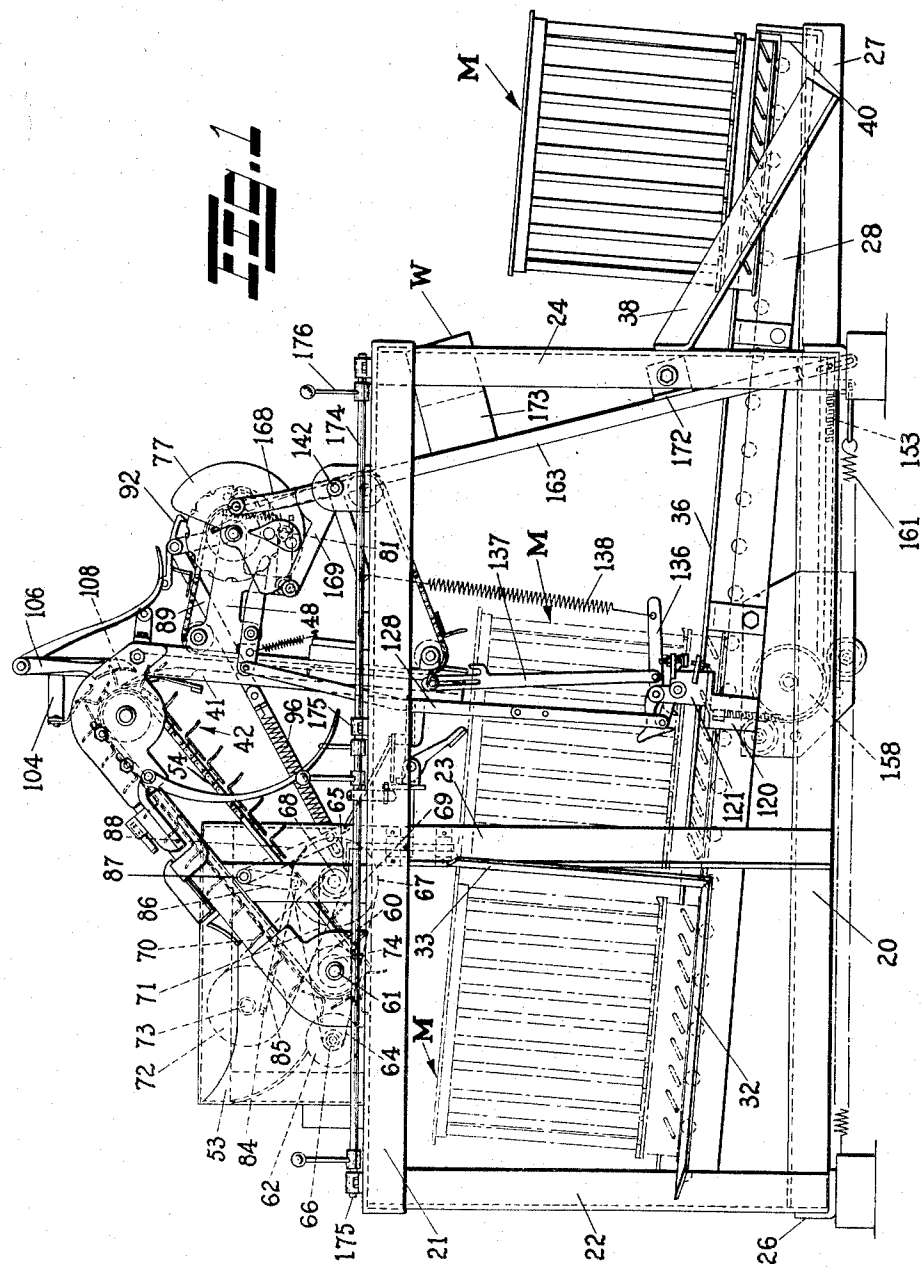
Oct. 21, 1958 G. E. REPASS 2,856,740

BOBBIN LOADING MACHINE

Filed Jan. 6, 1956 6 Sheets-Sheet 1



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BOBBIN LOADING MACHINE

