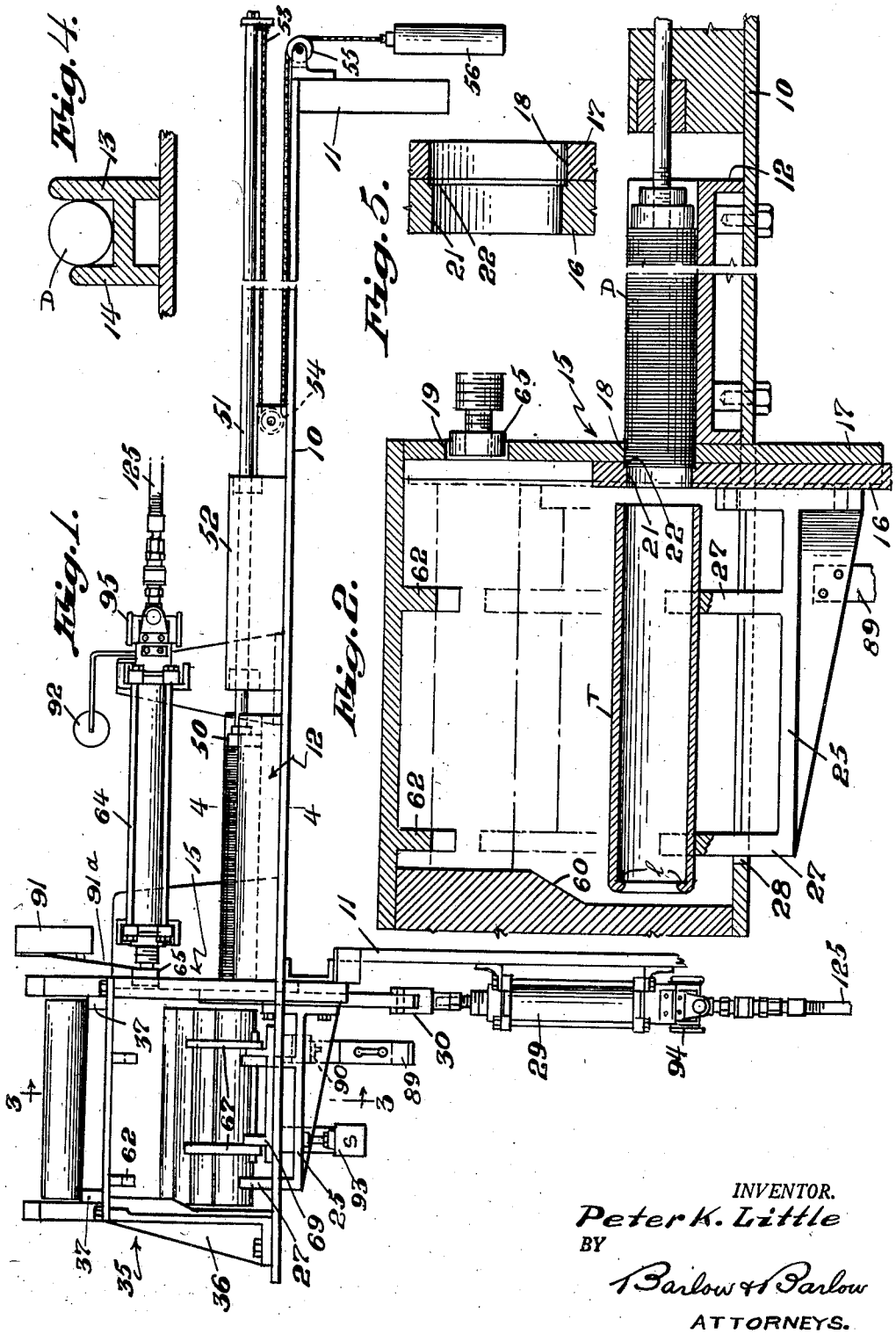
Dec. 31, 1957 P. K. LITTLE 2,818,006

DISK INSERTING MACHINE

Filed May 18, 1954 2 Sheets-Sheet 1



INVENTOR.
Peter K. Little
BY
Barlow & Barlow
ATTORNEYS.

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Fig. 3.

