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Murao

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[54] **AUTOMATIC BOBBIN LOADER**

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[52] **U.S. Cl.** ..... **53/59 R,** 53/142, 53/163, 53/236

[51] **Int. Cl.** **B65b 57/10,** B65b 35/54

[58] **Field of Search** ..... 53/59 R, 52, 163, 142, 53/236

[56] **References Cited**

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[57] **ABSTRACT**

A device for automatically loading bobbin boxes with bobbins. The bobbin boxes are placed on a conveyor which moves until a bobbin box interrupts a light beam causing the conveyor to stop with a bobbin box in proper position for loading. Bobbins are automatically loaded onto a foldable receiving plate placed within the bobbin box until the receiving plate is caused to open and the bobbins are loaded into the bobbin box. Another bobbin box is then moved into position for loading by the conveyor and the cycle is repeated.

3 Claims, 5 Drawing Figures

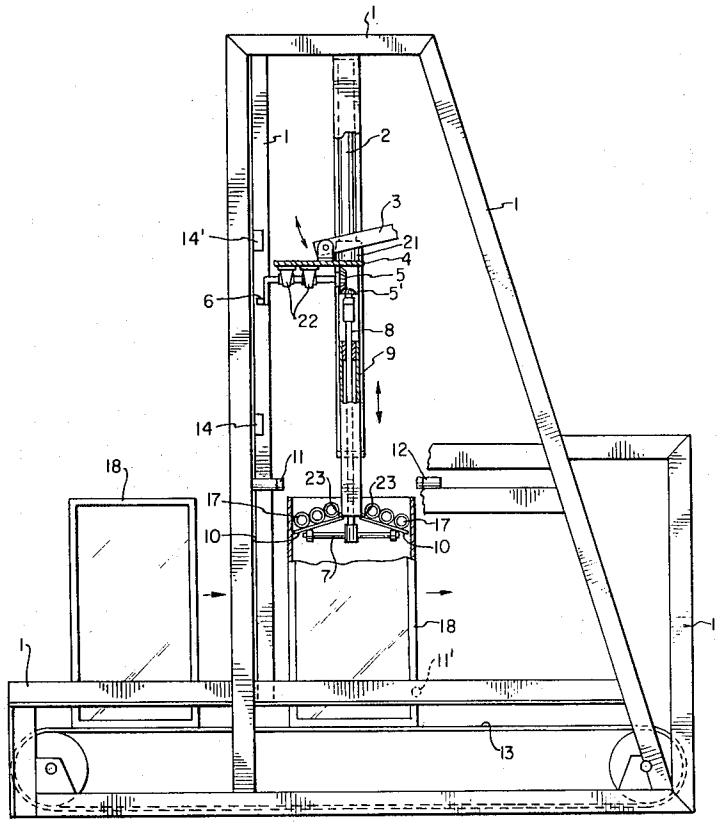


FIG. 1

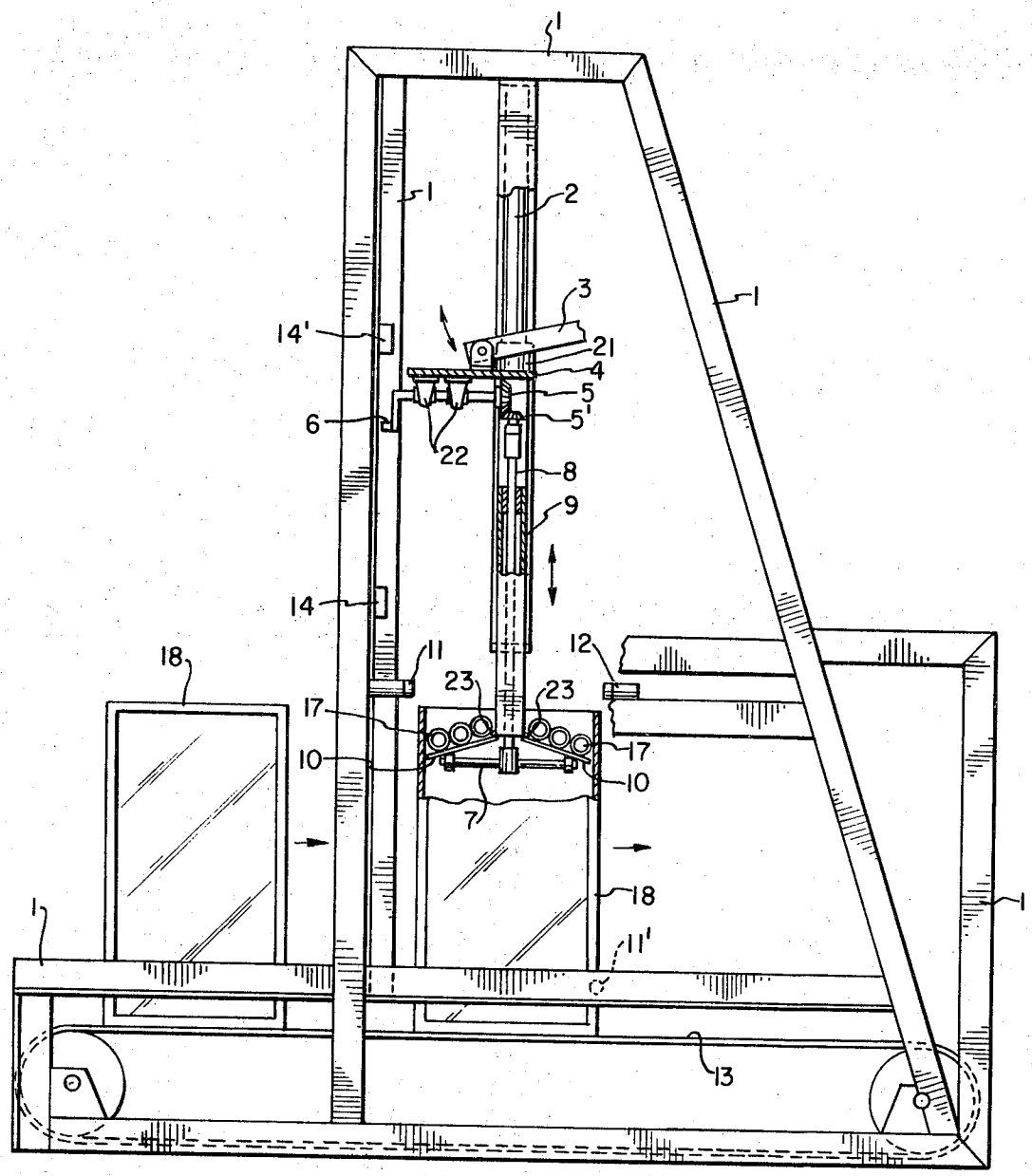
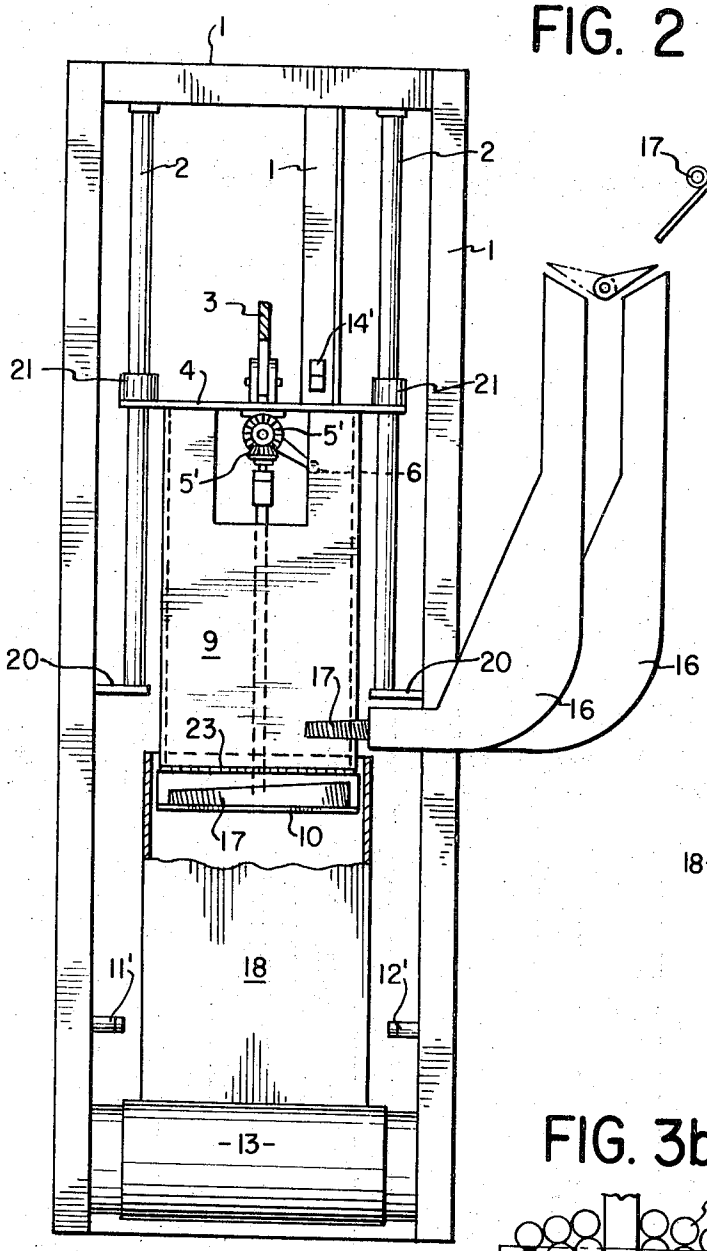


