

Dec. 6, 1960

R. M. INGHAM, JR
BOBBIN HANDLING ARRANGEMENT

2,962,856

Filed June 10, 1958

4 Sheets-Sheet 1

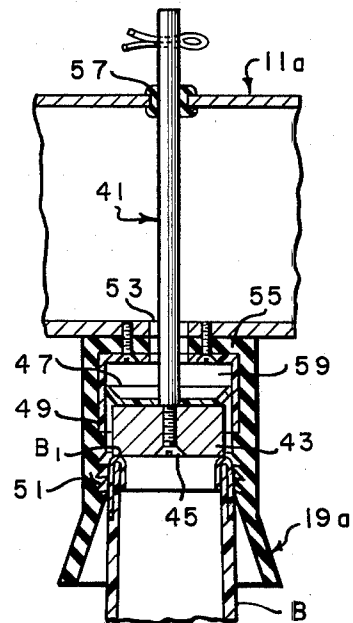
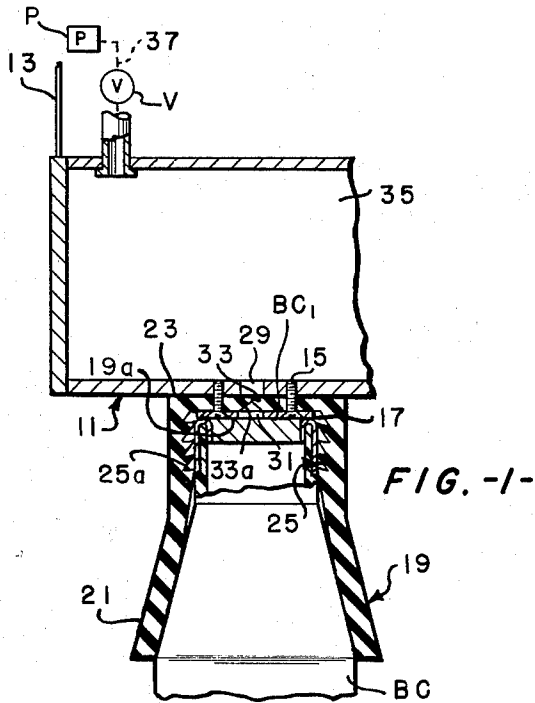


