March 13, 1962 R. M. INGHAM, JR 3,024,887

BOBBIN TRANSFER ARRANGEMENT

Filed Nov. 28, 1958 3 Sheets-Sheet 1

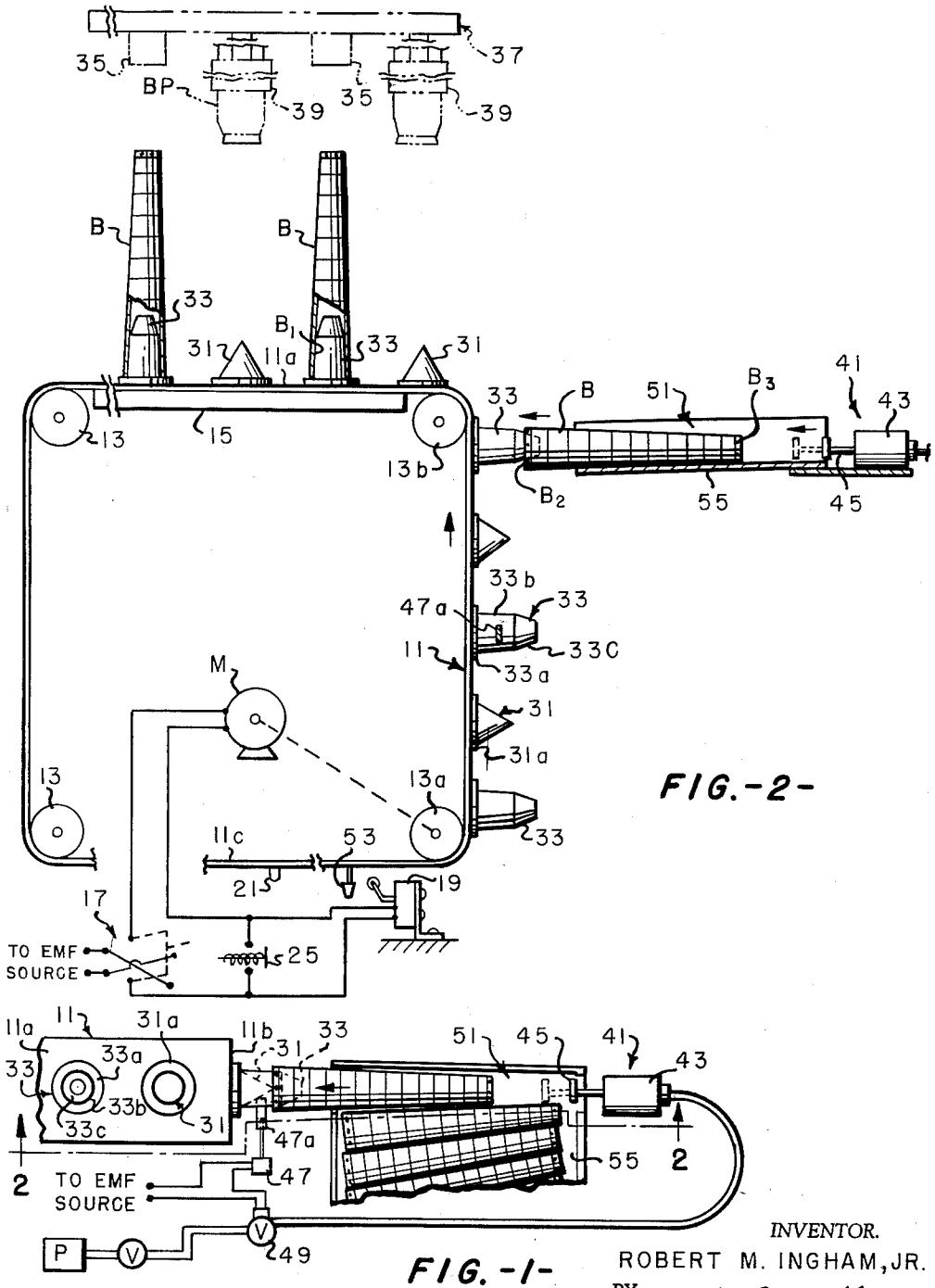


FIG.-1-

FIG.-2-