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FIG. 2

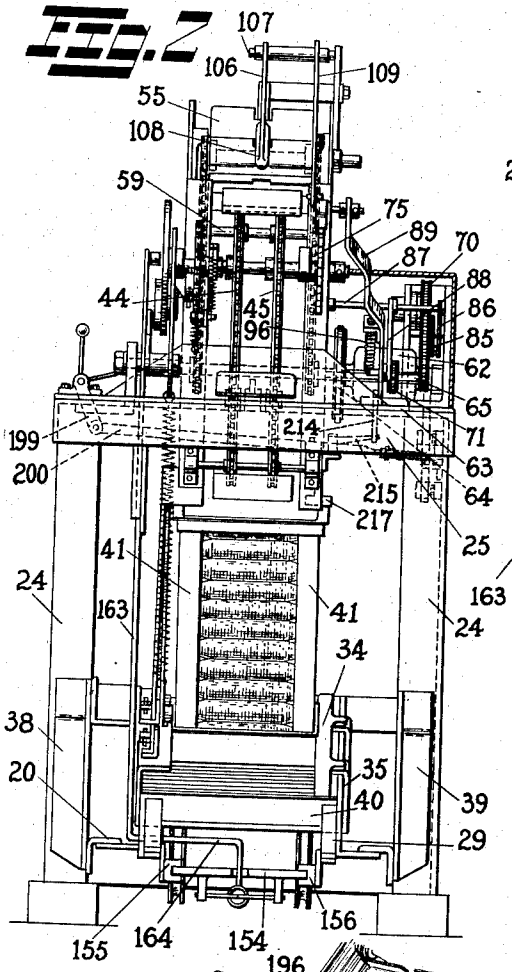


FIG. 4

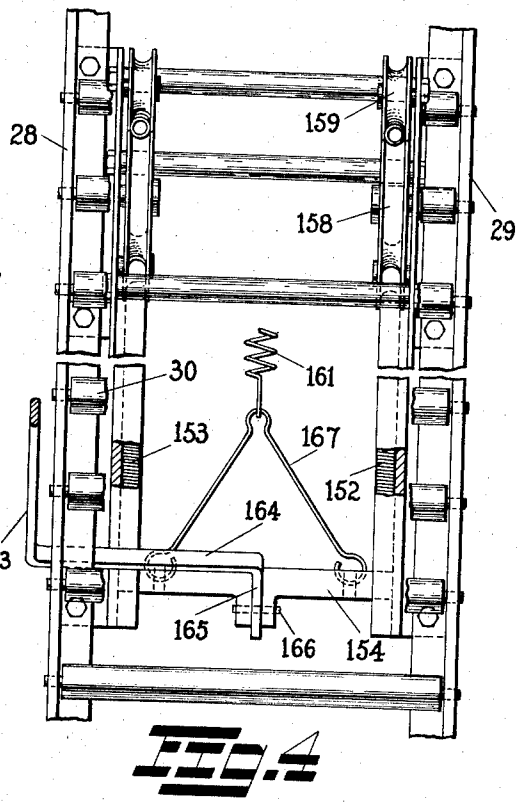
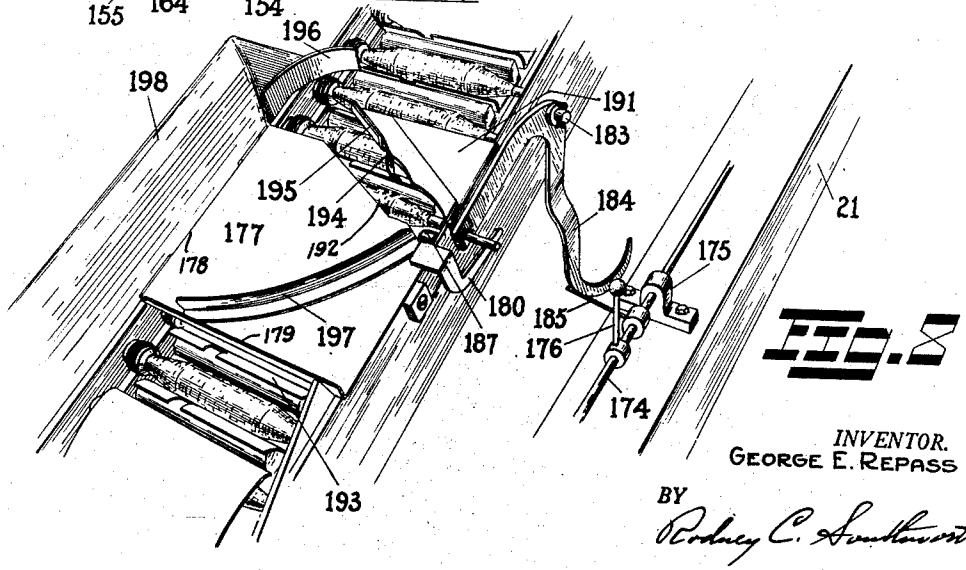


