Oct. 6, 1925. 1,556,469

E. R. ALDERMAN

BOBBIN HANDLING MACHINE

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Fig. 2.

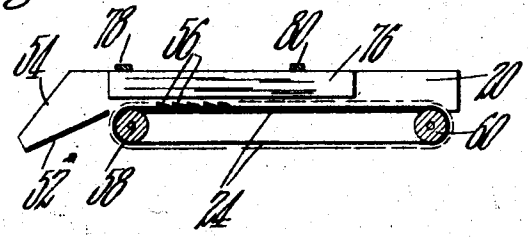
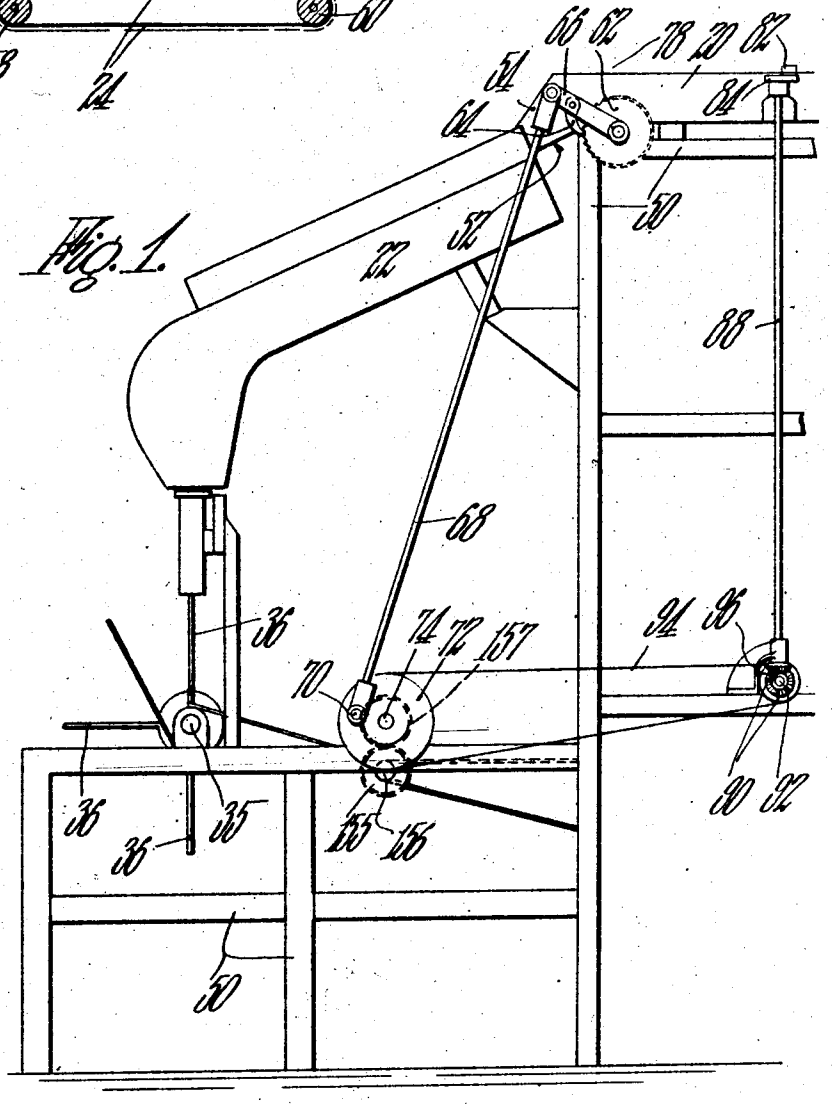


Fig. 1.



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Oct. 6, 1925. 1,556,469

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BOBBIN HANDLING MACHINE

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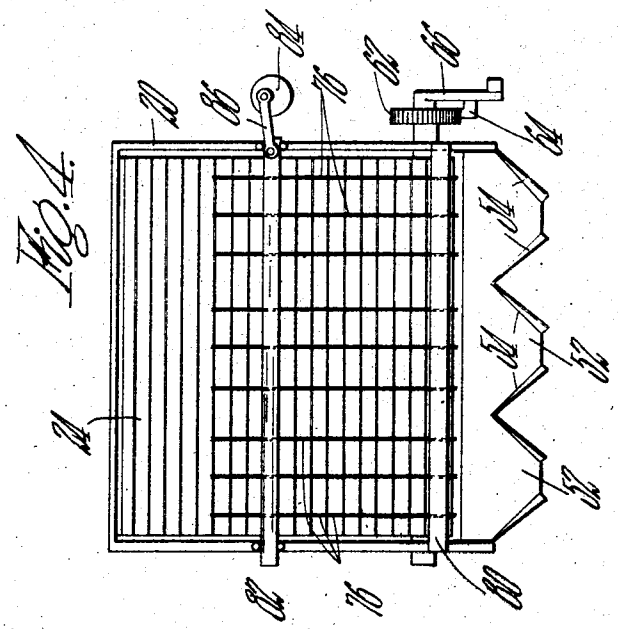

Fig. 4.

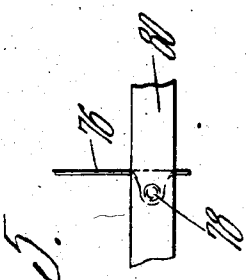

Fig. 5.

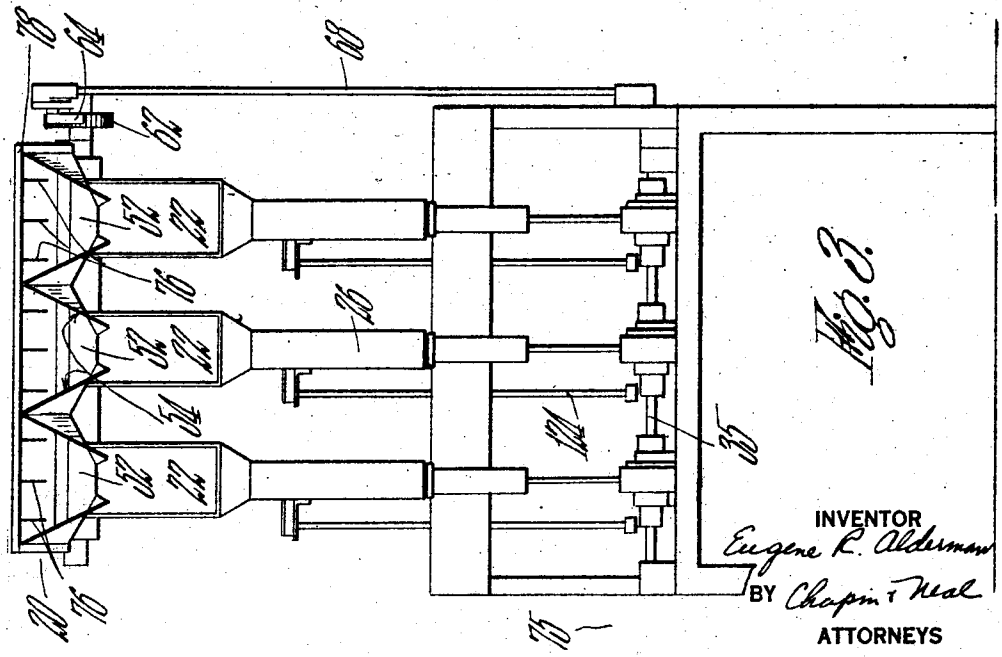

Fig. 3.