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BOBBIN TRANSFER ARRANGEMENT

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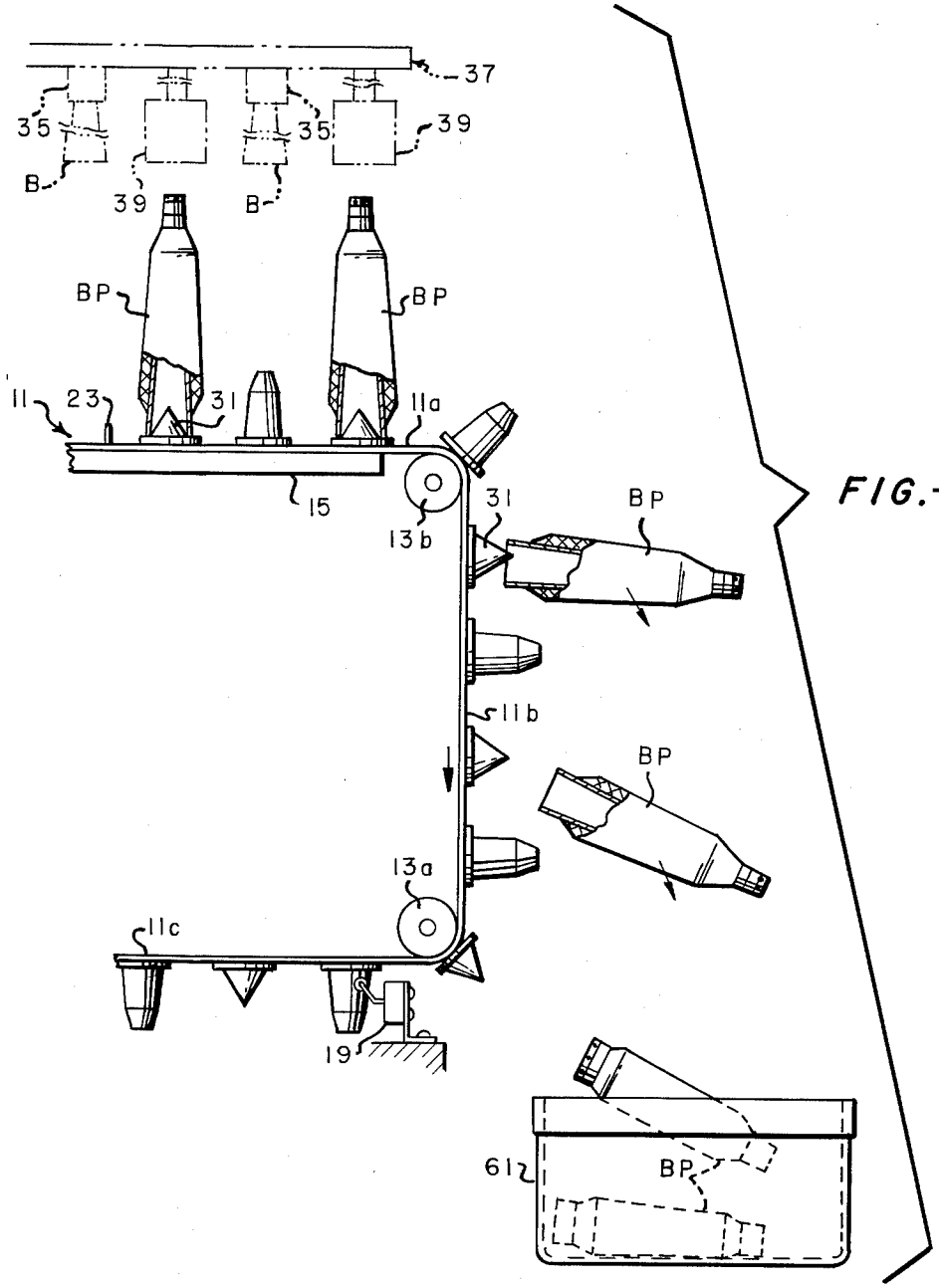