FIG. 3



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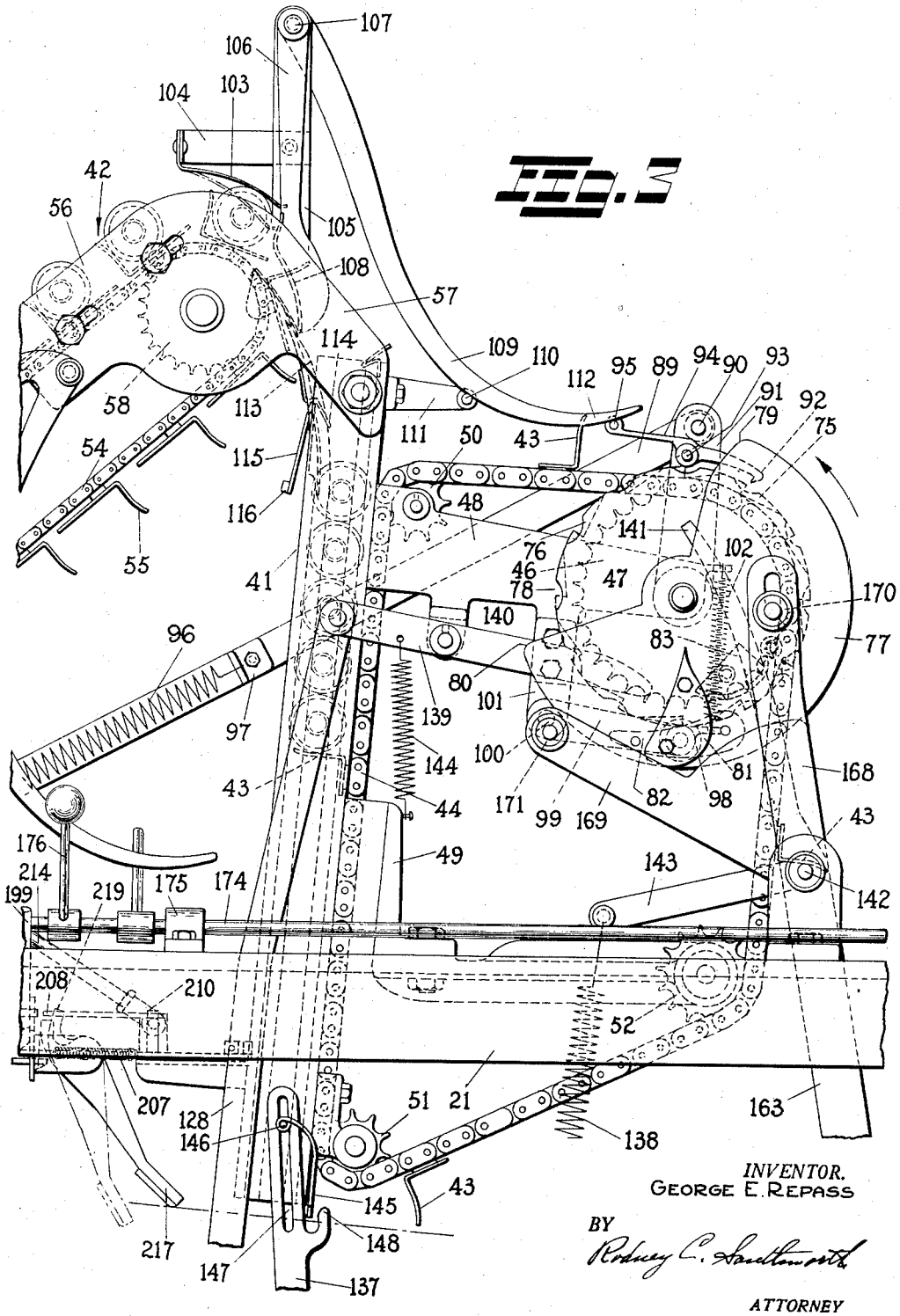
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BOBBIN LOADING MACHINE