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BOBBIN HANDLING MACHINE

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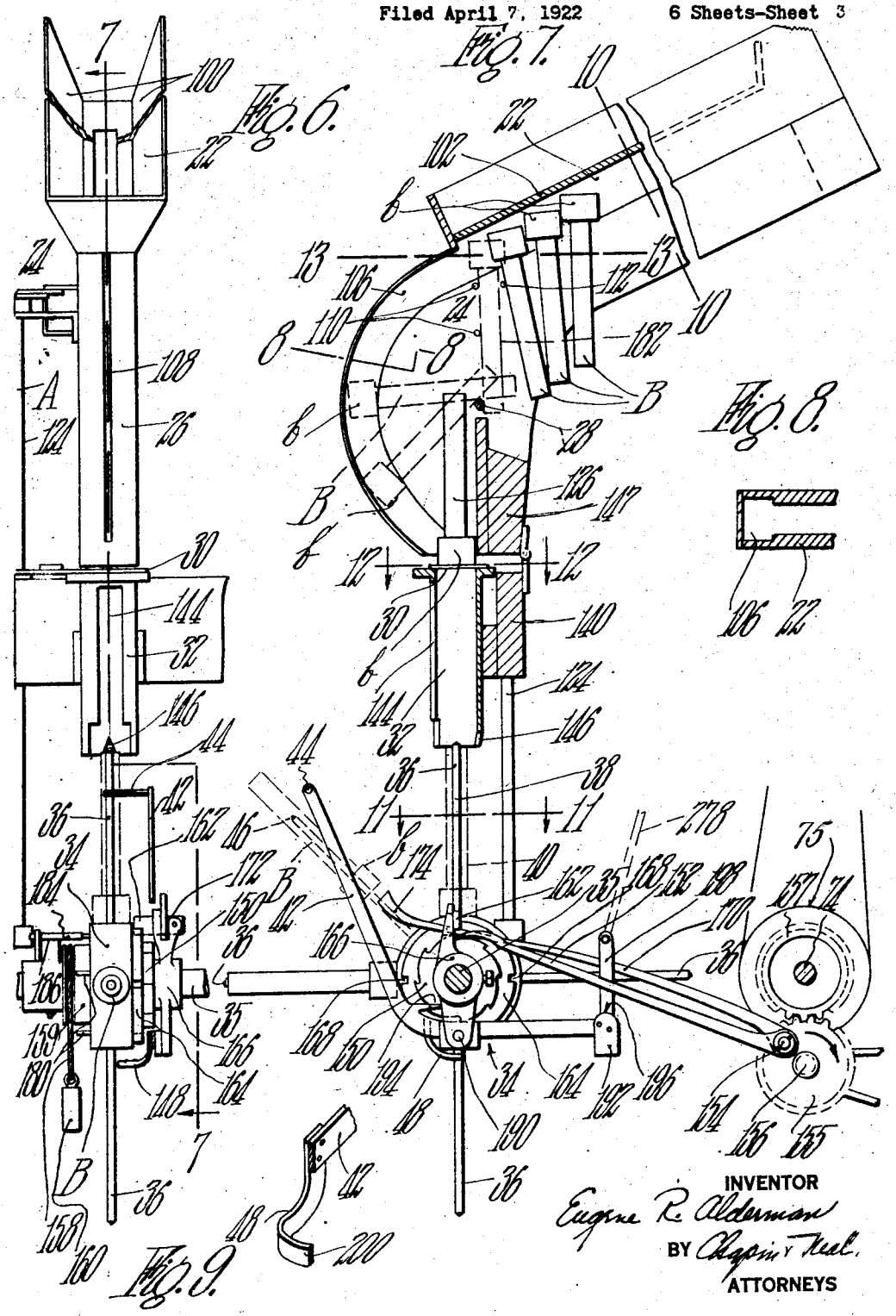

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BOBBIN HANDLING MACHINE

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Fig. 10.

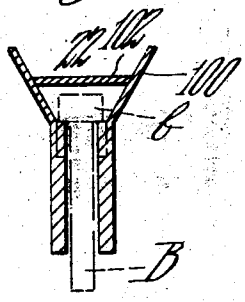


Fig. 11.

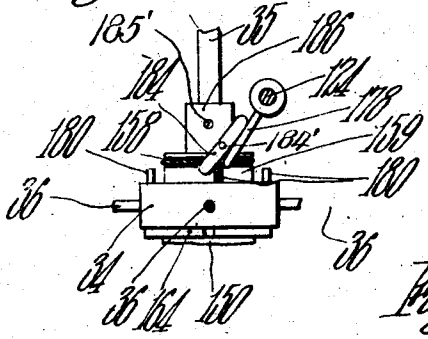


Fig. 12.

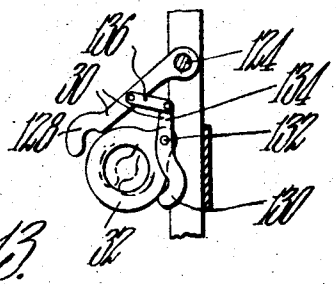


Fig. 13.

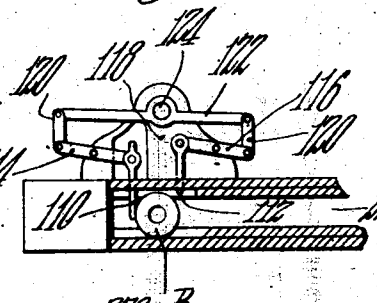


Fig. 14.

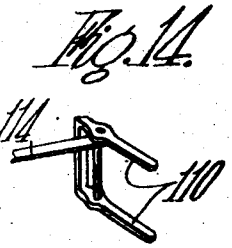


Fig. 15.

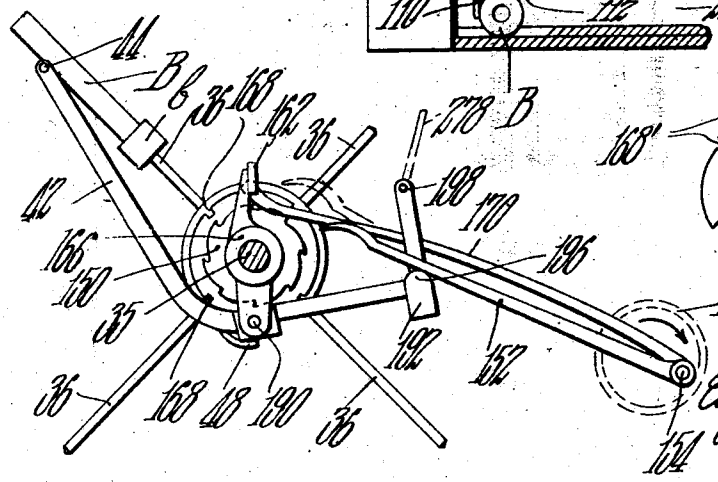
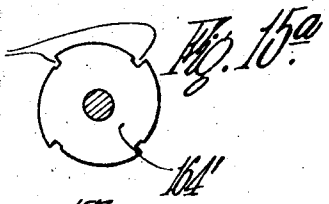


Fig. 15a.



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BOBBIN HANDLING MACHINE

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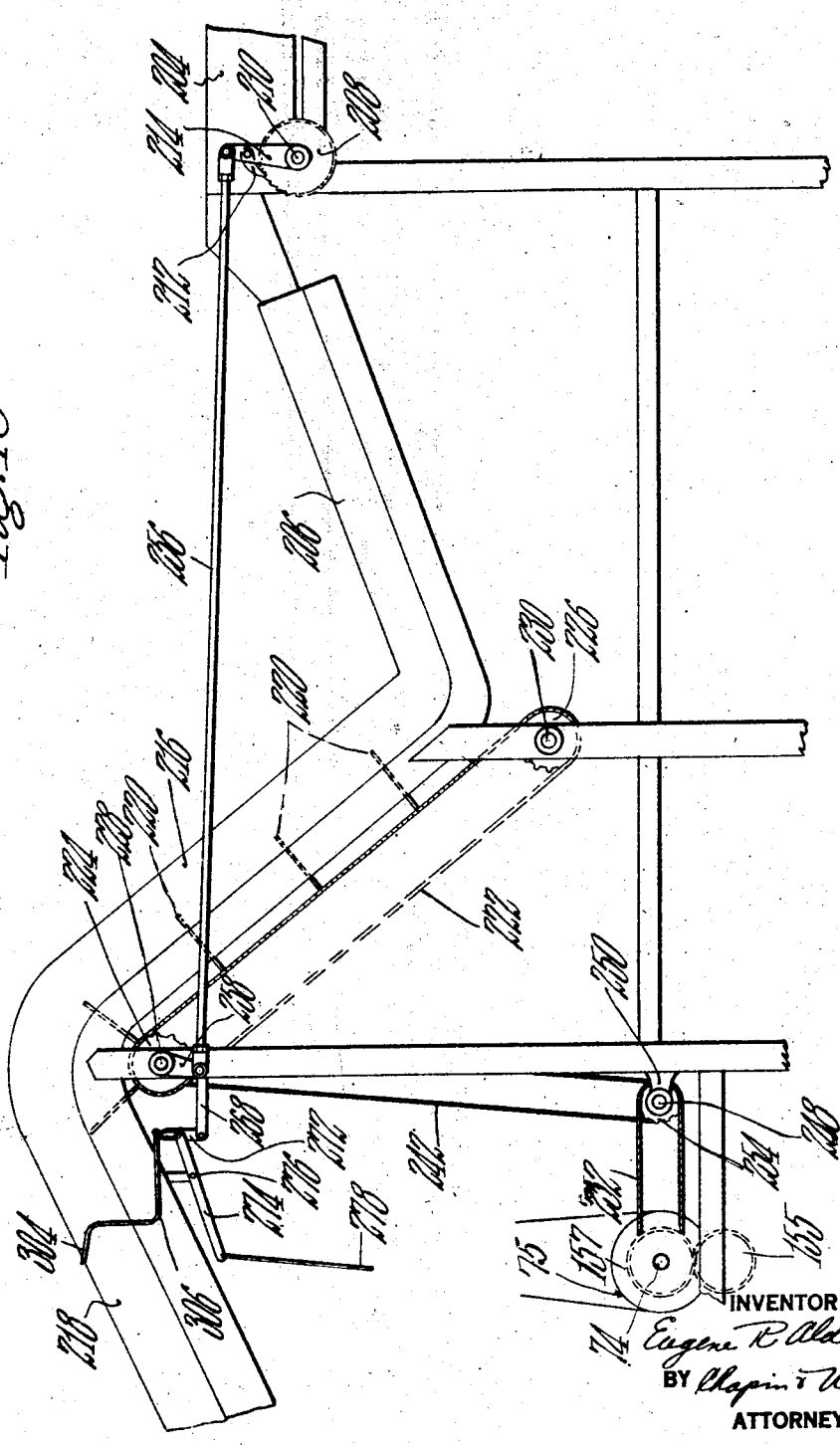
Fig. 16



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BOBBIN HANDLING MACHINE

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Fig. 17.