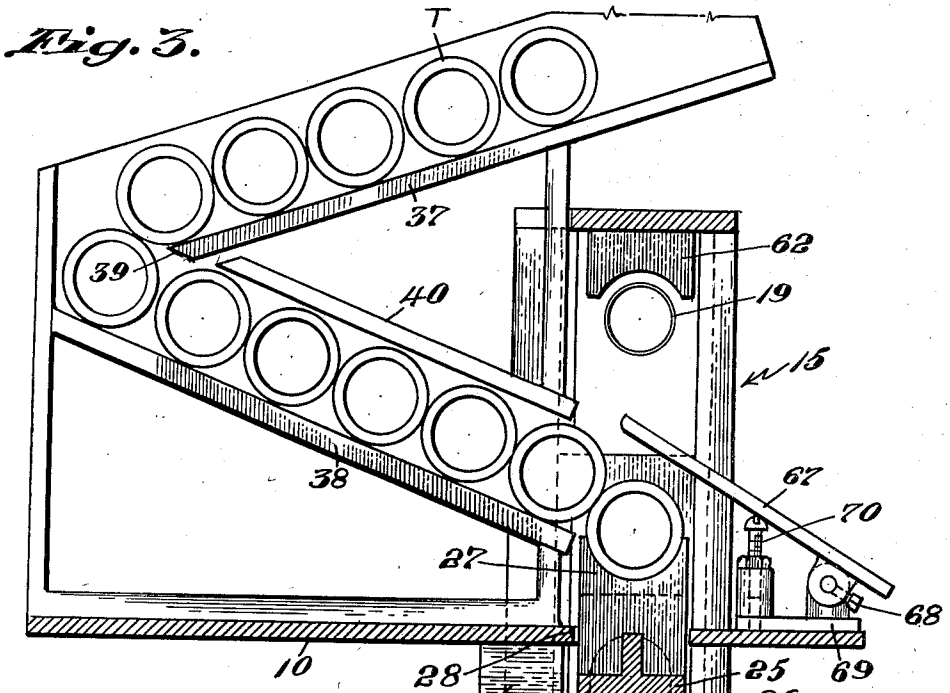
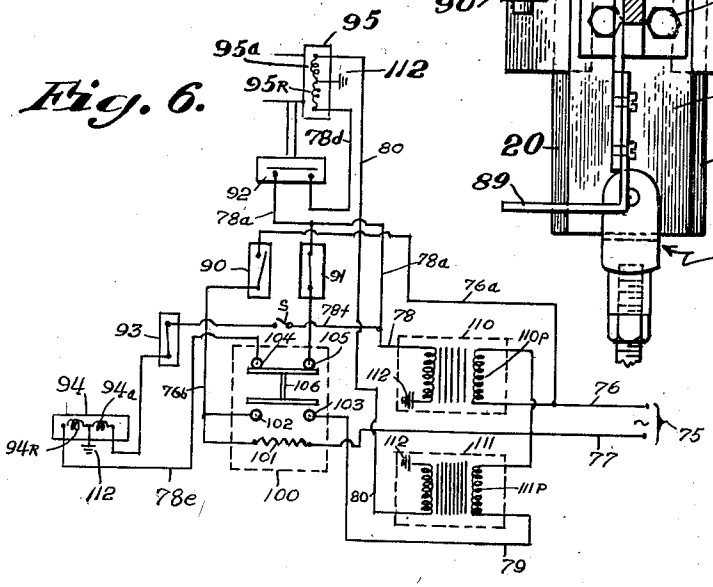


Fig. 6.



INVENTOR.
Peter K. Little
BY
Barlow & Barlow
ATTORNEYS.

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DISK INSERTING MACHINE

Peter K. Little, Pawtucket, R. I., assignor to John W. Little Company, a corporation of Rhode Island

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5 Claims. (Cl. 93—55.1)

This invention relates to a machine for inserting disks into the ends of tubular containers, the containers normally being provided with a rolled end or other stop means so that the disk may not be pulled out.

In the textile industry it has been the customary practice to label the bobbin upon which yarn is wound. This labeling has generally taken the form of gummed strips of paper which have been affixed to the inner side of the tubular bobbin and which, as can be readily appreciated, are difficult to see without tilting the bobbin to an angle and viewing into the interior of the cylindrical enclosure. It is considered preferable that there be some means at the end of the bobbin, and preferably the top end, that can serve as a ready identification means of the yarn that is wound thereupon.

It is therefore one of the objects of this invention to provide an apparatus in which an identifying disk may be inserted into the interior of a tubular bobbin.

It is a further object of the invention to provide an automatic apparatus in which the complete operation will be performed by the machine by merely furnishing the blank disks to a carrier and by feeding tubular bobbins to an inclined plane.