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FIG. 3



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BOBBIN LOADING MACHINE

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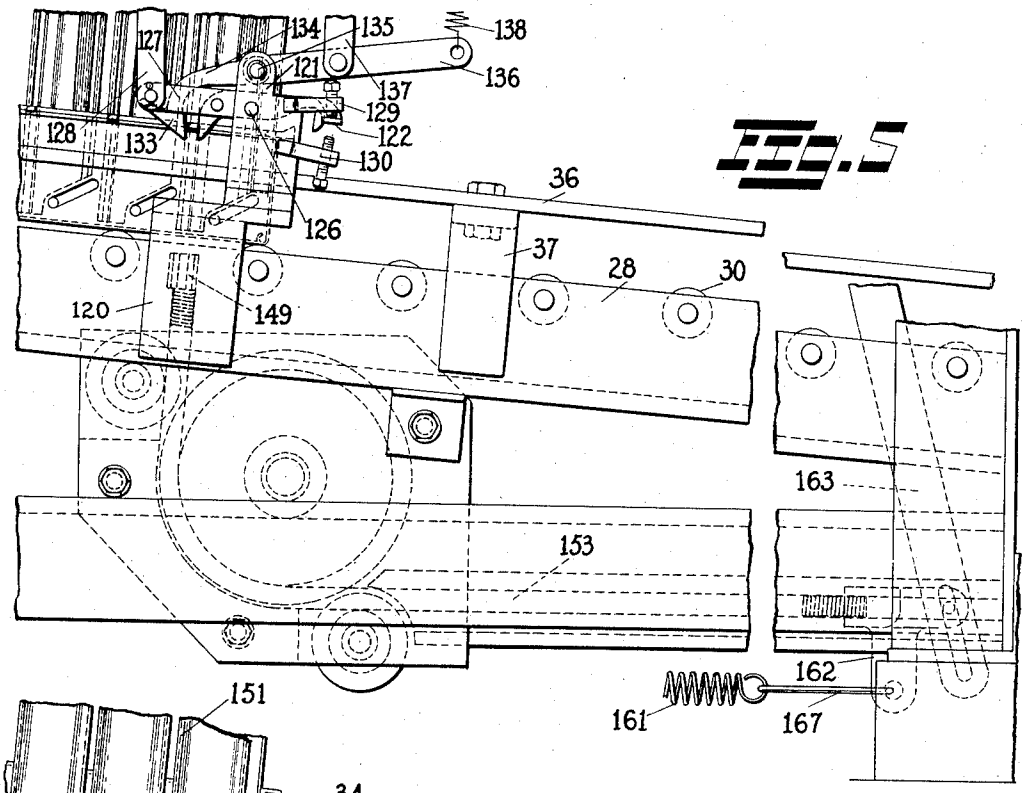