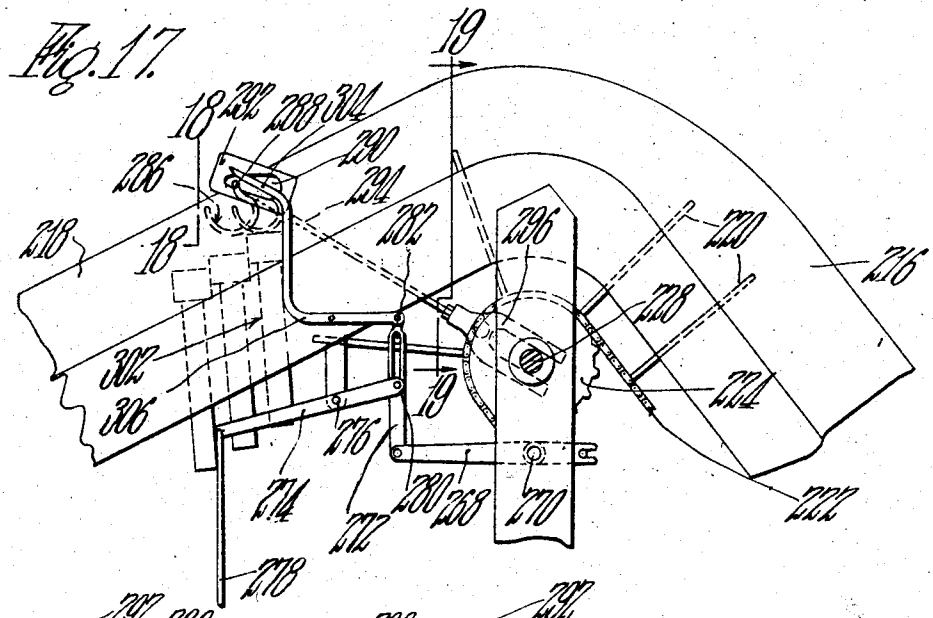


Fig. 18.

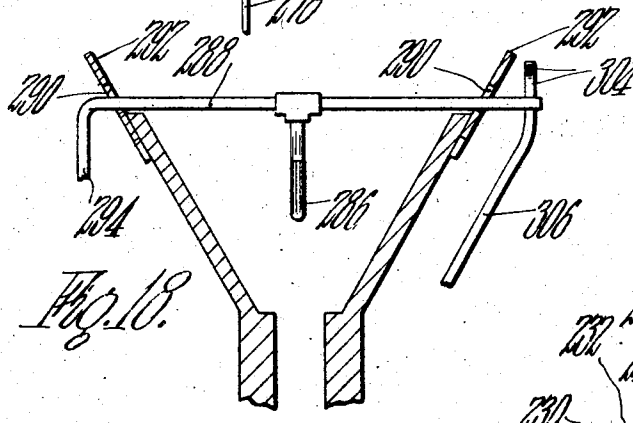
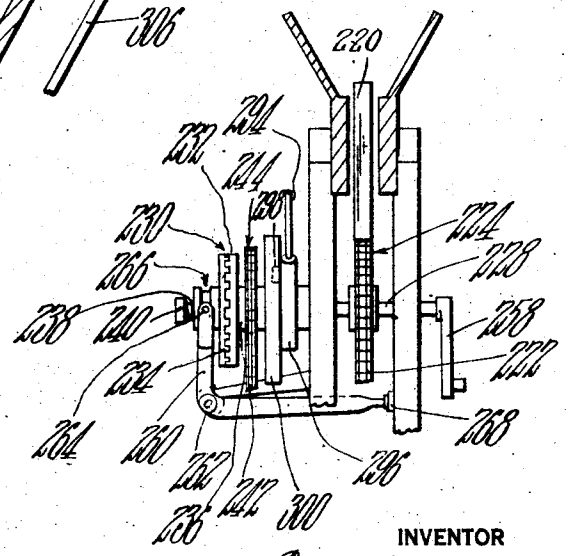


Fig. 19.



INVENTOR

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BY Chapin & Neal

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Patented Oct. 6, 1925. 1,556,469

UNITED STATES PATENT OFFICE.

EUGENE R. ALDERMAN, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR TO FARR ALPACA COMPANY, OF HOLYOKE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

BOBBIN-HANDLING MACHINE.

Application filed April 7, 1922. Serial No. 550,490.

To all whom it may concern:

Be it known that I, EUGENE R. ALDERMAN, citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Bobbin-Handling Machines, of which the following is a specification.

This invention has reference to the handling of empty bobbins which are to be used to replace the filled bobbins on a spinning frame.

During the performance of the bobbins replacing or doffing operation the spinning operation is necessarily arrested and in order to avoid prolonged interruption of the latter the doffing should be accomplished as quickly as possible. It is obvious that if any of the empty bobbins are warped or otherwise damaged to such an extent that they will not fit properly upon the spindles of the spinning frame, when placed thereon by the attendant, the imperfect bobbins will have to be removed from the spindles and discarded and perfect bobbins substituted therefor, thus retarding more or less the progress of the doffing operation. For various reasons such imperfect bobbins are liable to be present in greater or less numbers in the bobbin supply and their use seriously interferes with the desired expeditious doffing of the bobbins.

One of the objects of the present invention is to provide a bobbin handling mechanism operative upon the supply of empty bobbins for detecting such bobbins as are unsuitable for use in the spinning frame and enabling these unsuitable bobbins to be readily separated from the others.

To this end the invention comprises a machine through which the empty bobbins are fed, the machine having instrumentalities which operate to test the individual bobbins as they pass through the machine and if they are found to be in condition to fit properly upon the spindles of the spinning frame, to deliver them rapidly into a suitable receptacle, but which functions to stop the machine upon the detection of a bobbin which is in any way unsuitable for use, thus enabling the unsuitable bobbin to be easily rejected.

Further objects of the invention and the features of construction by means of which they are attained will be apparent from the following description of the illustrated embodiment of the invention.

In the accompanying drawings,

Fig. 1 is a view, in side elevation, of a machine constructed in accordance with the present invention;

Fig. 2 is a detail view, in vertical section, disclosing the construction of a certain portion of the machine shown in Fig. 1;

Fig. 3 is a front elevational view of the machine;

Fig. 4 is a top plan view of the bobbin-receiving hopper and associated mechanism;

Fig. 5 is a detail view, on an enlarged scale, showing a structural feature omitted in Fig. 4;

Fig. 6 is a front elevational view, on an enlarged scale, of a portion of the machine;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 6;

Fig. 8 is a detail sectional view on the line 8—8 of Fig. 7;

Fig. 9 is a perspective view showing in detail a portion of the stop mechanism;

Figs. 10, 11, 12 and 13 are detail sectional views taken substantially along the lines 10—10, 11—11, 12—12 and 13—13, respectively, of Fig. 7;

Fig. 14 is a perspective view of one of the elements shown in Fig. 13;

Fig. 15 is a view similar to the lower portion of Fig. 7 but showing a different position of the parts;

Fig. 15ª is a modification of one of the parts shown in Fig. 15;

Fig. 16 is a view, in side elevation of the rear portion of a machine embodying a modification of the present invention;

Fig. 17 is a detail view, in side elevation and on an enlarged scale, of a portion of the mechanism shown in Fig. 16;

Fig. 18 is a detail sectional view taken substantially along the line 18—18 of Fig. 17; and

Fig. 19 is a detail sectional view taken substantially along the line 19—19 of Fig. 17.