FIG. 2



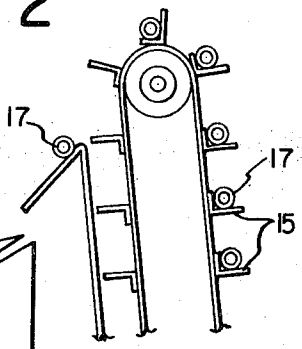


FIG. 3a

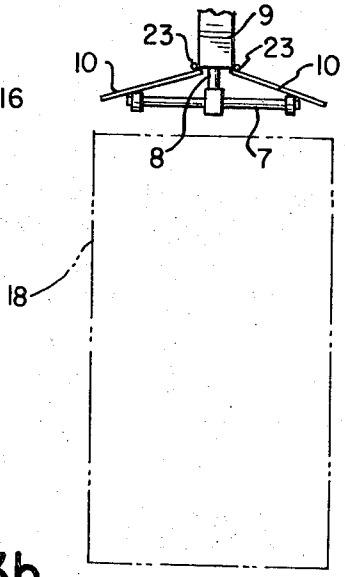


FIG. 3b

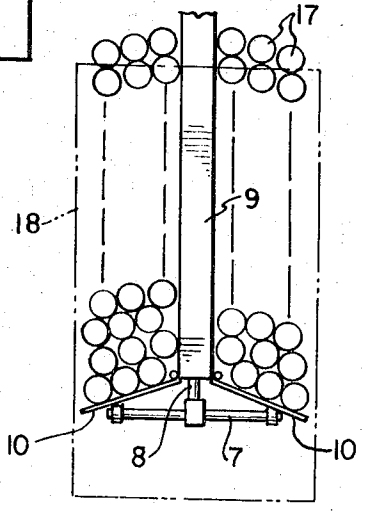
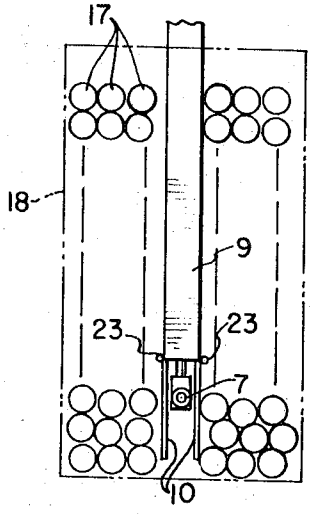