FIG. 5

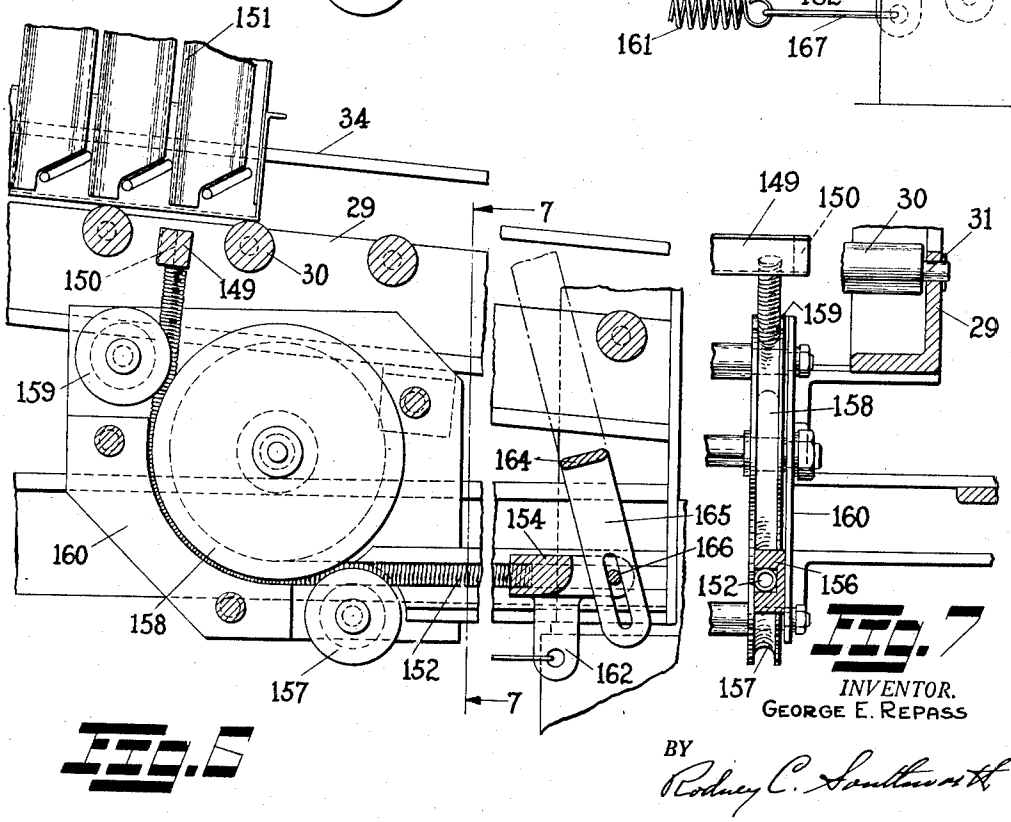


FIG. 6

FIG. 7

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BOBBIN LOADING MACHINE

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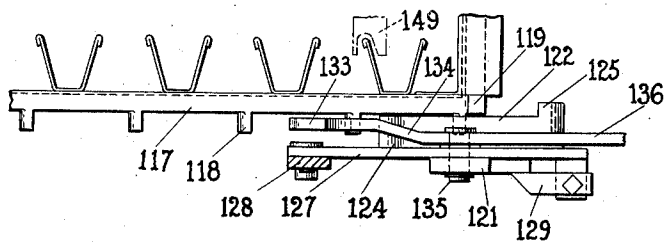