Before proceeding to a detailed description of the construction of the illustrative machine the general arrangement of its mechanism and the essentials of its mode of operation will be briefly outlined.

The bobbins to be operated upon are deposited in bulk in a receiving tray or hopper 20 (Fig. 1) at the top of the machine. At its forward end the hopper 20 communicates with a series of downwardly inclined bobbin chutes, three being shown in the present instance and severally indicated by the reference numerals 22 in Fig. 3, although a greater or less number of chutes may be employed as may be found desirable. A conveyer 24 (Fig. 2) of the endless belt type constitutes the floor of the hopper 20 and urges the bobbins toward the front thereof to replenish the supply in the chutes 22. The three chutes 22 are identical in construction and each chute has associated therewith similar mechanism for receiving and handling the bobbins to accomplish the ends for which the machine is designed. Consequently, in continuing this general outline of operation it will be necessary to refer to only one chute and the set of mechanism associated therewith. Referring now particularly to Figs. 6 and 7, the chute 22 is shaped in cross-section so that the bobbins B will be suspended therein by their heads *b* in substantially vertical positions as shown in Fig. 7, and so that the bobbins will be free to slide downwardly in the chute until they reach an escapement device, indicated generally at 24, which operates to deliver the bobbins one-by-one from the chute. When released by the escapement device 24, the head of the bobbin moves downwardly through a curved extension 26 at the lower end of the chute while the opposite end of the bobbin rocks about a fixed abutment rod 28, the result being that the bobbin is inverted by the time it reaches the lower extremity of the chute and is delivered in an upright position with its head resting upon a removable support 30 and in registry with a vertically arranged tubular bobbin guideway 32. Below the guideway 32 is a carrier 34 which is rotatably mounted upon a fixed horizontal shaft 35 and is provided with four equally spaced, radial, bobbin-supporting arms or spindles 36. The carrier 34 is actuated intermittently to successively position the spindles at 36 at a loading station 38 in axial alinement with the guideway 32 and with the bobbin upon the support 30. Substantially upon the arrival of a spindle in the position just described, the support 30 is retracted from beneath the bobbin and the latter falls through the guideway 32 and is received upon the spindle 36 which occupies a position of rest at the loading station, the spindle entering the axial opening in the bobbin. If the bobbin is in perfect condition it will come to rest in the position indicated at 40 in Fig. 7, with its head resting upon the carrier hub from which the spindles 36 radiate, and with the shank of the bobbin loosely surrounding the spindle. In such a case, when the intermittent rotation of the carrier 34 brings the spindle and bobbin into a downwardly inclined position, the bobbin will slip off from the spindle and fall into a suitable receptacle (not shown) which may be provided to receive it.

The spindles of the carrier 34 correspond in diameter to that of the spindles or whorls of the spinning frame. Consequently if the bobbin which is loaded upon the carrier spindle at the loading station 38 is warped or otherwise damaged to such an extent that it will not fit properly upon the spindles of the spinning frame, neither will it fit properly upon the carrier spindle but it will usually stick thereon so that its head will not come into engagement with the carrier hub and its small end will project beyond the free end of the spindle. Conversely, those bobbins which will fit loosely upon the spinning frame spindles will fit in a similar manner upon the carrier spindles of the present machine.

In accordance with one feature of the present invention means including a lever 42 is provided for detecting the presence upon the carrier spindles of an improperly positioned bobbin, i. e., a bobbin which has stuck upon a spindle before its head has reached the inner end thereof, and for stopping the machine when such an improperly positioned bobbin is present.

When a bobbin sticks upon a spindle in the manner described, the outer end of the bobbin will be located at a greater distance from the center of the carrier 34 than if the bobbin were properly positioned, and such a bobbin is detected by means of a finger 44 which projects from the upper end of the lever 42 into the path of the bobbin. The lever 42 will be actuated by the engagement with the finger 44, of the imperfect bobbin and moved into the position in which it appears in Fig. 15 and wherein it is operative to stop the rotation of the carrier 34. Upon the stopping of the carrier 34 under these conditions, the spindle carrying the imperfect bobbin will come to rest in the position indicated by dotted lines at 46 in Fig. 7 where it may be conveniently removed by an attendant. After being removed the imperfect bobbin is discarded and upon its removal the lever 42 automatically returns to its normal position and the stop mechanism then functions to set the carrier in operation again.

It may happen, however, that a bobbin which is sufficiently distorted or otherwise damaged to cause it to stick upon the carrier spindle will nevertheless assume a normal position thereon, i. e., with its head seated against the carrier hub. In such an event the outer end of the bobbin will not, of course, be engaged by the detector finger 44

and consequently the stop mechanism will not be actuated to stop the machine. It is obvious also that such a bobbin will not drop off of the spindle as the latter moves into the lower half of its orbit and consequently will not be delivered into the receptacle containing the perfect bobbins. It must, however, be removed from its spindle before the spindle is again brought to bobbin-receiving position at the loading station and to this end a small curved finger 48 depends from the lever 42 and into the path of the head of the bobbins and so located as to be engaged by the latter approximately when the bobbin reaches the lowest point of its travel. This engagement of the bobbin with the finger 48 serves to rock the lever 42 in a direction to effect the stopping of the machine. The stopping of the machine is a signal to the attendant who then removes the imperfect bobbin and discards it. Upon the removal of the bobbin from the carrier spindle, the lever 42 automatically returns to its normal position and the machine is again started.

From the foregoing it will be seen that the present mechanism operates to detect all bobbins which are so warped or damaged that they stick when deposited upon the spindles of the carrier 34, and upon such detection to stop the machine so that the same may be removed and discarded. It will also be apparent that so long as only perfect bobbins are present upon the carrier spindles the machine will operate to deliver these spindles into a receiver and that under no conditions is it possible for an imperfect bobbin to be deposited in this receiver by the action of the machine. Thus by using in the doffing operation only bobbins taken from the receiver into which they were discharged by the present machine there will be no undesirable interruption of the doffing operation due to the use of warped or damaged bobbins.

Having thus briefly outlined the general arrangement and mode of operation of the mechanism, the particulars of construction thereof will now be explained in detail. It should be understood that the many details of construction are relatively unimportant and are merely illustrative of means which it has been found convenient to use for the purpose and that the invention is not limited to such details as many and various changes, alterations and substitutions may be made therein and still fall within its scope and principle.

Referring particularly to Figs. 1 to 4, inclusive, the hopper 20 comprises a shallow rectangular tray the side walls of which are supported at the top of a suitable framework 50. At the front of the hopper 20 three inclined discharge troughs 52 are provided, these troughs having downwardly converging side walls 54 (Fig. 4) for guiding the bobbins into the chutes 22. The conveyer, which constitutes the floor of the hopper, consists of an endless belt carrying a plurality of transverse slats 56 arranged to frictionally engage the bobbins and urge them constantly toward the forward end of the hopper. The conveyer belt passes over rollers 58 and 60 that are suitably journaled in the frame work 50 and is advanced step-by-step by a feed mechanism comprising a ratchet wheel 62 secured to one of the trunnions of the roller 58 and a feed pawl 64 pivoted upon a pawl-carrier 66 that is arranged to oscillate upon said trunnion. The pawl-carrier 66 is connected by a link 68 with an eccentric pin 70 (Fig. 1) upon a pulley 72 secured to a horizontal main drive shaft 74 that is journaled in suitable bearings on the framework 50. The main shaft 74 is provided with a driving pulley 75 (Fig. 7) which may be connected with any suitable source of power.

To insure that the bobbins shall be discharged longitudinally into the chutes 22, the forward portion of the hopper 20 is subdivided by a plurality of parallel partitions or blades 76 into a series of channels which are only wide enough to permit the bobbins to pass freely through them in an endwise direction. To facilitate the entrance into said channels of any bobbins which may have been deposited in the rear of the hopper in such positions as to bridge across two or more adjacent blades or partitions 76, the forward ends of said blades are pivoted at 78 (Fig. 5), to a transverse bar 80 and are arranged to be vibrated horizontally about their pivoted ends thereby causing their rear ends to move back and forth to break up any bridging or blockading of the channels by the bobbins.

The means for vibrating the hopper partitions 76 comprises a horizontal slide bar 82 (Fig. 4) which extends above the partitions in parallel relation to the fixed bar 80 and which is mounted in suitable guideways in the side walls of the hopper. The slide bar 82 is reciprocated by means of a crank disk 84 having a crank pin which is connected by a link 86 with the slide bar. The crank disk 84 is carried at the upper end of a suitably journaled vertical shaft 88 and the latter is connected with a short horizontal shaft 92 by intermeshing bevel gears 90. The shaft 92 is driven from the main drive shaft 74 by a belt 94 which passes over the pulley 72 on the drive shaft and over a pulley 96 on the shaft 92.