FIG.-3-

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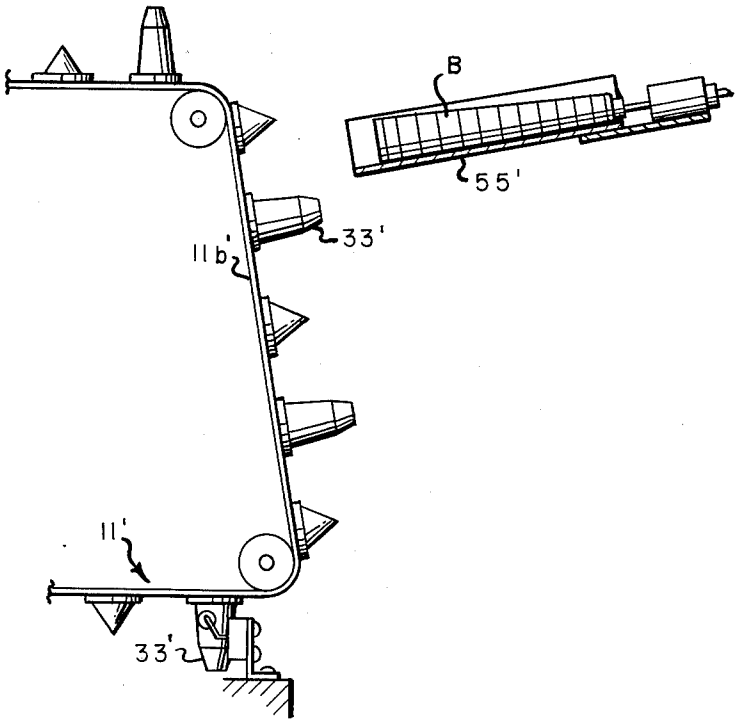
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BOBBIN TRANSFER ARRANGEMENT

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FIG. -5-



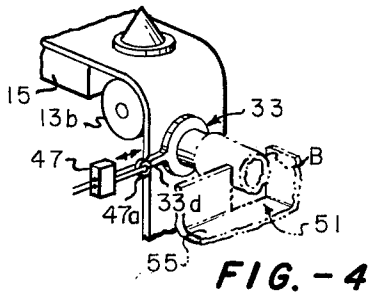


FIG. -4-

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BOBBIN TRANSFER ARRANGEMENT

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13 Claims. (Cl. 198—21)

This invention relates to an improved transfer band arrangement for receiving empty bobbins from a supply source and holding them in secure relation for subsequent pick-up therefrom by an overhead conveyor, the transfer band being also adapted to receive full bobbins thereon from the overhead conveyor with provision for easy and automatic discharge of the full bobbins therefrom into a suitable receptacle such as a box, etc., disposed adjacent one end of the band.

A major feature of the invention lies in the provision of a transfer band having two different alternately interspaced sets of bobbin holders, one set being adapted to receive empty bobbins at one end run of the band and to hold the empty bobbins in substantially upright precisely spaced position on the upper run thereof, and the other set of holders being adapted to receive yarn filled bobbins thereon while disposed along the upper run and being of different shape and size from the first set of holders and particularly adapted to readily doff the filled bobbins during movement thereof along an end run of said band.

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

FIGURE 1 is a fragmentary schematic plan view of a preferred embodiment according to the invention.

FIGURE 2 is a schematic elevation view taken along the line 2—2 of FIGURE 1, with elements added thereto for completeness of illustration and illustrating the donning of empty bobbins onto the empty bobbin receivers of the transfer band.

FIGURE 3 is a view similar to FIGURE 2, illustrating the doffing of wound bobbin packages at one end of the transfer band.

FIGURE 4 is a view in perspective of a modification of the switch actuating arrangement for control of the bobbin seating plunger.

FIGURE 5 is a schematic view in side elevation of a modified arrangement of the transfer band.

Referring now in detail to the figures of the drawings a flat band **11** preferably of continuous longitudinally flexible yet relatively stiff metal banding is mounted for reversible length wise movement about a plurality of spaced apart guide rollers **13**, one of the rollers **13***a* being a drive roller operatively connected to a suitable drive source such as a motor M for selectively driving the band **11** in either desired direction. The upper run **11***a* of the band is supported as by a longitudinal support beam **15** having a flat upper guiding and supporting surface in order to give full lateral stability to the upper run of the band. The motor is provided with a suitable reversing switch generally indicated at **17**, and also connected in circuit controlling relation with the drive motor is a limit stop switch **19** actuated as by either of two limit stop cam lugs **21** and **23** suitably secured to the band **11**. A push button normally open motor start switch **25** is arranged in the control circuit for the motor for overriding the limit switch, in order to provide for restarting of the motor in the reverse direction after stopping of the motor by the limit switch operating cam lugs **21**, **23**. The motor control circuit does not per se form a part of the invention and will therefore not be further described herein, it being noted, however, that the illustrated circuit is only shown by way of example and many other circuit arrangements might be suitably employed if desired.