Fig. 5a

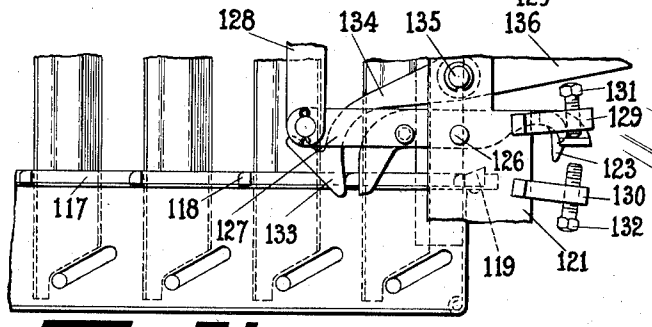


Fig. 5b

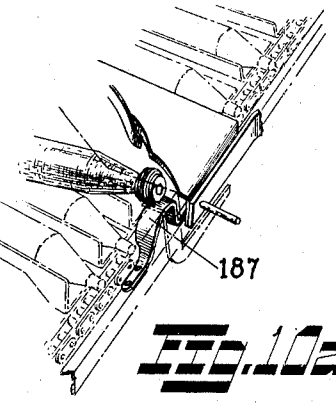


Fig. 10a

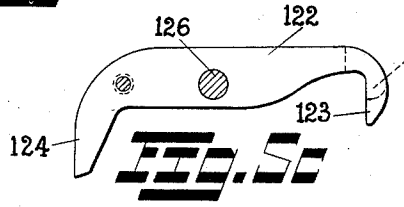


Fig. 5c

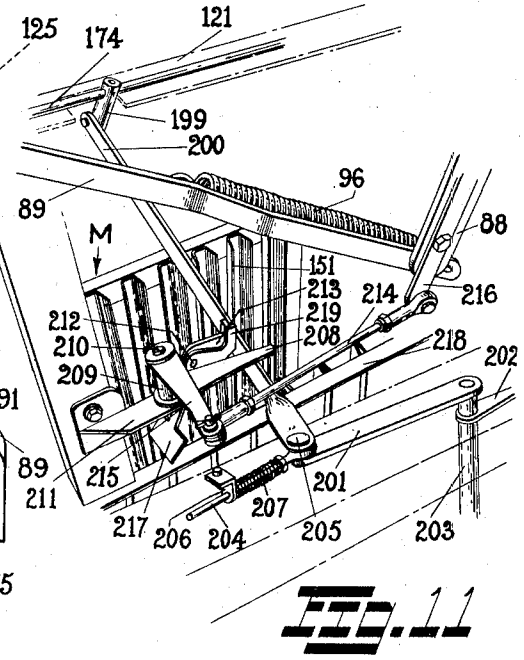


Fig. 11

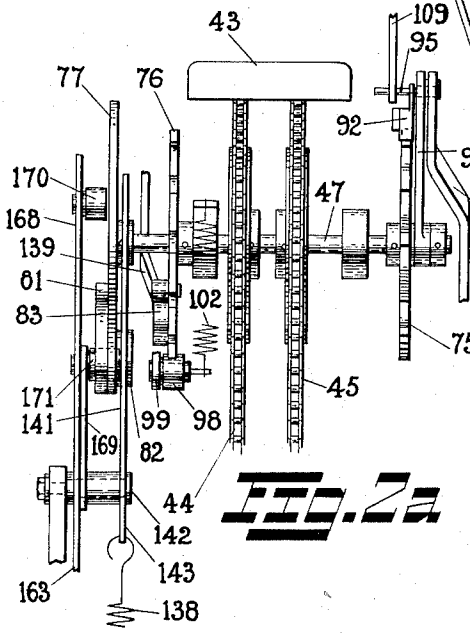


Fig. 2a

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BOBBIN LOADING MACHINE

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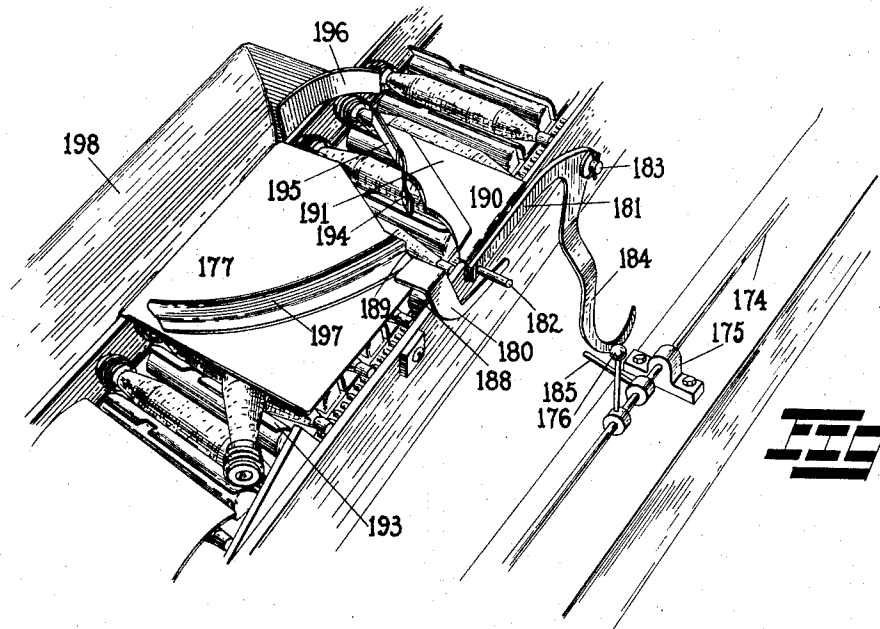