As already stated the three chutes 22 are identical in construction and the three sets of bobbin-handling mechanism which are severally associated with said chutes are also of the same construction and accordingly a detailed description of one chute and the

mechanism associated therewith will suffice for all.

Referring to Figs. 6 and 7, the upper portion of the chute therein shown has upwardly flaring side walls 100, and the chute is partially covered by a top plate 102 which prevents possible upward displacement of the bobbins. The top plate 102 terminates at a point short of the upper extremity of the chute to provide a clearance space for the entering bobbins. It is obvious that the bobbins may enter either end first into the chute but the latter is shaped in cross-section as shown in Fig. 8, and accordingly when a bobbin enters the chute its head will be retained in the wide portion 106 thereof while shank of the bobbin will lie in the narrow part of the chute. The chute having no bottom wall, the bobbins will be suspended by their heads and will assume substantially vertical positions with their heads in abutting relation and the angle of inclination of the chute is such that the stack tends to slide freely down the chute. The stack of bobbins will be retained in the chute by the escapement device 24 which releases them one by one. A longitudinal slot 108 in the curved portion of the chute permits the introduction of an instrument for dislodging a bobbin if one should become jammed in the chute.

The construction and operation of the escapement device 24 will be described by reference to Figs. 7 and 13. This device comprises two sliding escapement pawls 110 and 112 which extend horizontally through one side wall of the chute and are disposed in the path of the bobbin shanks. The pawl 110 is made in the form of a yoke, as shown in Fig. 14, the side members of the yoke providing two parallel fingers for engaging the bobbin shank at spaced intervals. As shown, the spaced fingers of the pawl 110 are disposed in a vertical plane and the pawl 112, which consists of a single finger only, is spaced from the vertical plane of the pawl fingers 110 a distance substantially equal to the diameter of the bobbin heads. The two pawls are articulated for simultaneous movements in opposite directions. To this end the escapement pawls are pivoted to the proximate ends of two levers 114 and 116 which are disposed in substantial end-to-end relation and are separately pivoted intermediate their ends upon a bracket 118 on the side of the chute. The opposite ends of the two levers 114 and 116 are severally connected by links 120 to the opposite ends of a rocker bar 122 that is fixedly secured to the top of a vertical rock shaft 124. The rock shaft 124 turns in suitable bearings on the chute and on the frame work 50 and is actuated in time with the rest of the mechanism by means which will be later described. It will be understood that as the bobbins are released one by one from the chute by the action of the escapement mechanism the supply in the chute will be replenished from the hopper.

It is desirable to have the bobbins placed, large end first, upon the carrier spindles. Consequently the bobbins must be inverted to bring their heads lowermost before they are admitted to the guideway 32. For this purpose the lower portion of the channel 106 in the bobbin chute is curved as shown in Fig. 7 and the fixed abutment rod 28 is employed to engage the small ends of the bobbins while the heads thereof are sliding along the curved channel 106. As clearly shown by the several dotted line positions of bobbins in the bobbin chute in Fig. 7, a bobbin will readily tilt about the abutment rod 28 as the heavy head portion of the bobbin travels through the curved channel 26 and the bobbin will finally come to rest in the position shown at 126 with its head resting upon the support 30 and in registry with the passage through the tubular guideway 32.

The support 30 is adapted to be withdrawn from beneath the bobbin as a carrier spindle comes into bobbin receiving position beneath the guideway 32. To this end the support 30 comprises two arms 128 and 130 (Fig. 12) which are so mounted that their bobbin supporting ends will swing toward and from each other in the same horizontal plane. As shown, the arm 128 is rigidly secured to the vertical rock-shaft 124 while the arm 130 is pivoted at 132 to the upper end of the tubular guideway 32 and has an extension 134 which is connected by a link 136 with the arm 128. The two bobbin-supporting arms, thus articulated, are adapted to swing simultaneously in opposite directions so as to move into or out of supporting position.

The tubular guideway is carried by a frame piece 140 which may be hinged to a stationary frame piece 142 thus enabling the guideway to be swung away from the chute to facilitate the removal of a bobbin should one become jammed therein. The guideway may be rigidly secured in operative position by any suitable type of latching device or the like, it not being considered necessary to show such device in the drawings. To permit the escape from the guideway 32 of an imperfect bobbin which fails to entirely cover the carrier spindle, a slot 144 of the character shown in Fig. 6, is provided at the front of the guideway. A V-shaped notch 146 at the rear of the lower edge of the guideway 32 permits the passage of the carrier spindles and enables the carrier to be so positioned that the free ends of the spindles will project slightly above the lower end of the guideway when the spindles are in bobbin-receiving position. This arrangement helps

to insure that the bobbins will pass easily over the free ends of the spindles.

The spindle carrier 34 comprises a hub which is rotatable upon the shaft 35, the latter supporting the three spindle carriers which are shown in the illustrated embodiment of the invention. The four spindles 36 of each carrier are of such length that they will extend through the bobbins when the same are properly positioned thereon but the spindles are short enough to clear the detector finger 44.

The spindle carrier shown in Figs. 7 and 15 is rotated step-by-step, each step consisting of an angular movement of forty-five degrees. The intermittent actuation of the carrier is effected by a ratchet feed mechanism comprising a ratchet wheel 150, which is rigidly secured to the carrier hub, and a feed pawl 152 which cooperatively engages said ratchet wheel and is pivoted upon an eccentric pin 154 projecting from the side of a spur gear 155 that is mounted to turn upon a stud shaft 156 (Fig. 7) and is driven by a similar gear 157 on the main driving shaft 74. To properly control the rotation of the carrier 34 and prevent over movement at each partial rotation thereof, a braking device is provided in the form of a flexible cord or band 158 (Fig. 6) which passes over a grooved brake drum 159 which is secured to the carrier hub one end of said cord being secured to a fixed part of the machine while a weight 160 is secured to the opposite end of the cord. It will be understood the three spindle carriers shown in Fig. 3 are actuated in unison but by means of separate feed devices all of which are similar in construction to that just described and driven from the main driving shaft 74.

At every alternate step movement of the spindle carrier one of the spindles should be brought to rest in an absolutely vertical position at the bobbin loading station 38. To insure the accurate positioning of the spindles at the loading station means is provided for locking the spindle carrier against accidental rotation during each period of rest in which a spindle is located at the loading station.

The carrier locking device comprises a locking pawl 162 and a cooperating notched disk 164, said pawl being pivoted to the upwardly extending arms of a bracket 166 that is fixed upon the stationary shaft 35 while the notched disk 164 is interposed between the ratchet wheel 150 and the carrier hub and is fixedly secured to the latter. Four notches 168 are provided in the periphery of the disk 164 the notches being spaced ninety degree apart and in alinement with the spindles 36. The arrangement is such that the locking pawl 162 will drop by its own weight into the notches in the disk 164 as said notches come into position beneath the pawl and thus effectively lock the carrier disk with its spindles in the required angular positions. The notched disk may be constructed as shown at 164′ in Fig. 15[a] wherein the notches 168′ are provided with sides of unequal length, the shorter side being arranged to be first engaged by the locking pawl. This construction insures that the locking pawl will be certain to engage in the notches as the latter are positioned beneath the pawl.

To disengage the locking pawl 162 from the notch in the disk 164, prior to the start of the next feed movement of the spindle carrier, the following provision is made. A pawl releasing arm 170 is pivoted at one end upon the eccentric pin 154 beside the feed pawl 152. The pawl-releasing arm 170 extends through and is guided within a vertical slot 172 in the upwardly extending arm of the bracket 166. The upper or free end of the pawl-releasing arm is provided with a cam face 174 (Fig. 7) which is adapted to engage the lower edge of the locking pawl 162 just before the feed pawl 152 is ready to start upon its feed stroke and the shape of the cam face is such that the locking pawl will be lifted out of the notch thus unlocking the spindle carrier. Shortly after the start of the feed stroke of the feed pawl the cam face 174 disengages the locking pawl, allowing it to drop into contact with the periphery of the disk 164 so that when the next notch comes in to registry with the locking pawl the latter is free to drop therein to again lock the spindle carrier against rotation.