FIG. 2-

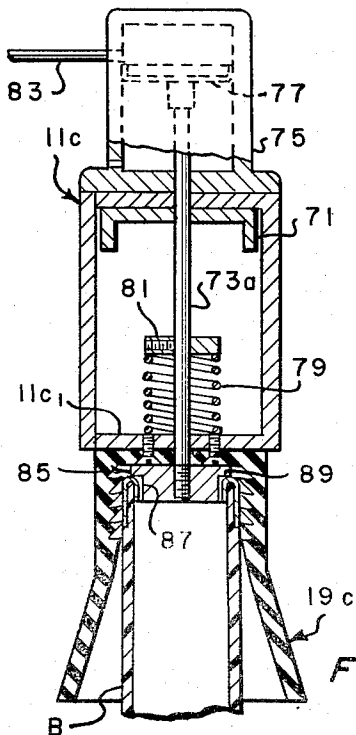


FIG. 4a-

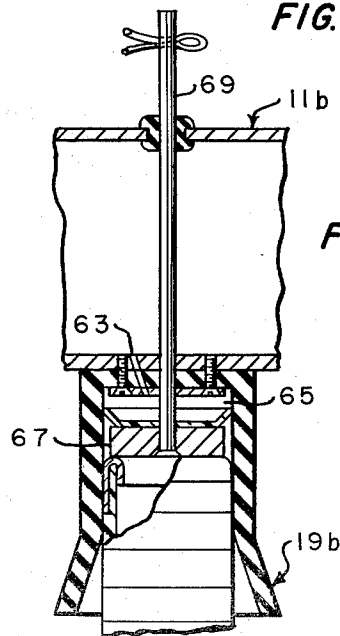


FIG. 3-

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4 Sheets-Sheet 2

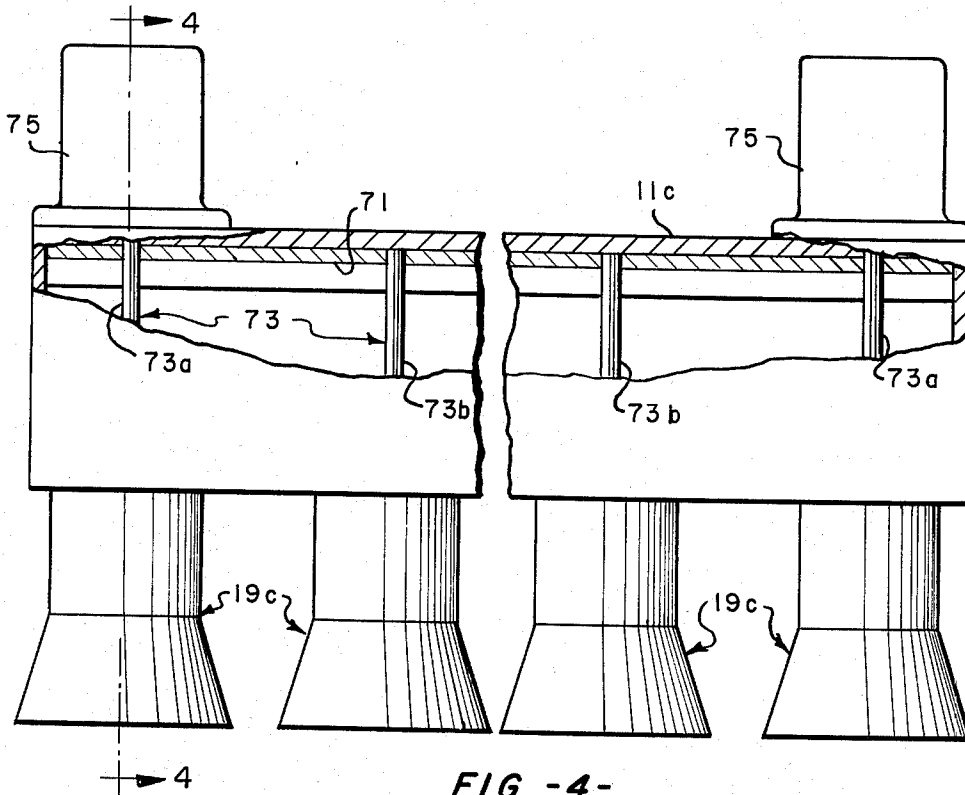


FIG. -4-

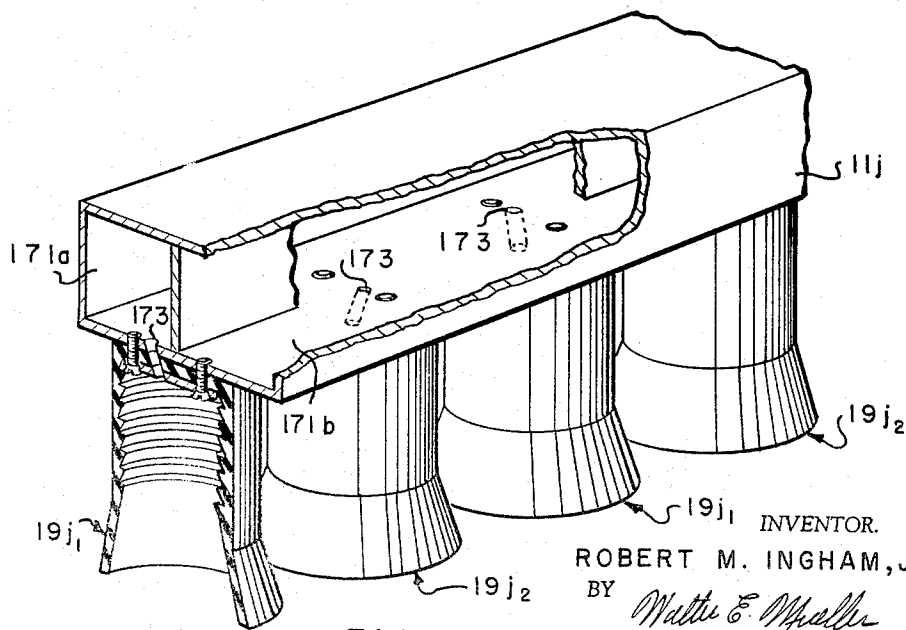


FIG. -II-

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FIG. 6-

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4 Sheets-Sheet 4

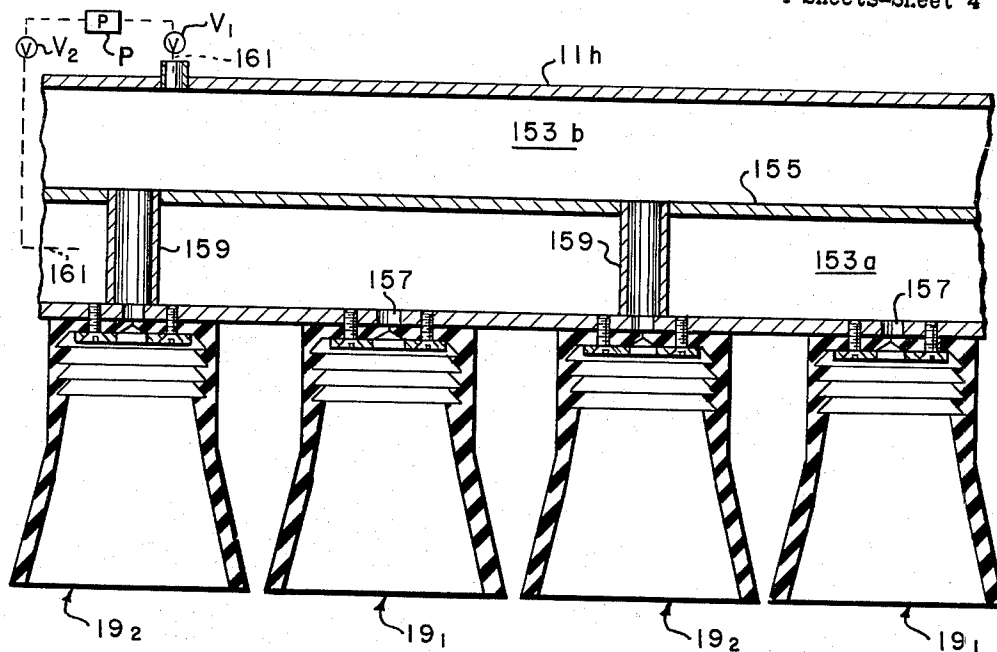


FIG. -9-

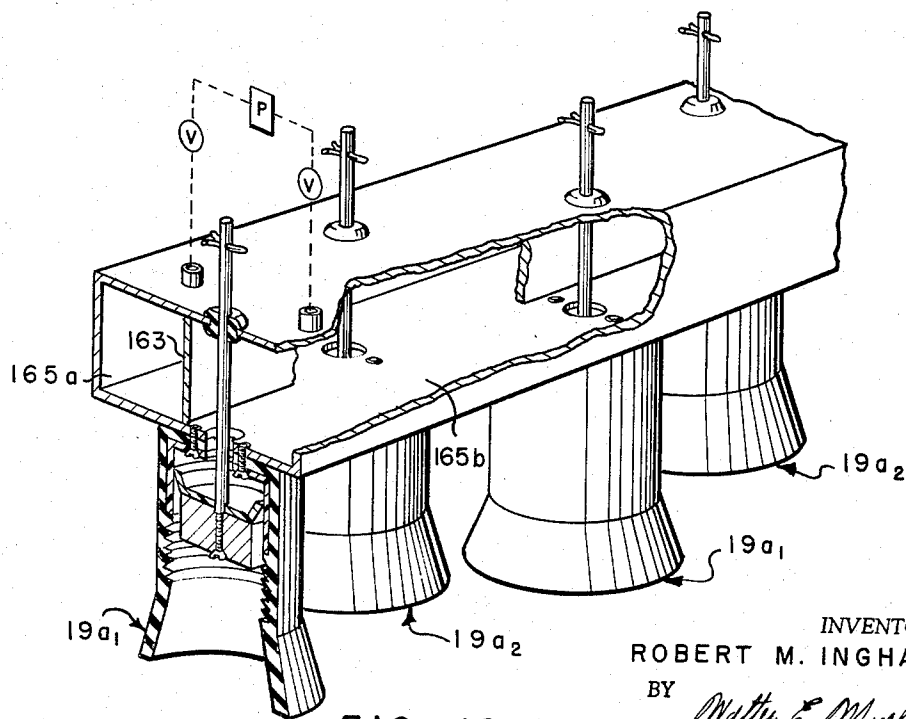


FIG. -10-

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2,962,856

BOBBIN HANDLING ARRANGEMENT

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38 Claims. (Cl. 57—52)

This invention relates to improved holders, and more particularly to an improved bobbin holding and ejecting arrangement which is particularly adapted to overhead donning of bobbins from a carrier onto a spindle, or other suitable receiving device.

In the art of doffing and donning bobbins respectively from and onto spindles of a textile spinning frame or the like it is desirable to eliminate as much manual labor as is possible. Accordingly, various labor-replacing doffing and donning apparatus have been proposed and tried. In employing various ones of the proposed systems one major problem is the carrying of bobbins from the location or position to another and the discharge of the bobbins, as well as the seating thereof, at a desired position as for example from a loading station to the spindles, where the bobbins must be discharged and seated thereon.

Accordingly it is a major feature of this invention to provide a unique carrier for bobbins or other desired articles which is particularly adapted to the holding and carrying of bobbins from one position to another and which has the feature of providing resilient gripping of the bobbin end while also providing for positive discharge or ejection of the bobbin and seating of the bobbin at a desired discharge point, as for instance onto a spindle of a textile frame.

A further feature is the provision of a unique bobbin holding and ejecting arrangement wherein the bobbin is held by a holder and is ejected by force exerted axially thereon through one end of the holder.

Another feature of the invention is the provision of an end bobbin holder which is capable of ejecting and seating bobbins of both closed end type and open end type.

Still a further feature of the invention is the provision of end gripping holders having an annulus gripper and a pneumatically effected ejecting means.

Still another feature is the provision of an end holder arrangement for bobbins and other suitable articles, in which two separate sets of bobbins may be held and separately positively ejected each as a complete set and independently of the other.