A more specific object of the invention is to provide a machine with a slide which will pick up a disk to be inserted at one station and move the disk and the tubular bobbin to a second station where the disk will be rammed home.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a front elevational view of my machine;

Figure 2 is a detailed sectional view of the tube carrier and slide mechanism;

Figure 3 is an end sectional view taken on lines 3—3 of Figure 1 showing the manner in which the tubular containers are advanced to the tube carrier and the ejecting mechanism associated therewith;

Figure 4 is a detailed sectional view of the disk magazine taken on lines 4—4 of Figure 1;

Figure 5 is a detailed sectional view of the slide mechanism; and

Figure 6 is an electrical schematic diagram showing the manner in which the various control circuits are associated one with the other to effect the automatic operation of the machine.

In proceeding with my invention, I provide an inclined guide for cylindrical tubes so that they will roll on to a tube carrier that is mounted integral with a vertical slide member. On the other side of the slide member I provide a channel-shaped magazine in which cardboard disks may be placed on edge, the magazine communicating with an opening in the slide support, the slide being provided with an opening having a recess to selectively grasp one disk at a time. After a disk has been placed within the recess in the slide, the slide and tube carrier which are

physically associated with each other are moved upwardly until they are positioned opposite a ram which operates to force the disk into the far end of the tube. After the ram has receded from the tube, the slide moves downwardly, and the cylinder with the disk inserted in the end thereof is automatically ejected from the machine.

Referring to the drawings, the machine has a suitable bed 10 with supporting legs 11 at the ends and intermediate portions, as necessary, thereof. Upon this bed 10 there is mounted a disk magazine 12 which is provided with two open ends and two upstanding side walls 13 and 14 (Figure 4). Adjacent one end of the disk magazine 12 is a vertical slide mechanism generally designated 15 which consists of a slide 16 mounted for reciprocation within a guideway 17. The guideway 17 is suitably fixed to the bed 10 and is provided with a circular opening 18 to receive the disks D from the disk magazine 12. A second opening 19 is also provided in the guide member 17 to allow the passage of a ram therethrough which will presently be described. The slide 16 is held within the channel guide 17 by providing beveled edges 20 (Figure 3) thereon which communicate with beveled edges in the guide 17. As will be seen by referring to Figure 5, the slide 16 is provided with a single opening 21 therethrough which has an enlarged recess at one end thereof forming a lip 22. The depth of this recess is the same as the thickness of the disks D so that one disk at a time is selectively engaged by the slide and removed thereby. A tube carrier 25 is affixed to the slide 16 by bolts 26 so that it may move therewith and has supports 27 extending therefrom with semicircular ends which are adapted to receive the cylindrical tube, an opening 28 being provided in the bed 10 so that the tube carrier 25 and slide mechanism 15 may pass therethrough. A vertical air motor 29 is connected to the slide 16 as at 30, providing motion to the slide 16 and the tube carrier 25.

To provide a feed means for the tubes T to the tube carrier 25, an inclined guide generally designated 35 is mounted adjacent the tube carrier 25 allowing the cylindrical tubes to roll on to the tube carrier. This inclined guide includes a support arm 36 mounted on the bed 10 and comprises two pairs of tracks 37, 38, respectively. As shown in Figure 3, these tracks are so arranged that tubes T may be placed on the tracks 37 where they will roll to the ends 39 thereof and thence drop on to the tracks 38. A retainer track such as 40 may be provided parallel to and spaced from the tracks 38 to prevent the tubes from jumping therefrom due to vibration. It will thus be apparent that the tubes T drop one by one on to the tube carrier arms 27 where their interior diameter is positioned for registration in line with the openings 18 and 21 in the channel guide 17 and slide 16, respectively.

The disks D are urged to the lip 22 of the slide 16 by means of a ram 50 which is connected to a shaft 51 that is supported in a bearing block 52. At the end of the shaft 51 there is affixed a chain 53 which runs parallel to the shaft 51 and over a roller 54 and thence over a second roller 55 at the end of the bed 10 to a weight 56. This arrangement therefore exerts an axial force along the shaft 51 which is transmitted to the ram 50, thus forcing the disks through the opening 18 and to the lip 22. It will also be noted that, through the provision of this arrangement, an equal axial force is exerted at all times throughout the travel of the shaft 51, which is important, inasmuch as the pressure exerted upon these disks must be uniform at all times to secure the proper operation of the machine. It might be noted that such a result could not be secured by the use of a spring loaded shaft and ram, although other mechanisms could be substituted so long as they produce a constant pressure at all extended positions of the ram.