The rockshaft 124 which operates the escapement mechanism 24 and the removable bobbin support 30 is actuated from the hub of the spindle carrier in the following manner: The lower end of the rock shaft 124 has rigidly secured thereto an arm 178 (Fig. 11) which projects into the path of four equally spaced actuating pins 180 which project from the side of the carrier hub. As the spindle carrier rotates, the pins 180 in turn engage the arm 178 and cause the rockshaft to be rocked in a direction to retract the arms of the bobbin support 30 from supporting position and concurrently to withdraw the escapement pawl 112 from the chute while projecting the pawl 110 into bobbin holding position. This action causes a bobbin to drop through the guideway 32 and onto the adjacent spindle 36 and also causes the lowermost bobbin in the chute 22 to slide by gravity into the dotted line position indicated at 182 in Fig. 7. Upon the succeeding partial rotation of the spindle carrier the pin 180 which just effected the above described movement of the rockshaft 124 engages the adjacent end of a rocker member 184 (Figs.

6 and 11) which is pivoted at 184′ upon a bracket 186. The opposite end of the rocker member 184 engages the arm 178 and the said member is rocked by the movement of the pin 180 in a direction to swing the arm 178 and rock the rockshaft 124 in a reverse direction. A stop pin 185′ is located on bracket 186 to limit the swinging movement of rocker member 184. As a result of this reverse rocking of the rockshaft 124 the arms of the bobbin support 30 are returned into bobbin-supporting position while the relative positions of the escapement pawls 110 and 112 is reversed thus releasing a bobbin from the stack in the chute 22 and permitting it to move through the curved portion of the chute and into upright position upon the now operatively positioned bobbin support 30.

So long as perfect bobbins are deposited upon the carrier spindles the bobbins will completely cover the spindles and will not project beyond the outer ends thereof so that they will not engage the detector finger 44 of the stop mechanism as the carrier rotates. Bobbins which are warped or damaged in a certain way, however, may stick as they fall onto the carrier spindle as hereinbefore mentioned and consequently will engage the detector finger as they move away from the loading station and operate the stop mechanism to stop the machine.

The construction and mode of operation of the stop mechanism will now be explained. The lever 42 which constitutes part of the stop mechanism is pivoted at 190 upon a depending arm of the fixed bracket 166 and is provided with a weight 192 which tends to hold the lever in the normal or inoperative position in which it appears in Fig. 7, this position being positively determined by the engagement of a stop lug 194 with the bracket 166. If a bobbin which has been loaded upon the carrier spindle projects beyond the end of the spindle, the first step movement of the spindle carrier will cause the bobbin to engage the detector pin 44 and swing the lever 42 in a counter clockwise direction about its pivot 190 until it is positioned as shown in Fig. 15. When thus positioned, a curved face 196 at the weighted end of the lever 42 is substantially in engagement with the lower edge of the long feed pawl 152. It should be understood that the eccentric pin 154 upon which the feed pawl is pivoted travels in a clockwise direction. It will therefore be seen that the feed stroke of the feed pawl 152 occurs while the pivot 154 is traveling through the lower portion of its orbit and accordingly, with the lever 42 positioned as shown in Fig. 15 the feed pawl will be held out of engagement with the ratchet wheel 150 upon the feed strokes of said pawl thus maintaining the carrier 34 stationary until the imperfect bobbin has been manually removed from its spindle. The escapement mechanism 24, being actuated from the hub of the carrier 34, is maintained inoperative so long as the carrier 34 remains at rest. When the bobbin has been removed from its spindle, the lever 42 will be returned by gravity to its normal position, retracting the face 196 from the path of the feed pawl 152 and permitting the feed pawl to function to rotate the spindle carrier. A guide finger 198 projecting from the weighted end of the lever 42 extends between the feed pawl 152 and the releasing arm 170 for the locking pawl and assists in maintaining the feed pawl and the lever 42 in vertical alinement.

To provide for the stopping of the rotation of the carrier 34 and the escapement mechanism 24 when a bobbin does not project beyond the outer end of its spindle but sticks upon the spindle so that it fails to be delivered into the receiver with the perfect bobbins, the curved finger 48 is provided on the lever 42. This finger 48 has its free end offset, as shown at 200 in Fig. 9, into the plane of movement of the bobbins. If a bobbin remains upon a spindle when the spindle reaches its lowermost position, the head of the bobbin will engage the offset end 200 of the finger 48 and cause the lever 42 to be rocked in the same manner as when the detector pin 44 is engaged by a bobbin. This movement of the lever 42 will cause the stop mechanism to be then actuated and the carrier 34 and the escapement mechanism 24 to be stopped in the manner already described. An attendant will then remove the bobbin from the spindle and discard it and upon such removal of the bobbin the lever 42 will return to its normal position, permitting the machine to resume its normal operation.

Figs. 16 to 19, inclusive, are illustrative of a modified construction of the mechanism for feeding the bobbins to the chutes 22 which it may be desired to employ to insure against possibility of said chute becoming choked with bobbins in case the carrier 34 is allowed to remain at rest for any extended period of time. As shown in said figures, a receiving tray or hopper 204 is provided, into which the bobbins are to be deposited. The forward end of the hopper 204 communicates with one or more bobbin chutes 206. The apparatus shown in Fig. 16, being adapted to deliver bobbins to three bobbin carriers, will be equipped with three chutes 206 but inasmuch as the three chutes are identical in construction, only one of said chutes will be referred to hereinafter.

The hopper 204, is the same in construction as the hopper 20 hereinbefore described, its floor comprising an endless belt conveyer (not shown) which is driven in a direction

to urge the bobbins toward the front of the hopper and to discharge them into the chute 206. To this end the roller supporting the forward end of said conveyer belt is rotated by pawl and ratchet mechanism comprising a ratchet wheel 208 fast upon a shaft 210 to which said roller is secured, and a feed pawl 212 which is carried by an arm 214 that oscillates upon the shaft 210 to enable the pawl to actuate the ratchet wheel. The means for oscillating the arm 214 will be hereinafter described.

The bobbin chute 206 is downwardly inclined at its receiving end and is provided with an intermediate upwardly inclined portion 216 and terminates in a downwardly inclined delivery portion 218. Throughout its length the chute 206 is shaped, in cross-section, as shown in Fig. 10. The bobbins slide by gravity to the lower end of the downwardly inclined receiving portion of the chute 206 and then they are engaged and lifted by the fingers 220 of an endless belt conveyer 222, which, after elevating the bobbins to the highest part of the chute, introduces them into the downwardly inclined delivery portion 218 thereof. The lower end of the downwardly inclined portion 218 of the chute 206 is the same in construction as the corresponding end of the chute 22, having an escapement device similar to that shown at 24 which controls the delivery of the bobbins from the chute.

The conveyer 222 comprises a sprocket chain which passes over sprocket wheels 224 and 226 and to which the fingers 220 are secured so that they will project at right angles to the length of the chain as shown in Fig. 16. The sprocket wheels 224 and 226 are fast upon suitably journaled shafts 228 and 230, respectively. The shaft 228 is adapted to be driven through a clutch 230 which is controlled by the stop mechanism lever 42 so that the feed of the bobbins will be arrested when the rotation of the carrier 34 is stopped. To this end the clutch 230 comprises a driving member 232 and a driven member 234 the driving member 232 being fast upon a sleeve 236 that is mounted to turn upon the shaft 228 while the driven clutch member 234 is splined to slide upon said shaft so that it may be moved into and out of cooperative engagement with the driving clutch member.

Normally the driven clutch member 234 is maintained in engagement with the driving clutch member 232 by means of a spring 238 which encircles the shaft 228 between the hub of the driven clutch member and a collar 240 that is secured upon the end of the shaft.

The clutch member 232 is adapted to be continuously driven during the operation of the machine by means of a sprocket chain 242 which passes over a sprocket wheel 244 that is fast upon the sleeve 236 and over a sprocket wheel (not shown) that is fast upon a shaft 248 journaled in bearings 250. The shaft 248 is, in turn, driven by a sprocket chain 252 passing over a sprocket wheel 254 that is fast upon the shaft 248 and over a sprocket wheel (not shown) that is fast upon the shaft 74. During such time as the clutch members 232 and 234 are engaged, the shaft 228 is intermittently rotated and accordingly the conveyer 222 is intermittently advanced.

The pawl-carrying arm 214 is oscillated to actuate the ratchet wheel 208 and thereby to cause the bobbins to be fed from the hopper 204 into the receiving end of the chute 206 by means of a rod 256, which is pivoted at one end to the arm 214 and at the other end to a crank arm 258 that is fast upon the shaft 228 and serves to reciprocate said rod as the said shaft is rotated.