Still a further feature of the invention is the provision of a bobbin or other article holding arrangement wherein the bobbins or the like are held by individual holders and a common pneumatic connection is employed to eject the bobbins as a group substantially simultaneously from their holders.

Still other objects, features, and attendant advantages will become apparent to those skilled in the art from a reading of the following detailed description of several embodiments constructed according to the invention, taken in conjunction with the accompanying drawings, wherein

Figure 1 is a longitudinal section view illustrating one end section of an embodiment constructed according to one aspect of the invention,

Figure 2 is a section view illustrating a representative

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section of a modified embodiment constructed according to a further aspect of the invention,

Figure 3 illustrates a further modification according to the invention,

Figure 4 illustrates schematically in front elevation another modification constructed according to the invention,

Figure 4a is a section view taken on line 4—4 of Figure 4,

Figure 5 is a section view illustrating a further modification,

Figure 6 illustrates still a further modification according to the invention,

Figure 7 is a schematic illustration illustrating still another modification according to the invention,

Figure 8 is a schematic illustration in partial section illustrating a further modification wherein a plurality of bobbin holders are provided with a common closed collapsible tube employed for providing ejection pressure to each individual holder, and

Figures 9, 10, and 11 illustrate still further modifications according to the invention, wherein two different groups of alternate bobbin holders are mounted on a common carrier with separate pneumatic connections thereto

Broadly, according to one aspect of the invention, a bobbin holder arrangement is provided for holding one end of a bobbin, preferably in depending relation therefrom, and including a pneumatic force ejecting connection between a pneumatic conduit and the upper held end of the bobbin. In one group of embodiments according to the invention the force is applied directly by air pressure exerted on the top or closed end of substantially closed ended bobbins. According to another aspect of the invention as applied to bobbins having open ends the ejecting force is pneumatically applied through the medium of a movable plunger which is moved by pneumatic pressure exerted thereon either directly by air as illustrated in several of the embodiments or indirectly by the pneumatic expansion of a flexible tube as illustrated in another of the embodiments.