Suitably mounted on the band **11** along a length corresponding to the length of upper run thereof are a plurality of alternate full bobbin male holders **31** and empty bobbin male holders **33**, the holders being suitably secured, as by screws, at equal intervals thereon and extending outwardly from the flat surface of the belt of the band **11**. An important aspect of this invention lies in the provision of two different sized and shaped sets of male holder members **31**, **33** for holding respectively the wound bobbin packages BP and empty bobbins B on the relatively stiff widthwise yet longitudinally flexible continuous band **11**. The male members **33** for holding the empty bobbins are slightly tapered to be substantially complementary to the hollow slightly tapered interior B_1 of the base of the empty bobbins B over a substantial axial length **33***b* thereof sufficient to substantially firmly position the empty bobbins B in substantially perpendicular position relative to the surface of the band **11**, these empty bobbin holders **33** being slightly undersized in order to provide for ease of insertion of bobbins thereon and removal of the bobbins therefrom. The outer ends **33***c* of the holders **33** are more sharply inclined to aid in guiding of the bobbins B onto the holders. A flat skirt enlargement **31***a* and **33***a* is provided as the base of each holder **31** and **33** for supporting the base end surface B_2 of the bobbins. Thus, the empty bobbins B may be substantially definitely positioned in vertical relation upon the movement of their respective male holders **33** to the upper run **11***a* of the band, and the empty bobbins are thereby facilely disposed for pick up by a plurality of corresponding empty bobbin graspers **35** or the like in fixed spaced apart relation on an overhead carrier generally indicated at **37**.

As seen in FIGURES 1 and 2 the empty bobbins B are sequentially seated on the empty bobbin holders **33** by an air cylinder and plunger arrangement generally indicated at **41** and being under the control of a suitable band-movement actuated switch **47** through the medium of an intermediate solenoid air valve **49** connected between a source of air pressure P and the air cylinder **43**. The bobbin contacting end of the plunger **45** is of sufficient diameter to effectively engage the adjacent head end surface of each bobbin for end-wise movement thereof onto the empty bobbin holders. The switch **47** has an actuating finger **47***a* which may be suitably actuated to close the switch and open the solenoid valve **49** as by contact by the empty bobbin holders **33** during their movement therepast, as shown in FIGURES 1 and 2. As shown in FIGURE 2 the switch actuating finger **47***a* may suitably be disposed for actuating by the male empty bobbin holder following the male bobbin holder which is immediately adjacent to the bobbin loading station **51** (i.e. aligned with cylinder **43** and plunger **45**) and which is to receive a bobbin B as the result of actuation of the switch **47** by this following empty bobbin holder. In this arrangement a suitable actuating lug **53** may be employed for moving the switch actuating finger **47***a* as the last empty bobbin holder **33** is moved past the bobbin loading station **51**. Although not specifically apparent from the view of FIGURE 2 it will be readily apparent to one skilled in the art that the path of the switch actuating lug **53** is disposed so as not to actuate the limit stop switch **19** and is only operable to move the switch actuating finger **47***a* of the solenoid valve control switch **47**.

Any suitable supply source may be employed adjacent the loading station **51** for replenishing the supply of empty bobbins to the loading zone which extends along the axis of movement of the bobbin seating plunger **45**. In the present embodiment a downwardly sloped chute **55** is provided on which the bobbins may move downwardly under

the force of gravity to the discharge position adjacent the plunger and in line with the empty bobbin holders of the transfer band. In order to aid in the facile loading of bobbins B onto the empty bobbin holders 33 the bottom of the chute 55 at the bobbin loading station area 51 is slightly downwardly inclined toward the band 11 whereby the tapered bobbins B at the loading station 51 will be substantially perpendicularly aligned with their respective bobbin holders 33 and will more easily slide thereonto under the action of the plunger 45. Also, to accommodate the upward movement of the bobbins B from the chute 55 as the transfer band 11 is moved counter-clockwise as seen in FIGURE 2, the top of the chute is open, at least in the loading station area 51.