When the vertical air motor 29 is actuated, it will be

noted that the slide **16** in conjunction with the tube carrier **25** will move upwardly, a disk D having been grasped by the lip **22** of the slide **16**. As the tube T moves upwardly, the end thereof remote from the slide **16** will engage a cam surface **60** and be moved horizontally to the right as viewed in Figure 2 so that the end adjacent the slide will abut the slide **16**, as shown by the broken lines in Figure 2. At the topmost position of the stroke, the tube T additionally engages stop fingers **62** to limit the upward movement thereof and to positively align tube T with the opening **19**. At this position a horizontal air motor **64**, which carries a ram **65**, may be actuated to force the disk D away from the lip engaging portion **22** of the slide **16**, the end of the stroke of the ram **65** bottoming the disk D on lip **1** of the tube T. After the ram **65** has receded, the vertical air motor **29** reverses, lowering the tube. During this downward motion of the tube T it will engage the ejector arm **67** which is pivotally mounted as at **68** by means of a bracket **69** that is secured to the bed **10**. The motion of these ejector arms **67** is limited by a stop pin **70** so that the ejector arms extend just beyond the center line of the tubes during their vertical travel.

Referring now to Figure 6, there is shown the control circuit diagram to provide the automatic operation in the disk inserting machine. A source of alternating current **75** is provided, one side of which as represented by lead **76** is connected via lead **76*a*** to one terminal of microswitch **90**, the other terminal of which is connected by lead **76*b*** to a contact **102** of time delay relay **100** and also to one side of the actuating coil **101** of the time delay relay, a circuit across coil **101** being completed to the A. C. source by lead **77**. A low voltage control circuit is provided by step-down transformer **110** whose primary **110*p*** is connected across the source of alternating current **75**. The secondary of this step-down transformer has one side thereof connected to a common return as indicated by ground **112**, the other side of which as represented by lead **78** is connected by lead **78*a*** to one terminal of pressure switch **92** and by lead **78*b*** through toggle switch *s* to one terminal of microswitch **93**. A second low voltage source control potential is supplied by step-down transformer **111**, the primary **111*p*** of which is connected to one side of the source of alternating current as represented by lead **77**, the other side of the primary being connected through lead **79** to contact **103** of the time delay relay **100**. The secondary of transformer **111** has one side thereof connected to a common return as represented by the ground symbol **112**, the other side of the secondary being connected via lead **80** to one side of advance solenoid **95*a*** in "Electroaire" valve **95**, the other side of which is returned via a common return connection as represented by ground symbol **112** to the other side of the secondary of transformer **111**. For a fuller description of the operation of the "Electroaire" valves, the disclosure in Patent No. 2,641,229 to L. F. R. Bellows is incorporated herein.

In describing the operation of the disk inserting machine, let us assume that the parts are in their position as shown in Figure 1 of the drawing and that the switches as shown in Figure 6 are in the position shown therein. It should also be assumed that the mechanism is in the position as shown in Figure 1. In this condition it will be noted that switch **93** is being engaged by the tube carrier **25**, and since it is of the normally open type, will thereby be closed, as shown in Figure 6. Likewise the switch **91**, which is also of the normally open type, is engaged by ram **65** and is also closed. Closing the switch *s* to start the device, it will therefore be seen that the secondary of transformer **110** will be connected across the solenoid coil **94*a***, thus energizing it. Coil **94*a*** is the advance coil of the "Electroaire" valve associated with the pneumatic motor **29** and operates a valve to supply air from a source **125** to advance the piston of the air motor **29**, the operation of which is more fully described in Patent No. 2,641,229. The tube carrier **25** and the slide **16** therefore rise in a vertical direction as viewed in the drawing, and switch **93** opens. At the top of the stroke of the tube carrier **25**, the bracket **89** affixed to the tube carrier will engage switch **90**, closing this switch, which will thereby energize coil **101** of the time delay relay **100** by virtue of the connection from the alternating current supply source **75** as represented by leads **76**, **76*a***, **76*b***, and **77** and move the contactor arm **106** away from the contacts **104** and **105**. When the contactor **106** engages the contacts **102** and **103**, this will complete a circuit across the primary **111*p*** of transformer **111** to the source of A. C. voltage **75** by leads **77**, **79**, **76*b***, **76*a*** and **76**. The secondary of transformer **111** is now energized and supplies a voltage as represented by lead **80** and the common ground connection **112** to the advanced solenoid coil **95*a*** of the "Electroaire" valve **95**, which operates as the "Electroaire" valve **94** just described and advances the ram **65** of the air motor **64**. As the cylinder ram **65** is advancing, the time delay relay coil **101** moves the contactor **106** back to position as shown in Figure 6 to complete a circuit across contacts **104** and **105**. To reverse the operation of the air motor **64**, there is affixed to the cylinder a pressure switch **92**, which will be actuated upon a certain positive pressure being exerted thereupon. Thus, when the ram **65** reaches the end of its stroke, pressure will continue to build up by virtue of continuous supply from line **125** to a point where the switch **92** will be actuated. With switch **92** closed, this will complete a circuit across the retract solenoid **95R** of the "Electroaire" valve **95** from the secondary of transformer **110** as represented by leads **78*a*** and **78*d*** and the common ground connection **112**. This will retract the ram **65** until it engages the actuator arm **91*a*** of switch **91**, reclosing switch **91**, and completing a circuit from the secondary of transformer **110** across the retract solenoid **94R** of the "Electroaire" valve **94** as represented by leads **78**, **78*a***, contactor **106**, and lead **78*e*** in conjunction with the common ground return **112**. It should be noted at this point that the switch **93** has been open during all of the preceding operations so that voltage has been removed from across the advance solenoid coil **94A** of the "Electroaire" valve **94**. With the retract solenoid **94R** energized, the supply of air pressure **125** to the piston of air motor **29** is reversed and the slide **16** of the tube carrier **25** is retracted or lowered. As soon as the tube T releases its contact with switch **90**, coil **101** is de-energized and the time delay relay **101** is automatically reset. As the slide **16** and tube carrier **25** are lowered, the tube T will be ejected by the ejector arm **67**, and as soon as the tube carrier **25** reaches its lowermost position, it will re-engage the switch **93**, closing it, and repeating the complete cycle, an additional tube T having fallen into the tube carrier arms **27** as soon as the tube carrier has reached a low enough position.

