March 24, 1964 ICHISABURO KAINO ETAL 3,125,782

AUTOMATIC CAN REPLACING APPARATUS FOR A DRAWING FRAME

Filed Oct. 13, 1961

2 Sheets-Sheet 1

Fig. 1

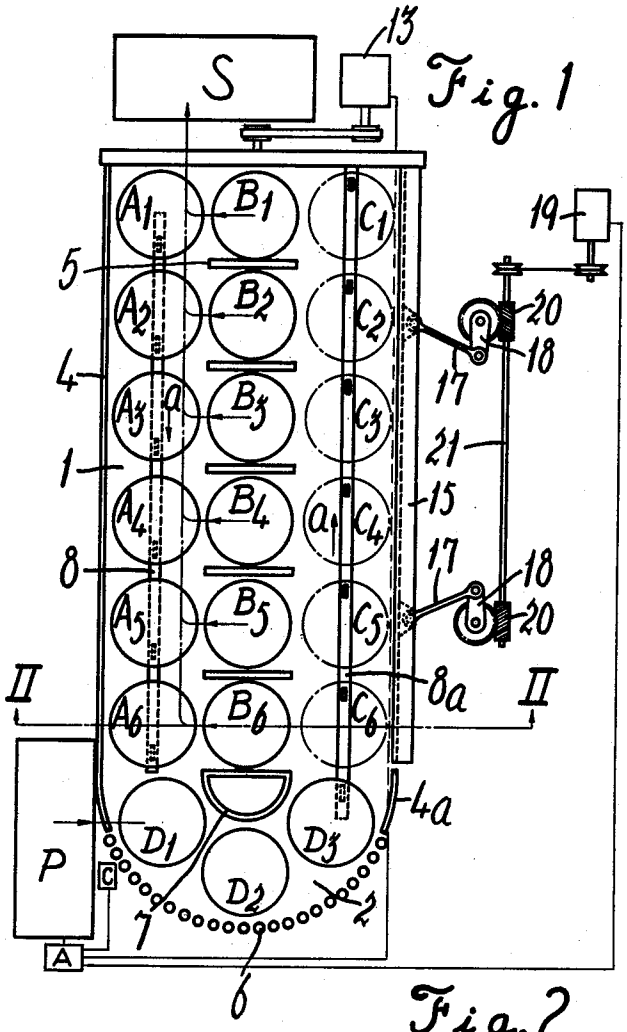
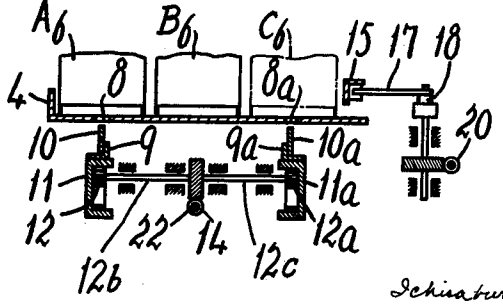


Fig. 2



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Fig. 3

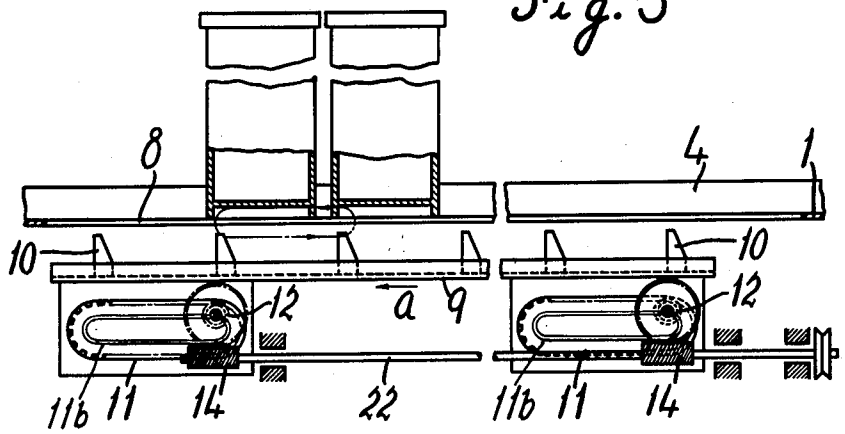
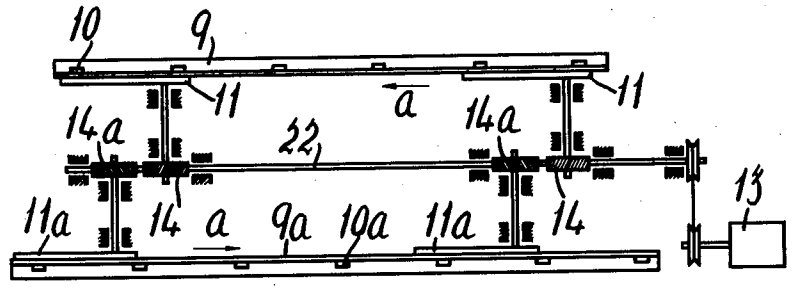


Fig. 4



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AUTOMATIC CAN REPLACING APPARATUS FOR A DRAWING FRAME

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3 Claims. (Cl. 19—159)

This invention relates to an automatic can replacing apparatus for a drawing frame in a spinning machine. In a conventional can replacing apparatus for a drawing frame, an empty can is replaced by one full of sliver when the sliver in the used can has been exhausted. Obviously a certain time is required for replacing each can.