According to still a further aspect of the invention the preferred embodiment includes annular elastic frictional ring members each of which encompasses and frictionally grips the upper end of a bobbin and has a pneumatic force connection between the upper end of the holder and a pneumatic conduit, preferably a pneumatic conduit to a plurality of holders on a common carrier. In this preferred embodiment the most universally applicable and preferable construction for applying an ejecting force to the bobbin is through the medium of a movable plunger which has a portion thereof operatively connected either directly to or indirectly to the air pressure line or conduit. According to still a further aspect of the invention a plurality of groups of individual holders for bobbins are actuated by groups through the medium of two or more conduits which are connected respectively to individual bobbin holders in the two or more corresponding groups of bobbin holders. This may be effected by conventional tubing or preferably by employing the carrier member itself as one or more compartmented pneumatic conduits. These and still other modifications are described in detail in the following detailed description of the various embodiments illustrated in the figures of the drawings.

Referring now in detail to the figures of the drawing, in Figure 1 a rigid hollow support beam 11 of rectangular cross section is suitably movably supported for desired lateral and vertical movement as by spaced-apart cables 13, one of which is shown. Suitably mounted, as by screws 15 and a metal washer 17, in depending relation on the lower side of the support beam 11 is a plu-

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ality of inverted-cup-shaped end-holders 19 of desired number, as for example corresponding to the number of spindles on the side of a spinning, twisting, or frame. The open lower end 21 of each end holder 19 has a flared skirt configuration which serves to guide the ends of the bobbins into the upper gripping or holding section 25 of the bobbin end holder, or vice versa serves to guide the holder into aligned position for movement down into gripping position about the bobbin end. The end holders 19 are preferably formed of elastic material such as rubber, neoprene, plastic or the like, in order to provide an elastic frictional inner gripping surface 25 for the end of the bobbin BC to be held thereby, although if desired a more rigid holder body might be employed and provided with an elastic inner surface therein formed as by an annulus insert of relatively elastic rubber or the like for frictionally gripping the bobbin end. In the example of Figure 1 the gripping section 25 is formed by one or more, and preferably a plurality of flexible annular rings 25a of saw-tooth cross-sectional configuration which provide a smaller resistance to bobbin insertion into the holder 19 than to removal of the bobbin therefrom. This is advantageous particularly in handling large numbers of bobbins, in that the force required to be exerted by or on the support in order to seat the bobbin ends within their respective holders 19 is considerably reduced. In many instances this force is effected substantially solely by the weight of the support beam and holder assembly 11, 19, and the reduction in amount of force required for insertion of the bobbins into the holders permits the use of a relatively light support beam assembly.

Positive acting pneumatic ejection of closed-ended bobbins BC is provided through the medium of a pneumatic force effecting arrangement between a source of pneumatic pressure P and the upper end of the holder 19, which takes the form of apertures 29, 31 formed respectively in the lower wall of the hollow support beam 11 and the washer 17, and a correspondingly aligned transverse slit 33 formed in the base 23 of the cup-shaped holder 19. The transverse slit 33 in the illustrated embodiment has an inverted Y-shaped cross-sectional configuration having lips 33a which are normally in mutual resilient contact, this configuration being provided to the end that the entry of a bobbin into the holder gripping section 25 will be relatively easily accomplished, the air trapped inside the upper end of the holder escaping easily through the normally substantially unidirectional valve formed by the slit 33, whereas removal by pulling on the bobbin is opposed not only by the sawtooth gripper rings 25a, but also by virtue of the greater resistance to air flow into the partially evacuated chamber which is formed at the upper end of the holder 19 above the bobbin BC upon any attempt to forcibly or accidentally dislodge the bobbin from the holder.

The closed-ended bobbin BC may facily be positively ejected and seated onto a spindle (not shown), or otherwise as may be desired, by opening a suitable control valve V in the pressure supply line, thereby applying air pressure to the upper closed end BC₁ of the bobbin BC through the common air conduit including supply line 37 and the hollow airtight support beam 11, and thence through slit valve 33. It will be apparent that while the slit 33 provides a desired finite resistance to air flow into the upper end of the holder 19 considerably greater than the resistance to outflow therethrough from the holder 19, it will nevertheless permit air under pressure, such as for instance 15-20 p.s.i., to pass therethrough from the hollow interior 35 of support beam 11 into the upper end of the holder to thereby forcibly eject the bobbin from the holder 19.

Operation of this apparatus will be readily apparent from the foregoing description, a bobbin, empty or full, being pushed into the upper gripper end of the holder 19 as by manual insertion and pushing of the bobbin, or

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by laterally aligning and lowering of the beam 11 so as to bring the holder or holders 19 down onto a respective bobbin or bobbins BC which are to be picked up. The kinetic energy or the weight of the beam assembly may be employed to securely seat the bobbin ends against the flat upper end 19a of their respective holders for desired vertical and mutually parallel positioning of the laterally spaced-apart bobbins held by the holders 19 on the beam 11.

The beam 11 may then be raised and moved laterally by the cables 13 and positioned with the end holder 19 at a desired discharge station, as for instance a side of a textile frame having spindles thereon, or a belt or receiving hopper. Thereupon the beam may be lowered to the desired height, and the bobbins BC may be vertically discharged from their holders 19 by opening control valve V to thereby apply pneumatic pressure on the closed upper ends of the bobbins BC through the conduit system 37, 11, 29, 31, 33. In using the invention for donning empty bobbins onto the spindles of textile frames, such as spinning frames and the like, it is particularly advantageous, in that by positioning the holders 19 such that the bobbins held thereby are still a small vertical distance above their seated positions on the spindle at the point of their moving completely free of the friction gripping section 25 (e.g. rings 25a) they will be subjected to a sudden acceleration upon this release due to the sudden decrease in resistance to expansion of the pressurized air acting on the bobbin end, with resultant excellent seating of the bobbin on the spindle.