In order that the movement of the conveyer 222 may be arrested to stop the feed of the bobbins when the intermittent rotation of the carrier 34 has been interfered with, the driven clutch member 234 is adapted to be shifted upon the shaft 228 against the action of the spring 238 to disengage it from the driving clutch member 232. To this end a clutch actuating elbow lever 260 (Fig. 19) is fulcrumed upon a fixed pivot 262 and is provided with a forked upper extremity which straddles the hub of the driven clutch member 234 and carries inwardly projecting pins 264 which enter an annular groove 266 in said hub. The opposite end of the lever 260 is received in the notched extremity of a lever 268 (Fig. 17) which is pivoted upon a fixed stud 270 and is connected by a slotted link 272 with a lever 274, the latter being fulcrumed upon a fixed pivot 276 and connected by a rod 278 with the guide finger 198 of the stop mechanism lever 42. While the clutch members 232 and 234 are held in engagement the levers 268 and 274 and the link 272 are held in the position in which they appear in the drawings, the link 272 being so disposed that a pin 280 carried by the lever 274 pivoted at 276 is engaged by the portion of the link 272 adjacent the lower end of a longitudinal slot 282 therein. When the lever 42 is rocked by the engagement of a bobbin with the finger 44 or 48, the rod 278 will be lifted, and the levers 274, 278, 268 and 260 will be rocked so as to disengage the driven clutch member 234 from the driving clutch member 232, thus stopping the rotation of the shaft 228 and the advance of the conveyer 222, thus checking the feed of the bobbins into the downwardly inclined delivery section 218 of the chute 216. As the shaft 228 is caused to remain idle, the pawl carrying arm 214 will not be oscillated and accordingly the ratchet wheel 208 will not be rotated and the trans-

fer of the bobbins from the hopper 204 to the receiving end of the chute 206 will be arrested.

As the bobbins are delivered from the conveyer 222 to the portion 218 of the bobbin chute they assume the positions indicated by dotted lines in Fig. 17. It might happen, during the normal operation of the machine that the downwardly inclined portion 218 of the bobbin chute would become filled with bobbins to such an extent that those at the upper end of the row would interfere with the movements of the fingers 220 of the conveyer 222. To prevent such a possibility, means is provided for determining when the row of bobbins in the portion 218 of the bobbin chute has reached a point near the path of the conveyer fingers 220 as they swing around the sprocket wheel 224, and for operating thereupon to stop the feed of said conveyer and also to stop the transfer of bobbins from the hopper 204 to the receiving section of the bobbin chute. To this end a detector consisting of a curved wire 286 depends from a horizontal rod 288, the opposite ends of which extend through downwardly inclined slots 290 in plates 292 that are secured to the opposite side walls of the portion 218 of the bobbin chute. One end of the rod 288 is bent rearwardly, as shown at 294 and terminate in a yoke 296 which straddles said shaft and carries a cam roll 298 that rides in a cam groove in the side of a cam disk 300 (Fig. 19). The cam 300 functions during normal operation of the machine, to reciprocate the rod 288 in the slots 290 thus causing the detector wire 286 to be alternately raised and lowered above the longitudinal center of the bobbin chute. If the stack of bobbins in the portion 218 of the bobbin chute has been built up until the uppermost bobbin therein is substantially in the position of the bobbin 302 in Fig. 17, the advance of the conveyer 222 must be stopped because if more bobbins should be added to the stack they would lie in the path of the conveyer fingers 220 and interfere with the movement of the conveyer. Accordingly, as the detector wire 286 is moved rearwardly and downwardly by the action of the cam 300 said detector encounters the head of the uppermost bobbin of the stack in the portion 218 of the chute and the rod 288, instead of being retracted along the downwardly inclined lower edge of the slot 290 is lifted away from said edge as it is moved rearwardly, the shape of the slot 290 being such as to permit the rod to move through a substantially horizontal path of movement. As the movement of the rod 288 is thus modified by the engagement of the detector wire 286 with head of a bobbin, the end of said rod at the opposite side of the bobbin chute from the rearwardly bent portion 294 thereof, engages beneath the laterally offset upper end 304 of a lever 306 which is pivoted at 306′ and is connected at 282′ to the upper end of link 272. The rearward movement of the rod 288 serves to cam the finger 304 upwardly to rock the lever 306 to depress the slotted link 272 and thus to swing the levers 268 and 260 in directions to disengage the driven clutch member 234 from the driving clutch member 232 and thus to stop further feed of the bobbins either up the inclined portion 216 of the bobbin chute or into the receiving end thereof, without retarding the rotation of the carrier 34.

The above described modified construction insures against possibility of loss of bobbins from the machine by reason of the introduction into the bobbin chute of a quantity of bobbins exceeding the capacity of the chute.

As hereinbefore stated the invention is not limited to the details of construction and arrangement of parts herein illustrated, it being manifest that numerous variations and modifications may be made therein without departing from the spirit and scope of the invention.

I claim—

1. A bobbin handling machine, having in combination, a hopper for receiving a supply of bobbins, means for effecting the feed of said bobbins through the machine, means for testing said bobbins as they are fed through the machine to determine their characteristic for fitting loosely or tightly upon a spindle or whorl, comprising means for arresting the progress of bobbins which would fit tightly upon a spindle.

2. A bobbin handling machine having, in combination a hopper for receiving a supply of bobbins each having a bore to receive a spindle or whorl, means for effecting the feed of the bobbins through the machine, and means rendered operative by the feed movement of a bobbin having a tight fitting bore for a spindle or whorl to stop the operation of the machine to permit said bobbin to be removed therefrom and discarded.

3. A bobbin handling machine having, in combination, a hopper for receiving a supply of bobbins each having a bore to receive a spindle or whorl, means for effecting the feed of the bobbins through the machine, and means rendered operative by the feed movement of a bobbin having a tight fitting bore for a spindle or whorl to stop the operation of the machine until said bobbin has been removed and rendered operative by the removal of said bobbin for setting the machine in operation again.

4. A bobbin handling machine, having in combination a hopper for receiving a supply of bobbins, normally operative means for effecting the feed of the bobbins through the machine and their delivery from the machine upon reaching a predetermined

point therein, and means rendered operative by the presence in the machine of a bobbin which has passed said predetermined point of normal delivery to stop the machine to permit said bobbin to be removed therefrom.

5. A bobbin handling machine, having, in combination, a hopper for receiving a supply of bobbins, normally operative means for effecting the feed of the bobbins through the machine and their delivery from the machine upon reaching a predetermined point therein, and means rendered operative by the presence in the machine of a bobbin which has passed said predetermined point of normal delivery to stop the machine to permit said bobbin to be removed therefrom, and rendered operative by the removal of said bobbin for setting the machine in operation again.

6. A machine for handling bobbins prior to their use in a spinning frame having, in combination, means for holding a supply of bobbins, a plurality of bobbin spindles corresponding in diameter to the diameter of the spindles or whorls of the spinning frame, means for effecting the removal of the bobbins from said holding means, the loading thereof upon said spindles and the ultimate delivery from the machine of all bobbins which fit loosely upon their spindles, and means rendered operative by the presence upon a spindle of a tightly fitting bobbin for stopping the operation of the machine to permit the manual removal of said bobbin.

7. A machine for handling bobbins prior to their use in a spinning frame having, in combination, means for holding a supply of bobbins, a plurality of bobbin spindles corresponding in diameter to the diameter of the spindles or whorls of the spinning frame, means for effecting the removal of the bobbins from said holding means, the loading thereof upon said spindles and the ultimate delivery from the machine of all bobbins which fit loosely upon their spindles, and means rendered operative by the presence upon a spindle of a tightly fitting bobbin for stopping the operation of the machine to permit the manual removal of said bobbin, said means being constructed and arranged to set the machine in operation again when said removal has been effected.

8. A bobbin handling machine having, in combination, means for holding a supply of bobbins, a carrier having spindles upon which perfect bobbins are adapted to fit loosely, means for actuating said carrier to successively position said spindles at a loading station, means for effecting the removal of the bobbins from said holding means and the loading of the bobbins upon said spindles as they successively reach the loading station, and mechanism for rendering said carrier actuating mechanism inoperative if an imperfect bobbin fits tightly upon one of said spindles.

9. A bobbin handling machine having, in combination, a hopper for holding a supply of bobbins, a rotatable carrier having radial spindles upon which perfect bobbins are adapted to fit loosely, means for rotating the carrier intermittently to successively position the spindles at a loading station, means for effecting the removal of the bobbins one-by-one from the hopper and the loading of the same upon said spindles as the latter successively reach the loading station, and stop mechanism for arresting the operation of the machine if a bobbin which has been loaded upon a carrier spindle fits tightly thereon.