The present invention has for its object an improved type of apparatus wherein a certain number of empty cans are replaced at one time by a like number of full cans, and while a sliver is taken from the full cans one after the other, a new sliver is supplied to the empty cans one by one as the empty cans are being returned to the positions where the full cans were placed, whereby considerable time and trouble are saved.

The manner in which the invention is carried into effect is hereinafter more fully described with reference to the accompanying drawings, wherein:

FIG. 1 is a diagrammatic plan view of the apparatus embodying the invention;

FIG. 2 is a sectional view taken on line II—II of FIG. 1;

FIG. 3 is a side elevation view, partly in section, of the same in an enlarged scale; and

FIG. 4 is a plan view of a can conveying device with the floor removed.

Referring to the drawing, especially FIGS. 1–3, the floor of the apparatus consists of a rectangular bed 1 with a semi-circular extension 2 at one end, and the length of the rectangular bed is large enough to place a certain number of cans, say six, in alignment with a clearance between them, while the width is large enough to place three rows of cans side by side with a small clearance between them. The semi-circular extension forms a curved passage to connect the spaces for the rows of cans at the outer sides of the rectangular bed.

Along one side of the rectangular space is provided a low wall 4, and a series of guide pins 6 and a short wall 4*a* are mounted along the outer end of the extension 2. Guide walls 5 guide the cans during transverse movement across rectangular bed 1, and guide wall 7 forms an inner wall on the extension 2.

A_1–A_6 denote cans which are placed in the row at left hand side on the bed 1. B_1–B_6 are the cans in the row of cans placed in the middle of the bed, and C_1–C_6 are the can positions on the right hand side of the bed. D_1–D_3 denote the cans in the passage bordered by the series of pins 6 and the guide wall 7. During the operation of the apparatus, there are always present a number of cans sufficient to fill two rows plus three, as described hereinafter.

There are two long slots 8 and 8*a* in the bed along the entire length of the positions for the series of cans A_1–A_6 and C_1–C_6. As best seen in FIGS. 2–4, long rods 9 and 9*a* are provided under the slots 8 and 8*a*, respectively, and the rods have mounted on each end internal mangle racks 11 and 11*a*, with which pinions 12 and 12*a* mesh. The ends of pinion shafts 12*b* and 12*c* extend into grooves 11*b* in the mangle racks. Fingers 10 and 10*a* are fixed to the rods 9 and 9*a* at intervals the same as the pitch of the cans. The rods reciprocate through a distance equal to the length of the racks 11 which is the same as the pitch of the cans, raising the fingers above the bed through the slots when they travel in the direction

shown by *a* and lowering them when they travel in the other direction. It should be noted that in the disclosed embodiment the pitch of the cans, i.e. the distance between corresponding points on adjacent cans, is somewhat greater than the diameter of the cans in order to take into account the above-mentioned clearance between adjacent cans.

When the rods travel in the direction shown by *a*, the rods are raised and the fingers catch the bottom part of each can, so that the latter are carried forward for a distance equal to the pitch of the cans. By this means, the cans at the positions A_1–A_6 and C_1–C_6 are sent forward for a distance equal to the can pitch during each forward travel of the rods 9 and 9*a*, and the cans in the positions D_1–D_3 are pushed ahead by the can at the position A_6.

The shafts 12*b* and 12*c* of the pinions 12 and 12*a* are driven by worm gears 14 and 14*a*, which are fixed on a shaft 22, which in turn is driven by a motor 13 as shown in FIGS. 2–4. The directions of worms 14 and 14*a* are opposed to each other so that the rods 9 and 9*a* travel in opposite directions.

Adjacent the side of the bed 1 on which are the can positions C_1–C_6 is a shoving plate 15. Each end of the plate is connected with a crank arm 18 by a connecting rod 17, and the crank arms are simultaneously turned by a driving element such as worm gears 20 on a shaft 21. The shoving plate is pushed by the connecting rods to transfer the cans in the positions C_1–C_6 to the positions B_1–B_6, and the cans at the positions B_1–B_6 are shoved to the positions A_1–A_6, no cans being existing at the positions A_1–A_6 at this time. The transverse movement of the cans is guided by walls 5.

P denotes a preceding apparatus, for example, a first drawing machine, for supplying a sliver to the cans on the apparatus of the invention, and a sliver or slivers are supplied to a succeeding machine S, such as a second drawing machine.