I claim:

1. A machine for inserting discs in tubes comprising a mounting plate, a disc magazine mounted on said plate and adapted to support substantially flat discs on their edges, a slide mounted for reciprocation on a plane perpendicular to said plate and parallel to the stored discs, said slide having a through bore surrounded by a recess of identical shape to the outline of said discs, means urging said discs into said recess, a tube carrier affixed to said slide adjacent said bore, means feeding tubes to said carrier, a ram operable on an axis perpendicular to the reciprocating plane of said slide and intersecting the center of said bore, and means to reciprocate said slide and said ram so as to first move the bore in said slide into alignment with said ram and then reciprocate the ram and force a disc into a tube held in said carrier.

2. A machine as in claim 1 wherein the slide and the ram are reciprocated by air motors, said motors having solenoid actuated reversing valves affixed thereto, and a control circuit associated with said reversing valves to provide sequential operation of said motors.

3. A machine for inserting discs in tubes, comprising a magazine for storing discs in parallel relationship, a slide moving on an axis perpendicular to said magazine, said slide having means affixed thereto for grasping the end disc in said magazine, a tube carrier affixed to said slide in alignment with said disc grasping means, means feeding tubes one at a time to said carrier, means positioned on an axis parallel to said slide and adapted to engage the end of the tube in said carrier to move it into abutting relationship with said slide as said slide moves, a ram operable on an axis parallel to said magazine, and means for moving the ram against the disc gripped by said slide to force the disc into the tube.

4. A machine for inserting discs in tubes, comprising a horizontally disposed magazine for storing discs edgewise in parallel relationship, a slide mounted for vertical reciprocating movement on an axis perpendicular to said magazine, said slide having means affixed thereto for grasping the end disc in said magazine, a tube carrier secured to said slide for reciprocating movement therewith and extending in alignment with said disc grasping means, means including an incline for feeding tubes one at a time to said carrier and a ram spaced from said magazine and operable on an axis parallel to said magazine and means for moving said slide and carrier into alignment with said ram, and means for moving the ram against the disc gripped by said slide to force the disc into the tube,

means for moving the tube longitudinally into abutting relation with the slide as the tube is moved into alignment with the ram.

5. A machine for inserting discs in tubes comprising a movable tube carrier, a fixed disc magazine adapted to support substantially flat discs on their edges, means affixed to said movable carrier to grasp one disc at a time and hold it in alignment with a tube on said carrier, means exerting a constant pressure on said discs throughout their travel in said magazine, a ram operable on an axis parallel to a tube held by said carrier, said ram being spaced from said magazine, means to move said tube carrier to align said tube with said ram, means including an incline for feeding tubes one at a time to said carrier, cam means positioned on an axis parallel to the reciprocating axis of said carrier to engage the end of the tube and move it into abutting relationship with the disc grasping means, and means for moving the ram against the gripped disc to force the disc into the tube.

References Cited in the file of this patent

UNITED STATES PATENTS

1,053,702	Bond	Feb. 18, 1913
2,180,954	Harrison	Nov. 21, 1939
2,580,846	Sayre et al.	Jan. 1, 1952
2,678,591	Fleming et al.	May 18, 1954