10. A bobbin handling machine having, in combination, a hopper for holding a supply of bobbins, a rotatable carrier having radial spindles upon which perfect bobbins are adapted to fit loosely, means for rotating the carrier intermittently to successively position the spindles at a loading station, means for effecting the removal of the bobbins one-by-one from the hopper and the loading of the same upon said spindles as the latter successively reach the loading station, and stop mechanism for arresting the operation of the machine if a bobbin which has been loaded upon a carrier spindle fits tightly thereon, said means being constructed and arranged to cause the machine to be started again upon the removal of said bobbin from its spindle.

11. A bobbin handling machine having, in combination, a hopper for holding a supply of bobbins, a rotatable carrier having radial spindles upon which perfect bobbins are adapted to fit loosely, means for rotating the carrier intermittently to successively position the spindles at a loading station, means for locking the carrier when a spindle has been positioned at the loading station, means for effecting the removal of the bobbins one-by-one from the hopper and the loading of the same upon said spindles as the latter successively reach the loading station, means for releasing said locking means after the spindle at the loading station has received a bobbin, and stop mechanism for arresting the operation of the machine if a bobbin which has been loaded upon a carrier spindle fits tightly thereon.

12. A bobbin handling machine having, in combination, a hopper for holding a supply of bobbins, a rotatable carrier having radial spindles upon which perfect bobbins are adapted to fit loosely, means for rotating the carrier intermittently to successively position the spindles at a loading station, means for effecting the removal of the bobbins one-by-one from the hopper and the loading of the same upon said spindles as

the latter successively reach the loading station, means for locking the carrier when a spindle has been positioned at the loading station and for subsequently unlocking the carrier to enable it to advance through its next partial rotation, and stop mechanism for arresting the operation of the machine if a bobbin which has been loaded upon a carrier spindle fits tightly thereon.

13. A machine for handling bobbins prior to their use in a spinning frame having, in combination, means for holding a supply of bobbins, a carrier having radial spindles corresponding in diameter to the spindles or whorls of the spinning frame, means for actuating the carrier to successively position its spindles at a loading station, means for effecting the removal of the bobbins singly from said holding means and the placing of the same upon the carrier spindles as the latter are successively positioned at the loading station, a detector member located out of the path of movement of bobbins which fit loosely upon the carrier spindles but adapted to be engaged and moved by bobbins which fit tightly on said spindles so that they fail to reach the bases thereof, and stop mechanism with which said detector member is associated for rendering the carrier actuating mechanism inoperative upon the movement of said member by a bobbin.

14. In a bobbin handling machine, feed mechanism having, in combination, a chute in which a plurality of bobbins may be supported in side-by-side stacked relation with their heads uppermost, said chute being inclined to enable the bobbins to slide by gravity therethrough, means for retaining the stack within the chute and for releasing the bobbins one-by-one therefrom, means for delivering the released bobbins successively in inverted upright position and means for receiving the inverted bobbins comprising testing devices to determine their characteristic for fitting tightly or loosely upon a spindle.

15. In a bobbin handling machine, feed mechanism having, in combination, a chute having an inclined portion for supporting a plurality of bobbins in side-by-side stacked relation and through which the bobbins may slide by gravity, an escapement device for retaining the stack in the chute and successively releasing individual bobbins therefrom, an extension of said chute for conveying the bobbins from the stack to a point of delivery, means cooperating with said extension to invert the bobbins as they pass therethrough and means for receiving the inverted bobbins comprising testing devices to determine their characteristic for fitting tightly or loosely upon a spindle.

16. A bobbin handling machine having, in combination, means for holding a stack of bobbins, a vertically arranged tubular guideway for said bobbins, means for supporting a single bobbin in upright position adjacent the upper end of said guideway, means for releasing the bobbins one-by-one from said stack and delivering them successively in a position of axial alinement with said guideway with their large ends resting upon said supporting means, a rotatable carrier having a plurality of radial spindles adapted to be brought to a loading station in a position of axial alinement with said guideway and to loosely receive perfect bobbins, means for intermittently rotating said carrier to bring said spindles successively to rest at said loading station and to transfer bobbins from said station to a point of delivery where they may fall by gravity from their spindles, means for removing said supporting means from beneath the bobbin supported thereby to permit the latter to fall through said guideway and on to the spindle beneath it, and stop mechanism operative to arrest the rotation of the carrier if a bobbin fails to fit loosely upon its spindle.

17. A bobbin handling machine having, in combination, a hopper holding a supply of bobbins, a chute in which a plurality of bobbins are suspended by their heads in side-by-side stacked relation and through which they are adapted to slide by gravity, means for retaining the stack in the chute and releasing the bobbins one-by-one therefrom, means for feeding the bobbins from the hopper to the chute, a plurality of spindles upon which perfect bobbins are adapted to fit loosely, means for carrying said spindles and positioning them successively at a loading station, means for temporarily supporting a bobbin above a spindle at the loading station, means for guiding the bobbins after they are released from said stack and delivering them in inverted position upon said supporting means and locating them in vertical alinement with the spindle at the loading station, means for retracting said supporting means to cause the bobbin supported thereby to drop onto said spindle, and means cooperating with said spindles to detect the presence upon anyone of them of a tightly fitting bobbin and for stopping the machine if such a bobbin is detected.

18. A machine for handling bobbins prior to their use in a spinning frame having, in combination, a hopper for receiving a supply of bobbins, an inclined bobbin chute through which the bobbins may slide by gravity, means for feeding bobbins from the hopper to the chute, means for continuing the feed of the bobbins through the machine and for detecting certain imperfections in the bobbins, and means rendered operative by the continued feed movement of a bobbin having such imperfections to arrest the progress of said bobbin and to stop the feed

of the bobbins from said hopper to said chute.

19. A machine for handling bobbins prior to their use in a spinning frame, having, in combination, a hopper for receiving a supply of bobbins, means including a conveyer for receiving bobbins from the hopper and advancing them through the machine, means for detecting bobbins having certain imperfections during the advance of the bobbins, and means operative upon such detection for arresting the progress of the imperfect bobbin and for stopping the operation of said conveyer.

20. A machine for handling bobbins prior to their use in a spinning frame having, in combination, a hopper for receiving a supply of bobbins, means including a chute and a conveyer for receiving bobbins from the hopper and advancing them through the machine, means for detecting bobbins having certain imperfections during the advance of the bobbins through the machine, means operative upon such detection for arresting the progress of the imperfect bobbin and for stopping the operation of said conveyer and auxiliary means rendered operative by the accumulation of a predetermined number of bobbins in the bobbin chute for stopping the operation of said conveyer.

21. A machine for handling bobbins prior to their use in a spinning frame having, in combination, a hopper for receiving a supply of bobbins, means including a chute and a conveyer for receiving bobbins from the hopper and advancing them through the machine, feed mechanism for transferring bobbins from said hopper to said chute, means for detecting bobbins having certain imperfections during the advance of the bobbins through the machine, means operative upon such detection for arresting the progress of the imperfect bobbin and for stopping the operation of said conveyer and auxiliary means rendered operative by the accumulation of a predetermined number of bobbins in the bobbin chute for stopping the operation of said conveyer, and of said feed mechanism.

22. A machine for handling bobbins prior to their use in a spinning frame having, in combination, a hopper for receiving a supply of bobbins, a bobbin chute having an upwardly inclined portion between two downwardly inclined portions, feed mechanism for transferring bobbins from the hopper to the downwardly incline portion at the receiving end of the chute, a conveyer for elevating the bobbins through the upwardly inclined portion of the chute and delivering them into the downwardly inclined portion at the delivery end of the chute, means including a clutch for driving said feed mechanism and means for continuing the advance of the bobbins after they leave the chute, means for operation during said continued advance for detecting bobbins having certain imperfections, and means operative upon such detection for disengaging the members of said clutch to stop the operation of said feed mechanism and said conveyer.

23. A bobbin handling machine having, in combination, a hopper for holding a supply of bobbins, a rotatable carrier having radial spindles upon which perfect bobbins are adapted to fit loosely, means including a feed pawl and ratchet, for rotating the carrier intermittently to successively position the spindles at a loading station, means for effecting the removal of the bobbins one-by-one from the hopper and the loading of the same upon said spindles as the latter successively reach the loading station, and stop mechanism for arresting the operation of the machine if a bobbin which has been loaded upon a carrier spindle fits tightly thereon, said means including a lever adapted to be engaged by said bobbin and oscillated thereby to disengage said feed pawl from said ratchet.

24. A bobbin handling machine, having in combination, a hopper for receiving a supply of bobbins, means for effecting the feed of said bobbins through the machine, and means including a member corresponding to a spindle or whorl for testing said bobbins as they are fed through the machine to determine their characteristic for fitting loosely or tightly upon a spindle or whorl.

In testimony whereof I have affixed my signature.

EUGENE R. ALDERMAN.