In Figure 2, there is illustrated an alternative embodiment particularly adapted to use with either closed-ended bobbins BC as in Figure 1 or open-ended tube type bobbins B as are commonly employed on spinning frames. In this arrangement a pneumatically actuated plunger 41 is provided, the plunger 41 having an enlarged end formed as by a disc 43 formed thereon or suitably secured thereto, as by screw 45. The enlarged end 43 of the plunger serves to positively engage the open end surface B₁ of the bobbin and eject and seat it onto a spindle or the like, as may be desired.

Mounted on the upper end of the disc 43 is a cup-shaped flexible washer 47 which fits snugly within a smooth-walled insert liner 49 in the cup-shaped holder 19a and having a relatively low coefficient of friction, thereby permitting more facile movement of the washer 47 and disc 43 therein, whereas the rubber bobbin gripping section 51 of the holder 19a provides a surface with relatively high coefficient of friction for effectively gripping the end of a bobbin inserted therein.

The plunger 41 extends loosely through an oversize bore 53 formed in the base of liner 49, the cup base 55 and the lower wall of the conduit-beam 11a, and extends at its upper end through a rubber bushing 57 which serves both as a guide for vertical movement of the plunger rod and as a seal against escape of air from the conduit-beam interior. The oversize bore 53 serves the dual purpose of providing a passage for plunger 41 and for air communication between the interior of conduit carrier 11a and the chamber 59 formed above washer 47 and disc 43.

The operation of this arrangement is similar to the arrangement of Figure 1, differing therefrom however in the important respect that air pressure is channeled from the beam conduit interior through the orifice 53 into the chamber 59 to thereby move the plunger down and eject and seat the bobbin, this being effected through positive engagement of the enlarged end 43 of the plunger assembly with the held end of the bobbin B.

Referring now to Figure 3 there is shown an embodiment similar to that in Figure 2 in that a plunger 67, 69 is employed for positively ejecting a retained bobbin under the influence of selectively controlled air pressure from the interior of the hollow support beam 11b. This arrangement differs from that of Figure 2 in that the orifice connection 63 between the hollow interior of the beam

and the upper chamber 65 formed above the enlarged lower end 67 of the plunger is disposed to one lateral side of the plunger rod 69. Otherwise the construction and operation of this modification is substantially similar to the embodiment of Figure 2.

In Figures 4 and 4a there is illustrated a further modification wherein a common longitudinally extending connecting bar 71 connects a plurality of ejection plungers 73 for operation by a single one or several spaced apart air cylinders 75. In this particular arrangement two air cylinders 75 are operatively connected through a common longitudinal bar 71 to a greater plurality of ejection plungers 73, the air cylinders being mounted or formed on the top of the support beam 11c. Two of the plungers 73a are directly coupled to and actuated by the two air cylinders 75 and have formed at their respective upper ends an enlarged piston portion 77 which serves to transmit the pneumatic force within the respective air cylinder 75 in the form of rectilinear motion, this rectilinear motion being transmitted to each of the other plungers 73b through the common connection effected by the longitudinally connecting bar disposed within the support beam. While return movement of the plungers may be effected in most instances by the insertion of a bobbin into each of the holders 19c, it is sometimes advantageous to employ a return spring 79 as illustrated in this embodiment, this return spring arrangement being a compression spring surrounding the plunger rod and acting between the lower wall 11c₁ of the support beam and an adjustable collar 81 suitably fixed to the plunger rod (see Figure 4a). In operation, compressed air is supplied through the supply line 83 to the upper interior of the air cylinder or cylinders 75 and the force effected thereby is transmitted to each of the plungers 73 through the medium of the directly acted upon plungers 73a and the connecting bar 71 which is connected to each of the adjacent vertically movable plunger rods 73b.

The arrangement as illustrated in Figure 4 also differs from the preceding embodiment in that the enlarged lower end 85 of the plunger has a reduced portion 87 thereof complementary to or slightly smaller than the inner peripheral surface of the bobbin B, an annular shoulder 89 being formed on this enlarged lower end of the plunger for engagement with the upper end surface of the bobbin in order to provide the necessary ejecting force on the bobbin. Thus the reduced portion 87 serves as a positioning guide for the bobbin B during the ejection and/or seating thereof by the ejector-holder 19c.

An arrangement similar to that disclosed in Figure 4 is illustrated in Figure 5, this modification differing in the particular holder 19d for retaining the bobbin. In this arrangement a flared annulus 91 encompasses and is secured as by bonding to a flat disc magnet 93 which is mounted in a suitable manner, as by screws 95, onto the bottom wall 11d₁ of the support beam. The plunger rod 97 extends through an aperture 99 formed in the lower wall 11d₁ and the magnet 93 into the space within the flared annulus 91 below the magnet, and has formed or secured thereon an enlarged disc 101 portion of non-magnetic material which is of a diameter sufficient to engage the upper end surface of the bobbin which has an end cap B₂ of ferromagnetic material, such as steel. The operation of this embodiment is generally similar to that of the embodiment of Figure 4 in the operation of the plunger assembly 97, 101; however, the flared annulus 91 serves only to guide the bobbin B into engagement with the enlarged disc portion 101 of the plunger, the bobbin being retained by the magnetic attraction between the magnet 93 and the metallic end portion B₂ of the bobbin. Ejection of the bobbin is effected by downward movement of the plunger 97, 101 under the influence of air pressure in the air cylinder 103.