The operation will be discussed starting from a condition in which the cans in positions A_1–A_6 and D_1 are empty, and those in positions B_1–B_6 and D_2 and D_3 are full of sliver, while there are no cans in the positions C_1–C_6. A new sliver is supplied from the machine P to the can positioned at D_1, and the slivers in the cans at B_1–B_6 are supplied to the machine S. When the can at D_1 becomes full of a new sliver, an auto-counter A, attached to the machine P actuates a cutting means C which cuts the sliver which is being supplied from the machine P. At the same time, the auto-counter actuates the power for motor 13 and the motor 13 starts to drive the shaft 22, whereby the rods 9 and 9*a* travel transmitting the cans at A_1–A_6 and C_1–C_6 one pitch of the cans. By this means, the can at A_6 is transferred to position D_1 and pushes the cans at D_2 and D_3 to D_3 and C_6, respectively.

While the slivers in the cans at B_1–B_6 are being supplied to the machine S at the same time by conventional means, not shown, the empty cans in positions A_1–A_6 are transferred to positions C_1–C_6 one by one, each can having been supplied with a new sliver from the machine P when it passes the position D_1. Now the cans at C_1–C_6 are full of sliver and the cans at B_1–B_6 are empty, while no cans are in positions A_1–A_6. An auto-counter A attached to the machine P works at this time to start the motor 19, whereby the shaft 21 turns and causes the shoving movement of the plate 15. The cans in positions C_1–C_6, which are now full of sliver, push the cans in positions B_1–B_6, which are now empty, and the latter are transferred to the positions A_1–A_6, so that all the cans resume their starting conditions. These operations are repeated.

In the operation, the time for supplying the slivers to

this apparatus from the preceding machine and that for feeding slivers from this apparatus to the succeeding machine are so controlled to be substantially the same.

We claim:

1. An automatic can replacing apparatus for use with drawing frames, comprising a bed having a plurality of at least three side by side rows of can positions thereon, two outside rows and at least one central row between said outside rows, a guide passageway on the surface of said bed and extending from the end of one outside row to the corresponding end of the other outside row for guiding cans from said one outside row to the other outside row across the surface of the bed, can transfer means extending along said each outside row of can positions and adapted to engage cans at each of the can positions in the outside rows, can transfer driving means coupled to said can transfer means along said one outside row of can positions for moving cans in said row along said row toward said guide passageway a distance equal to the pitch of the can positions, and coupled to said can transfer means along said other outside row of can positions for moving cans in said last-mentioned row along the row away from said guide passageway a distance equal to the pitch of the can positions, a movable plate along the outside of said other outside row of can positions, plate moving means on which said plate is mounted for moving said plate transversely of said other outside row toward the said one outside row a distance equal to the transverse dimension of the row, and actuating means coupled to said can transfer driving means and to said plate moving means for actuating said can transfer driving means periodically and for actuating said plate moving means each time said can transfer driving means has been actuated a number of times equal to the number of can positions in said rows.

2. An automatic can replacing apparatus for use with drawing frames, comprising a bed having three side by side rows of can positions thereon, two outside rows and a central row between said outside rows, a semi-circular guide passageway on the surface of said bed and extending from the end of one outside row to the corresponding end of the other outside row for guiding cans from

said one outside row to the other outside row across the surface of the bed, can transfer means extending along said each outside row of can positions and adapted to engage cans at each of the can positions in the outside row, can transfer driving means coupled to said can transfer means along said one outside row of can positions for moving cans in said row along said row toward said guide passageway a distance equal to the pitch of the can positions, and coupled to said can transfer means along said other outside row of can positions for moving cans in said lastmentioned row along the row away from said guide passageway a distance equal to the pitch of the can positions, a movable plate along the outside of said other outside row of can positions, plate moving means on which said plate is mounted for moving said plate transversely of said other outside row toward the said one outside row a distance equal to the transverse dimension of the row, and actuating means coupled to said can transfer driving means and to said plate moving means for actuating said can transfer driving means periodically and for actuating said plate moving means each time said can transfer driving means has been actuated a number of times equal to the number of can positions in said rows.

3. An automatic can replacing apparatus as claimed in claim 2 in which said can transfer means each comprise a bar beneath said bed having fingers projecting upwardly therefrom and spaced at intervals therealong equal to the pitch of the can positions, said bed having a slot along each outside row through which said fingers can project, said bars each having a mangle rack at each end thereof, and said can transfer driving means comprise a plurality of pinions, one meshed with each mangle rack, and a motor geared to the pinions meshed with the mangle racks on the bar beneath said one outside row of can positions for rotating said pinions in one direction and geared to the pinions meshed with the mangle racks on the bar beneath said other outside row of can positions for rotating said lastmentioned pinions in the other direction.

No references cited.