FIG. 3c



AUTOMATIC BOBBIN LOADER

Spinning mills constantly strive to increase efficiency by introducing more efficient machinery to decrease the costs and manpower needs of the spinning mills. One possible way to decrease manpower needs is with more efficient loading of bobbins into bobbin boxes. The loading of the bobbins should be done in an orderly manner both to facilitate removal of the bobbins from the bobbin boxes and to maximize the number of bobbins that may be placed in each bobbin box. To reduce the capital expenditure of the spinning mills, the bobbin loader should be designed so that it will automatically load bobbins of different sizes into old, as well as new, bobbin boxes.

It is an object of this invention to provide an improved device for automatically loading bobbins into a bobbin box in an orderly manner.

According to the preferred embodiment, a bobbin box moves on a conveyor belt until it interrupts a light beam between a light source and photocell. The conveyor belt is then stopped with the bobbin box in proper position for loading, and loading of the bobbin box begins. The bobbins are placed on a foldable receiving plate that is free to move in a vertical direction. The receiving plate is maintained in a closed position by a pin, connected to a rotatable shaft mounted inside an elevator plate, and located directly underneath the plate. After a number of bobbins has been placed on the receiving plate, the receiving plate is caused to move downwardly. The flow of bobbins is interrupted until termination of the downward movement of the receiving plate, when the flow of bobbins resumes. The loading of bobbins onto the receiving plate proceeds until the pin supporting the receiving plate is caused to turn sufficiently so that the weight of the bobbins on the receiving plate opens the receiving plate, and the bobbins fall into the bobbin box. After the receiving plate opens, the elevator plate rises and the bobbin box conveyor moves until the next bobbin box is in position. The pin is caused to turn and close the receiving plate, and the flow of bobbins resumes after the receiving plate is properly positioned in the bobbin box.

These and other objects of the invention will be readily appreciated by reference to the following detailed description of preferred forms of the invention when considered in connection with the accompanying drawings wherein:

FIG. 1 is a side elevational view of the bobbin box loader;

FIG. 2 is a front elevational view of the bobbin box loader; and

FIGS. 3a, b and c illustrate, respectively, the position of the receiving plate with respect to the box before loading of the bobbins, the bobbins falling into the bobbin box and onto the receiving plate, and the position of the receiving plate after the bobbins have been unloaded.

The bobbin box loader includes a frame 1 having two guide rods 2 fastened to its top and descending vertically therefrom to supports 20 which extend horizontally from frame 1. A slidable bracket 4 has two collars 21 into which the guide rods 2 fit and which constrain the motion of the bracket 4 along the guide rods 2. A vertically movable arm 3 is also attached to bracket 4. A cam follower 6 is journalled in mounts 22 on the bottom of bracket 4. Cam follower 6 is rotated by abutment against upper and lower cams 14' and 14 secured to frame 1, as described below. An elevator plate 9 is also mounted on the bottom side of bracket 4 and descends vertically from bracket 4 to a foldable receiving plate 10. Receiving plate 10 has two parts, each of which is mounted on opposite sides of elevator plate 9 by hinges 23 in this embodiment, although other methods of attachment that permit the sides of receiving plate 10 to move could be used. Rotatable vertical shaft 8 extends internally through elevator plate 9 and is connected at its lower extremity to a horizontal pin 7. Cam follower 6 and shaft 8 are connected in this embodiment by bevel gears 5 and 5', which rotate shaft 8 when cam follower 6 is rotated. Pin 7 is directly underneath receiving plate 10 so that when pin 7 is perpendicular or approximately perpendicular to the hinges 23 and to the elevator plate 9, receiving plate 10 is in a closed position.

The bobbin boxes 18 are moved by bobbin box conveyor 13. When a bobbin box 18 reaches the proper position for loading, a light beam between a light source 11' and photocell 12' is interrupted and bobbin box conveyor 13 is caused to stop. The apparatus for stopping conveyor 13 when the light beam is interrupted may be conventional and, therefore, is not illustrated.