The arrangement illustrated in Figure 6 is similar in some respects to that shown in Figure 2, particularly in

that an air orifice 119, 121 is formed between the hollow interior of the support beam 11e and the upper chamber 113 of the bobbin holder 19e, this orifice surrounding and being coaxial with the plunger rod 123. In this modification however, the orifice is formed in a plug insert 115 suitably mounted as by a screw thread connection 117 in the lower wall 11e₁ of the support beam. A plurality of radial passageways 119 connect an axial passageway 121 with the hollow interior of the support beam 11e to effectively form a connecting passageway 119, 121 between the support beam interior and the upper chamber 113 formed in the holder. The plunger rod 123 is enclosed entirely within the holder 19e and the support beam interior and is guided at its upper end by a complementary bore 125 formed in the upper end of the plug insert 115. This embodiment thus has the advantage over several of the preceding illustrated embodiments in that the plunger rod does not extend through the upper wall 11e₂ of the hollow support beam, thus eliminating the difficulty of possible air pressure loss through the connection between the upper wall of the support beam and the upper end of the plunger rod.

In Figure 7 there is illustrated still a further modification wherein an open channel bar 131 is employed as the support beam, each of the bobbin holders 19f being actuated to eject a bobbin therefrom by an individual air cylinder 133 mounted on the channel bar in alignment with each respective bobbin holder. A common supply tube 137 may be employed for supplying air under pressure to the individual air cylinders for ejection of the bobbins held by the holders 19f. The plunger may advantageously be formed of a constant diameter rod 139, which is particularly advantageous when the holder is of a size adapted to hold the upper end of a filling bobbin or quill BF, the diameter of the upper ends of such bobbins being quite small compared to the warp bobbins B such as are illustrated in Figures 1, 2, etc.

A further modification is illustrated in Figure 8, wherein a common collapsible and expansible tube 141 is employed for effecting ejection of the individual plungers 143 at each of the bobbin holder positions. In this arrangement an inverted U-channel member 145 has mounted thereon in spaced apart relation a plurality of bobbin end holders 19g each having a plunger 143 mounted for vertical movement therewithin. Advantageously the bobbin holders 19g are slidably removably mounted on the U-channel support beam 145 by a common spacer support member 147 having a T-shaped or I-shaped cross section, the holders 19g being suitably secured to said spacer member 147 in any suitable manner as by bonding, screws, or the like, not shown. At each holder position the plunger is disposed for vertical movement within a vertical bore 149 formed in the upper end of the holder cup and the T-shaped spacer support member, the plunger being supported at its upper end by a flat pressure plate 151 resting on the upper surface of the spacer member 147 at the lower end of its travel. Each of the plate members 151 preferably has a substantial upper surface area in order to provide sufficient ejecting force to the individual plungers with a minimum of pressure within the collapsible tube. The tube, which is closed at one end (not shown) and is connected at the other end to a suitable pressure source P as through a control valve V, rests upon the flat upper surfaces of the pressure plate members 151 and is normally deflated. In the collapsed state of the tube the plungers 143 may be easily pushed upwardly by the insertion of bobbins into the gripper section of the bobbin holders, this action being effective to move the pressure transmitting plates 151 upwardly out of contact with the spacer support member 147. Upon the opening of the valve V the flexible tube 141 will be expanded and tend to assume a circular cross sectional shape. The cross sectional diameter of the tube 141 is

however preferably greater than the vertical distance between the upper wall of the U-channel support beam 145 and the pressure transmitting plates 151 when in their lowermost position thus preventing full expansion of the tube 141. The expansion of the tube 141 by the air pressure results in a vertical pressure being exerted by the tube on both the upper wall of the beam and on the plates, the plungers 143 being thereby forced downwardly to eject the bobbins held by the holders 19g.

The embodiment of Figure 8 is particularly advantageous in that a positive ejection of the bobbin from each of the gripper cup bobbin holders 19g may be effected by axially movable plungers without the necessity of having a movable member associated with the plunger which requires an air seal in order to prevent pressure loss during ejection. The particular illustrated arrangement of this embodiment is further advantageous in that the entire gripper cup assembly may be readily removed from and mounted in the inverted U-channel support beam by longitudinally sliding the T-shaped spacer member on the inwardly turned legs 145a of the U-channel member 145. This permits ready assembly and disassembly of this arrangement. Furthermore, the pneumatic force applying means in the form of the collapsible tube 141 is also advantageous in that such is readily removable and interchanged without material difficulties.

In Figures 9-11 there are shown three additional modifications wherein two groups of bobbin end holders are arranged in alternate sequential relation on a single support beam. In each of these embodiments the bobbins held by either of the groups of bobbin holders may be positively ejected without ejection of the bobbins held by the other group of bobbin end holders, or as may be desired both groups may be simultaneously actuated to eject their bobbins. The carrier beam in each of these embodiments is divided into and forms two sealed hollow air conduits, each of which serve to supply substantially air sealed pressure to each of the bobbin holders in a respective one of the two bobbin holder groups, the compartmented beam also serving in these embodiments as a movable carrier support for the bobbin end holders as in the embodiments illustrated in Figures 1, 2, etc.

In Figure 9 the support beam 11h is divided longitudinally along its length into two longitudinal air tight compartments 153a, 153b sealed from one another by a longitudinally extending separate plate 155 which extends along the entire length of the carrier support beam. In this illustrated embodiment the longitudinally extending separator plate 155 divides the support beam into two conduits one above the other, the lower compartment conduit 153a being connected by orifices 157 with the bobbin end holders 19₁ of the first group (which are by way of example of the type illustrated in Figure 1), whereas connection between the upper compartment conduit 153b and the bobbin end holders of the second group 19₂ is effected through the medium of a plurality of vertical tubes 159 passing through the horizontal separator plate 155 and the lower compartment conduit chamber 153a to the respective valve openings of the bobbin end holders. Separate external supply lines 161 are connected between a suitable source of air pressure P and the respective compartment conduits formed by the carrier support beam, a separate valve V₁, V₂ being connected in each of the supply lines for selected operation of the two groups of bobbin end holders.