Referring now to FIGURE 3 the wound bobbin package holders 31 are conical in shape, having their conical surface sharply inclined upwardly and inwardly away from the inner wall of the bobbins on which the wound packages are disposed. Full bobbins BP are transferred onto the alternate male holders 31 on the band 11 from suitably spaced apart full bobbin graspers or the like generally indicated at 39 which also may be suitably mounted in alternate spaced apart relation on the same overhead movable carrier device 37. The particular sharply inclined conical configuration of the wound package holders 31 is provided in order to permit the wound packages BP to be received from their respective graspers and then facilely discharged as the band is moved longitudinally to move each succeeding full bobbin package downwardly along an end run 11*b* of the transfer band. It will be noted that while the wound bobbin package holders 31 offer sufficient base size for adequately receiving and retaining the full bobbin packages in position while they are disposed along the upper run of the band, the sharply inclined conical surface of the holders offer substantially no support for the wound bobbin packages as they move downwardly along the end run 11*b* as shown in FIGURE 3. Thus, the full bobbin packages BP fall off their respective holders 31 freely and easily under the influence of centrifugal force and gravity as they proceed onto and along the end run 11*b* and are thus discharged into a suitable receptacle 61 which may be disposed adjacent the discharge end run 11*b* of the band.

By employing a portable loading device 41, 55 for the empty bobbins the loading device may be moved out of the way and the full bobbins may be discharged into the receptacle or other suitable receiving device at the same end run 11*b* of the band 11 as is employed for loading the empty bobbins B onto the band. Upon completion of the unloading of the wound bobbin packages BP the limit stop cam lug 23 is brought into contact with the limit stop switch 19 to thereby stop the movement of the transfer band 11, pending reactuation of the motor by reversing the switch 17 and closing of the normally open push button start switch 25 to subsequently reload empty bobbins B onto the holders 33.

In the arrangement of FIGURES 1–3 it will be seen that the switch actuating finger 47*a* is so disposed as to be in the path of the frusto-conical slightly tapered empty bobbin holders 33 but out of the path of the sharply tapered wound bobbin holders 31. Thus the switch is actuated only in response to movement therepast of an empty bobbin holder 33. In FIGURE 4 a modification is illustrated wherein the solenoid valve control switch is disposed directly adjacent the loading station 51 for the empty bobbins and it is thereby actuated directly by a laterally protruding cam lug 33*d* or the like which may be formed on the enlarged circular skirt base 33*a* of each of the empty bobbin holders. In such embodiment it will be seen that the wound bobbin holders 31 are provided with no corresponding cam lug, and thus do not actuate the solenoid valve 49 and air cylinder and plunger arrangement 41 as they pass by the switch actuating finger 47*a*.

A further modification is illustrated in FIGURE 5, which may be employed to aid in the ease of loading of the empty bobbins onto their respective male holders. In this arrangement the end run 11*b*′ is slightly inclined to the vertical in order to permit the loading chute 55′ to be more sharply inclined downwardly toward the transfer band 11′ and thereby permit faster and easier loading of the empty bobbins onto their holders 33′.

In operation, the transfer band 11 is at the beginning of a loading cycle disposed with its holders extending along the lower run 11*c* thereof. Upon closing of the motor start switch 25 to drive the band in the counter-clockwise direction as viewed in FIGURE 2 the bobbin holders will be moved sequentially past the switch actuating finger 47*a* and loading station 51 around the guide roller 13*b* and onto the upper run, the band being stopped after movement of the last holder into proper position on the upper run as by the cam lug 21 contacting the band limit stop switch 19. As each succeeding empty bobbin holder 33 is brought into alignment with the loading station 51 the switch actuating finger 47*a* is moved to open the solenoid valve 49, whereby pressurized air is supplied to the air cylinder 43 to move the plunger 45 which imparts an abrupt striking movement to the head end B_3 of the bobbin B aligned therewith at the loading station 51 and thereby seating the bobbin onto the empty bobbin holder 33 then at the loading station 51. The base end surface B_2 of the bobbin preferably rides on a circular skirt enlargement 33*a* of the empty bobbin holder 33, as previously described. By the downward inclination of the supply chute 55 toward the loading station 51 the adjacent empty bobbins B on the chute move under the influence of gravity or other suitable force to maintain a bobbin in position at the loading station 51 in alignment with the discharge and seating plunger 45 for discharge onto each succeeding empty bobbin holder 33. After all of the empty bobbin holders 33 have been filled with empty bobbins and are moved to the desired position on the upper run 11*a* of the band the motor M is stopped by contact of the limit switch cam lug 21 with the actuating finger of the limit switch 19.

