and L3) when starter relay 103 is energized by the control circuit power of the downstream installed strapping machine (machine 12 as shown in FIG. 1) (connections *b* and *d*). The obstruction relay 104 (connections *c* and *d*) is energized by the control circuit power of the downstream installed strapping machine 12 but only as long as the feeder system of said machine 12 is in operation. The normally open contact of relay 104 is part of said electrical obstruction circuit.

With reference to FIGS. 6 and 7, the operation which will be readily understood by those skilled in the art is as follows: As soon as a bundle 13 leaves the first strapping machine 11 and moves onto the turn table device 10, switch 40 (vide also FIG. 2) is tripped and the energized relay 105 closes the normally open contacts. When the bundle 13 reaches the position of just above the turn table 16, switch 40 is released by the trailing end of that bundle, energizing solenoid 101 via switch 77 and the normally open but now closed contact of relay 105 and switch 40, which causes solenoid operated air valve 102 to be actuated. The actuated valve 102 provides air to the rod end of the turn table cylinder 54, which moves the turn table 16 upward, causing the clutch 49 mounted on the bottom end of the turn table shaft 47 to engage clutch 48 of driven disc 45. When turned 90°, one of the four wings (50, 51, 52 and 53) mounted on the lower friction plate 49, hits the switch operating plate 67 (as is best seen in FIG. 5). This plate 67 operates lever 76 which has a limited stroke so that it stops the turn table 16 and trips switch 77, causing de-energization of relay 105 and solenoid 101 of valve 102. Simultaneously, solenoid 99 of solenoid operated air valve 100 is energized through the now closed contact of switch 77, permitting valve 100 to provide air to the blind end of the turn table cylinder 54 which allows the turn table 16 to move down. The switch lever 76 returns to its initial position and the released switch 77 de-energizes solenoid 99 of valve 100 which permits valve 100 to return to its initial position.

The turned bundle 13 is moved freely over the abutment pins 41 and 42 because said pins are kept down in retracted position by the abutment cylinder 78 which is pressurized on the blind end via solenoid operated air valve 98. Solenoid 97 of valve 98 is energized via the normally closed contacts of relay 106. If the last bundle 13 cannot enter the second strapping machine 12 for one reason or the other, this bundle will be stopped just beyond the abutment pins 41 and 42, keeping switch 43 depressed. The next bundle 13 turns 90° and during this period relay 106 is energized through switch 43 and the normally open but now closed contacts of relay 105. When the switch operating lever 76 is actuated by one of the wings (50, 51, 52, 53) of plate 49, as described above, and trips switch 77, relay 105 will be de-energized and opens again the normally open contacts. Relay 106, however, remains energized via switch 43 and the now closed contact of relay 106. Valve 98, its solenoid 97 no longer being energized because contact 105 as well as contact 106 are now open, exhausts the blind end of the abutment cylinder 78. The abutment pins 41 and 42, pulled upward by the tension springs 86 and 87, will stop the bundle 13. As soon as the trailing end of the obstructing bundle 13 releases switch 43, relay 106 will be de-energized and closed again the normally closed contacts. Consequently, solenoid 97 of valve 98 is re-energized and permits valve 98 to supply air to the blind end of the abutment cylinder 78, causing the abutment pins 41 and 42 to be retracted, thus releasing the stopped bundle 13. The conveyor drive motor of the upstream installed strapping machine 11 cannot be started unless at least one of the three contacts 104, 106 and 43, and in any case contact 103 of the obstruction circuit (connections A and C) are closed.

From a consideration of the foregoing disclosure, therefore, it will be evident that all of the initially recited objects of the present invention have been achieved.

Although the present invention has been described and illustrated in connection with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the scope of the invention, as those skilled in this art will readily understand. For instance, it is quite possible to employ conveyor belts or other conveying means in the work table of device 10 instead of rollers 20. Abutment pins 41 and 42 might then be centrally located between beams 22 and 23.

All such modifications and variations are considered to be within the purview and scope of the present invention as defined by the claims.

I claim:

1. Apparatus for strapping objects in two directions, comprising a pair of strapping machines, and a turntable device between said machines, said turntable device comprisng a frame, a work table at the top of said frame, conveying means defining the top plane of said work table and adapted to convey an object from adjacent one said machine towards the other said machine, said work table further comprising a vertically movable cross stepwise rotatable about a vertical axis, said cross in its lower retracted position having its wings below the said top plane and in its upper operative position above said top plane, drive means for the stepwise rotation of said cross, said drive means being controlled by a switch having an actuating lever extending above said top plane, said drive means comprising a friction disc rotatably mounted in the frame about a vertical axis and adapted to be continuously driven, a vertical shaft concentric with said disc, the upper end of said shaft carrying the cross, while the lower end carries a second friction disc having radially extending wings, means for moving said shaft upwardly to bring the second friction disc into engagement with the first friction disc and for moving said shaft downwardly to disengage the said friction discs, and a further switch which in the raised position of the shaft can be actuated by a said wing and when actuated controls the means for moving said shaft to move downwardly.

2. Apparatus as claimed in claim 1 in which in front of the switch a downwardly extending plate is pivotably suspended within the frame, which plate lies in the path of the wings when in their raised position and can actuate said further switch and which in its free downwardly hanging position is out of the vertical path of the adjacent wing which in its lower position is prevented to rotate with the shaft by guide pins.

3. Apparatus as claimed in claim 1, said switch being mounted upstream of said cross and being in a control circuit such that the drive means are put into operation for lifting and rotating the cross when the said switch is released by an object upon the work table.

4. Apparatus for strapping objects in two directions, comprising a pair of strapping machines, and a turntable device between said machines, said turntable device comprising a frame, a work table at the top of said frame, conveying means defining the top plane of said work table and adapted to convey an object from adjacent one said machine towards the other said machine, said work table further comprising a vertically movable cross stepwise rotatable about a vertical axis, said cross in its lower retracted position having its wings below the said top plane and in its upper operative position above said top plane, drive means for the stepwise rotation of said cross, said drive means being controlled a switch having an actuating lever extending above said top plane, said switch being mounted upstream of said cross and being in a control circuit such that the drive means are put into operation for lifting and rotating the cross when the said switch is released by an object upon the work table, retractable abutment pins in the work table located downstream of the cross, a still further switch having an actuating lever extending above said top plane and located downstream of said abutment pins, said circuit being such that the abutment pins will extend above said top plane as soon as an object completes its rotation but only if a preceding object is depressing the actuating lever of the said further switch and will retract below said plane when said still further switch is released, and upstream mounted separate supply conveyor means having drive means connected to said control circuit of the apparatus such that said drive means cannot be re-energized when said still further switch is depressed.

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