In Figure 10 the bobbin end holders 19a₁, 19a₂ of the two groups are, by way of example, of the type illustrated in Figure 2, and the longitudinal separator plate 163 is vertically disposed to effectively divide the carrier support beam into two horizontally side by side compartment conduits 165a, 165b. In this arrangement the bobbin end holders 19a₁ and 19a₂ of each group are in longitudinal alignment and are vertically mounted under a respective

one of the two laterally disposed compartment conduits 165a and 165b, the alternate spacing of the two groups of bobbin end holders thereby effecting a staggered relationship between the adjacent bobbin end holders.

In Figure 11 the embodiment is similar to that of Figure 10 in the positioning of the laterally disposed compartment conduits 171a and 171b within the body of the carrier support beam 11j; however, in this embodiment the bobbin end holders 19j₁ and 19j₂ are all in longitudinal alignment along the length of the carrier support beam 11j. To the end that this vertical alignment may be effected, while also achieving the division of the bobbin end holders into two separate groups which are selectively actuatable, the orifices 173 connecting the interior of the compartment conduits 171a, 171b with their respective alternate bobbin end holders 19j₁ and 19j₂ are laterally offset on opposite sides of a longitudinal line passing through the axis of the bobbin end holders. A separate suitable external supply line and valve (not shown) may be suitably connected between each of the compartment conduits and a source of pneumatic pressure as disclosed in the preceding embodiments of Figures 9 and 10. The bobbin end holder as disclosed in this embodiment differs slightly from the embodiment of Figure 1 in that the air orifice 173 connecting between the interior of each gripper cup holder and the respective compartment conduit is an open bore, although it will be apparent that a valve of the type disclosed in Figure 1 might also be suitably employed if desired.

While I have illustrated and described several physical embodiments according to various aspects of my invention it will be readily apparent to those skilled in the art that these embodiments are merely illustrative in nature and that many further modifications and changes may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that my invention is not to be limited to the physical embodiments disclosed herein but only by the scope of the appended claims.

That which is claimed is:

1. A bobbin holder arrangement comprising a movable support, an open bottomed downwardly depending peripheral gripper mounted on said support and having an internal resilient effective friction gripping surface therein, a pneumatic conduit, and a pneumatic axial-force-effecting connection from said conduit to said gripper for positively ejecting bobbins from and frictionally held within said internal friction gripping surface.

2. A bobbin holder arrangement according to claim 1 including a plurality of said grippers spaced apart in a linear path along said support, and a common pneumatic conduit for said grippers.

3. A bobbin holder arrangement according to claim 2 wherein said support is hollow and forms said common pneumatic conduit.

4. A bobbin holder arrangement comprising a movable support, an open bottomed downwardly depending peripheral gripper mounted on said support, a pneumatic conduit, and pneumatic axial-force-effecting connection from said conduit to said gripper for positively ejecting bobbins from said gripper, a plurality of said grippers mounted in spaced-apart relation on said support and a common pneumatic conduit for said grippers, said conduit comprising a resilient collapsible and expansible tube, and said pneumatic axial-force-effecting-ejection connection for each of grippers being a plunger movable within said grippers in response to pneumatic expansion of said tube.

5. An arrangement according to claim 4 wherein each of said plungers is movable in a direction transverse to said tube and includes a portion in engagement with the exterior surface of said tube.

6. An arrangement according to claim 5 wherein said

support is a U-channel member having connecting wall and two legs inwardly turned at their ends, said plungers being supported by said inwardly turned legs and, spacer means for spacing said plungers and grippers, said conduit being disposed within said U-channel member between said connecting wall and said plungers.

7. A bobbin holder arrangement comprising a support, an open-ended annulus having an effective resilient friction-gripping internal surface for effecting support of bobbins solely by frictional gripping therewithin and being mounted on said support, a pneumatic conduit, and a pneumatic-force-ejection connection between said conduit and the interior of said annulus for exerting an axial force on one end of a bobbin having said end thereof removably held within said annulus.

8. A bobbin holder arrangement according to claim 7 wherein said annulus includes a substantially cylindrical portion and a flared-ended portion for respectively holding a bobbin end and guiding a bobbin into holding position.

9. A bobbin holder arrangement comprising a support, an open-ended annulus having a resilient friction-gripping internal surface and being mounted on said support, a pneumatic conduit, and a pneumatic-force-ejection connection between said conduit and the interior of said annulus for exerting an axial force on one end of a bobbin having said end thereof removably held within said annulus, said pneumatic-force-ejection connection includes a plunger member movable within said annulus in response to pneumatic pressure within said conduit.

10. A bobbin holder arrangement according to claim 9 wherein said plunger includes a bobbin contacting end having a diameter larger than the opening in an open ended bobbin held by said annulus.

11. A bobbin holder arrangement comprising a support, an open-ended annulus having a resilient friction-gripping internal surface and being mounted on said support, a pneumatic conduit, and a pneumatic-force-ejection connection between said conduit and the interior of said annulus for exerting an axial force on one end of a bobbin having said end thereof removably held within said annulus, said pneumatic-force-ejection connection comprising an air cylinder and piston in pneumatic connection with said conduit, said piston including a portion thereof movable within said annulus in response to pneumatic pressure within said cylinder.

12. An arrangement according to claim 11 wherein said cylinder is formed by a portion of said annulus.

13. A bobbin holder arrangement comprising a support, an open-ended annulus having a resilient friction-gripping internal surface and being mounted on said support, a pneumatic conduit, and a pneumatic-force-ejection connection between said conduit and the interior of said annulus for exerting an axial force on one end of a bobbin having said end thereof removably held within said annulus, said pneumatic-force-ejection connection comprising an air cylinder and piston in pneumatic connection with said conduit, said piston including a portion thereof movable within said annulus in response to pneumatic pressure within said cylinder, said cylinder being disposed in axially spaced relation from said annulus.