The empty bobbins B may then be picked up by the corresponding empty bobbin graspers 35 of the movable overhead carrier 37 and full bobbins BP may be seated onto the corresponding holders of the band by the corresponding full bobbin holding graspers 39 of the overhead carrier. The carrier assembly 37 may then be raised and moved out of the path of movement of the bobbins on the band for subsequent further disposition of the empty bobbins, as by donning them onto the spindles of a spinning frame, and in order to permit discharge of the wound bobbin packages BP from the transfer band 11. The bobbin loading device 41, 55 is then moved away from the end run 11*b* and the motor M is reversed and again started to drive the transfer band in a clockwise direction as viewed in FIGURE 3, whereby the full wound bobbin packages BP are discharged and fall from their respective holders 31 into the receptacle 61 as they move onto and down the end run 11*b*.

While I have shown and described various embodiments and modifications constructed according to my invention it will be apparent that many modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the specifically illustrated embodiments but only by the scope of the appending claims.

That which is claimed is:

1. A movable endless member transfer arrangement for accepting empty bobbins at one end run and moving them in upright spaced apart position to the upper run thereof for subsequent pick-up therefrom, and for accepting bobbin yarn packages on the upper run thereof and subsequently discharging said bobbin yarn packages at one end run, comprising an endless member having a

horizontal upper run and at least one end run extending generally vertically along a portion of its length for discharge of bobbins therefrom, first and second sets of bobbin-receiving male members disposed in spaced-apart substantially perpendicular outwardly extending relation on said endless member, each of the male members of said first set having an outer general surface configuration over a substantial part of its length substantially conforming to a substantial length of the interior surface of bobbins held thereby whereby said bobbins are substantially vertically positioned in substantially precise spaced apart position when moved to said upper run, and each of the male members of said second set having an outer general surface configuration which includes a portion substantially inclined inwardly with respect to the outer general surface configuration of the male members of said first set and with respect to the perpendicular from said endless member and extending over at least the major portion of said member, whereby bobbins supported on said second set of bobbin-receiving male members will be easily self-discharged therefrom during travel along said end run.

2. A transfer arrangement according to claim 1 wherein said endless member is a longitudinally movable flat longitudinally flexible band, said arrangement including a rigid support disposed along and in supporting engagement beneath said upper run of said band.

3. A transfer arrangement according to claim 1 wherein said inclined portion of said male members in said second set extends from closely adjacent the base of said members to the outer free end thereof.

4. A transfer arrangement according to claim 3 wherein said inclined portion is conical in shape.

5. A transfer arrangement according to claim 1 wherein each of said male members has a raised base portion with a substantially flat upper surface larger than the interior end surface of bobbins held thereby and being adapted to engage in supporting relation the ends of bobbins disposed on said members.

6. A transfer arrangement according to claim 5 wherein said base portions are made of flexible material.

7. A transfer arrangement according to claim 1 wherein the extreme outer ends of each of said male members of said first set are substantially inclined with respect to the perpendicular from said endless member.

8. A transfer arrangement according to claim 1 wherein the surface configuration of said substantially bobbin-

conforming substantial length of each of said members of first set of male members has a slight degree of inward taper, the base end of said tapered portion thereof being substantially complementary to and adapted to engage the base end of a bobbin in easily removable relation, said slight degree of inward taper being comparatively small compared to the angle of inclination of said substantially inclined portion of said second set members.

9. A transfer arrangement according to claim 8 wherein said taper on said first set male members slightly exceeds the taper of the tapered interior of bobbins received thereon.

10. A transfer arrangement according to claim 9 wherein each of said male members of said first set has a further tapered outer end portion of substantially greater inclination than its first mentioned tapered portion whereby to aid in guiding bobbins onto said members.

11. A bobbin handling arrangement comprising a movable support member having two sets of spaced apart male bobbin holders thereon, a plurality of switch-actuating elements each associated and movable in synchronism with a respective one of the holders of one of said sets, and a switch having an actuating contact disposed in its normal ready position in the path of movement of actuating elements each associated with a respective one of each of the holders of one of said sets and out of the path of movement of the holders of said other set and any physical elements associated therewith, said two sets of male bobbin holders being respectively of two different sizes, said switch being disposed for contact by the holders of one size and for no contact by the holders of the other size.

12. An arrangement according to claim 11 wherein said holders of one of said sets have an outer surface at a greater angle to the perpendicular than the major portion of the outer surface of said holders of said other set.

13. An arrangement according to claim 12 wherein said holders of said one set are shorter than said holders of said second set.

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