The bobbins 17 are transferred individually by chain conveyor brackets 15 (FIG. 2). A distributor 16, having two chutes with exits on opposite sides of elevator plate 9 and means for alternating the chute into which the bobbins are fed as they leave the chain conveyor brackets 15, puts the bobbins 17 on alternate sides of elevator plate 9 and the bobbins 17 fall onto opposites of receiving plate 10. The movement of chain conveyor brackets 15 stops when bobbin box conveyor 13 is moving. When the level of bobbins 17 reaches a predetermined level, the bobbins 17 interrupt the light beam between a second light source 11 and photocell 12 and conventional means (not illustrated) activate the arm 3 to move bracket 4 downwardly until the beam is not interrupted and halt chain conveyor brackets 15 during the time bracket 4 is moving.

This process of loading and lowering is repeated until cam follower 6 reaches and is turned upwardly by the lower cam 14. This causes bevel gears 5 and 5' to pivot both shaft 8 and pin 7 sufficiently so that the weight of the bobbins 17 causes receiving plate 10 to open and the bobbins 17 fall into the bobbin box 18. Conventional means cause the conveyor brackets 15 to stop. Since bobbins 17 were placed on the receiving plate 10 in an ordered manner and since the receiving plate does not open until it is near the bottom of the bobbin box 18, the bobbins are placed in the bobbin box 18 in an ordered manner.

FIG. 3a illustrates the position of receiving plate 10 with respect to bobbin box 18 prior to loading. FIG. 3b shows bobbins 17 being loaded onto receiving plate 10 shortly after chain conveyor brackets 15 have resumed loading. FIG. 3c illustrates the orderly position of bobbins 17 in bobbin box 18 after receiving plate 10 has opened.

While the device may be used with bobbin boxes of any size, either the length of the pin 7 or the size of the receiving plate 10 must be adjusted to the size of the bobbin box to insure that the receiving plate 10 fits against the sides of the bobbin box or the bobbins might

fall directly into the bobbin box and would not be arranged in an orderly manner.

After the bobbins have been loaded into box **18**, the vertically movable arm **3** is activated after a preselected time interval by conventional means to move bracket **4** upwardly until the upper cam **14'** turns cam follower **6** and causes shaft **8** with pin **7** to turn and close receiving plate **10**. The bobbin box conveyor **13** is activated to remove the filled bobbin box while an empty bobbin box is brought into position to be filled.

What is claimed is:

1. Apparatus for automatically loading a bobbin box with bobbins comprising:

a vertically movable elevator plate;

a receiving plate for the bobbins having two parts pivotally attached to opposite sides of said elevator plate and adapted to fit within a bobbin box;

means for placing bobbins on said receiving plate;

means for raising and lowering said receiving plate and elevator plate into and out of said bobbin box;

a pin directly beneath the receiving plate for maintaining said receiving plate in a closed position whereby the bobbins remain on the receiving plate as the receiving plate is lowered into the bobbin box;

means for sensing when the bobbins on said receiving plate reach a predetermined level and causing said receiving plate to be lowered; and

means for rotating the pin in one direction when the receiving plate reaches a predetermined lower position in the bobbin box, whereby the weight of the bobbins opens the receiving plate and the bobbins fall into the bobbin box, and for rotating the pin to its original position when the receiving plate is raised to a predetermined upper position whereby the receiving plate is closed.

2. Apparatus as recited in claim **1** in which the means for rotating the pin comprises:

a first stationary cam;

a second stationary cam spaced vertically from said first stationary cam;

a rotatable cam follower for engaging said stationary cam;

a rotatable shaft extending vertically within said elevator plate and connected at its lower extremity to said pin; and

means for rotating said rotatable shaft when said rotatable cam follower is rotated.

3. Apparatus as recited in claim **2** in which the means for rotating said rotatable shaft comprises:

a first gear connected to said rotatable cam follower; and

a second gear connected to said rotatable shaft and engaging said first gear.

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