14. A bobbin holder arrangement comprising a support, an open-ended annulus having a resilient friction-gripping internal surface and being mounted on said support, a pneumatic conduit, and a pneumatic-force-ejection connection between said conduit and the interior of said annulus for exerting an axial force on one end of a bobbin having said end thereof removably held within said annulus, said pneumatic-force-ejection connection includes a plunger member movable within said annulus in response to pneumatic pressure within said conduit, and a spring biasing said plunger toward a return position for return upon release of the air pressure in said conduit.

15. A bobbin holder arrangement according to claim 7 wherein said pneumatic-force-ejection connection includes

an orifice formed between said conduit and the interior of said annulus.

16. An arrangement according to claim 15 and further including an inverted cup forming said annulus, said orifice being formed in the base of said cup and including a valve having less resistance to air flow therethrough outwardly from the interior of said cup than to the interior of said cup, whereby closed-ended bobbins may be easily seated within said annulus but will require a relatively greater force for removal therefrom.

17. A bobbin holder arrangement according to claim 7 wherein said friction gripping internal surface includes a plurality of elastic rings formed on the inner surface of said annulus.

18. An arrangement according to claim 17 wherein said rings are saw-tooth shaped and provide more opposition to removal of a bobbin therefrom than to insertion of a bobbin therein, whereby a relatively small insertion force is required while providing a secure grip on a bobbin to be held.

19. A bobbin holder arrangement comprising a common support, two groups of holder members mounted on said support, two separate pneumatic conduits, each of said conduits being connected respectively to each of said members of a respective one of said groups, and a pneumatic-force-effecting connection between said each of said holder members and its respective conduit.

20. A bobbin holder arrangement according to claim 19 wherein said support is hollow and serves as at least one of said conduits.

21. A bobbin holder arrangement according to claim 20 wherein said support is a longitudinally hollow member having a longitudinal partition therein forming said two separate conduits within said support.

22. An arrangement according to claim 19 further comprising a pneumatic pressure source and a separate control valve for each of said conduits.

23. An arrangement according to claim 19 wherein said holder members of said two groups are disposed in alternate relation along said support.

24. An arrangement according to claim 19 wherein said holder members of one of said groups each comprises an inverted cup-shaped resilient member having a flared open end, and a plunger movable within said cup-shaped members in response to air pressure within the respective one of said conduits for said one group to positively eject a bobbin from each of said cup-shaped members in said one group and to positively seat said bobbin on a spindle or the like when so desired.

25. An end-gripping bobbin holder comprising a support, means carried by said support for removably holding a bobbin, said bobbin holding means consisting of a bobbin-end-friction-gripping annulus mounted on said support, and positive-acting ejection means in operative connection with the interior of said annulus for positively ejecting bobbins therefrom.

26. An end-gripping bobbin holder comprising a support, a bobbin-end-gripping annulus mounted on said support, and pneumatic positive-acting ejection means in operative connection with the interior of said annulus for positively ejecting bobbins therefrom, said bobbin-ejector connection including a movable plunger, and means for connecting said plunger to a source of air pressure for selective actuation of said plunger.

27. A bobbin holder arrangement comprising a movable support, an open bottomed downwardly flared guide skirt depending from said support, bobbin holding means disposed interiorly of said skirt, a pneumatic conduit, and a pneumatic axial-force-effecting connection from said conduit to the interior of said skirt for positively ejecting a bobbin from said holding means.

28. An arrangement according to claim 27 wherein said bobbin holding means comprises a friction gripping annulus.

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29. An arrangement according to claim 27 wherein said bobbin holding means comprises a magnet.

30. An arrangement according to claim 27 wherein said bobbin holding means comprises a plurality of axially spaced apart friction gripping rings.

31. An arrangement according to claim 27 wherein said connection comprises a pneumatically actuated plunger in operative connection with said conduit.

32. A bobbin holding arrangement comprising a movable support, a bobbin holding device mounted on said support, a fluid conduit, and fluid-force-ejection connection between said conduit and said bobbin holding device for exerting a force on one end of a bobbin having said one end thereof removably held by said bobbin holding device, said fluid-force-ejection connection including a plunger member movable in response to fluid pressure within said conduit.

33. An arrangement according to claim 32 wherein said fluid conduit and fluid-force-ejection connection are respectively a pneumatic conduit and a pneumatic-force-ejection connection.

34. A bobbin holder arrangement comprising a common support, two sets of holder members carried by said support, two separate pneumatic conduits, each of said conduits being operatively connected respectively to each of said members of a respective one of said sets, and a pneumatic-force-effecting connection at each of said holder members and operatively connected to its respective conduit.

35. A bobbin holder arrangement comprising a com-

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mon support, two sets of holder members carried by said support, two separate fluid conduits, each of said conduits being operatively connected respectively to each of said members of a respective one of said sets, and a fluid-force-effecting connection at each of said holder members and operatively connected to its respective conduit.

36. An end-gripping bobbin holder according to claim 25 wherein said positive-acting ejection means comprises a plunger movable longitudinally in said annulus, and means for moving said plunger.

37. A bobbin holder according to claim 36 wherein said annulus is an elastic female annulus.

38. An end-gripping bobbin holder according to claim 25 wherein said annulus is an elastic female annulus and said positive-acting ejection means comprises a plunger movable longitudinally in said annulus, and means for moving said plunger.

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