FIG. 10

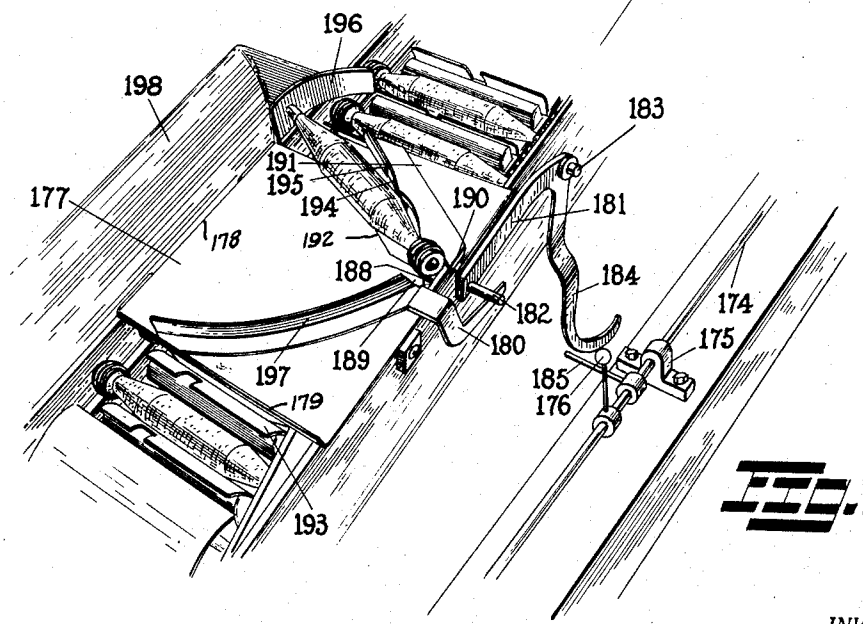


FIG. 9

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United States Patent Office 2,856,740 Patented Oct. 21, 1958

2,856,740

BOBBIN LOADING MACHINE

George E. Repass, Hopedale, Mass., assignor to Draper Corporation, Hopedale, Mass., a corporation of Maine

Application January 6, 1956, Serial No. 557,799

22 Claims. (Cl. 53—61)

This invention relates to a machine for loading textile bobbins in magazines for use on automatic, filling replenishing looms.

It is a general object of the invention to devise a complete machine to which filling wound or other bobbins may be fed and which shall automatically load these bobbins into magazines of a type in which columns or vertical rows of bobbins are retained in channels or cells in the magazine, it merely being necessary to supply both bobbins and magazines to the machine.

A more specific object is that of devising such a machine which shall handle and load the bobbins without damage to either the bobbins themselves or to the filling or other supply wound thereon.

A further object is that of loading a substantial number of bobbins rapidly and without violent handling or without dropping the bobbins more than a few inches so that there shall be no likelihood of incomplete or retarded action due to cocked or wedged bobbins.

A further object is that of automatically counting off the exact number of bobbins for each cell or channel in the magazine and of indexing the magazine and advancing it from channel to channel under the influence of gravity.

It is another object to devise such means that may be set to feed different sized bobbins and different numbers thereof per cell in the magazine without changing more than a minimum of control parts.

Another object is that of providing automatic stop means effective upon failure of a bobbin to proceed through the machine in intended fashion, also ejecting means for improperly oriented bobbins.

Other objects of the invention will become apparent from the following more detailed disclosure.

In automatic, bobbin-changing looms for weaving it has been suggested that instead of the conventional rotary battery or cradle, a preloaded magazine be brought to the loom and placed thereon to cooperate with the replenishing means of the loom in feeding its supply of bobbins to the shuttle as needed. This system has several advantages in that a larger number of bobbins can be handled at one time making it necessary to attend any particular loom less frequently and these magazines may also serve to transport the bobbin and in instances, serve as a receptacle for bobbins while the thread is being steamed or otherwise treated. One reason such systems have not been widely accepted is that too much time is required to load the bobbins in the magazine which, to be effective, must be of a type to hold about one hundred bobbins and must be compartmented and constructed to feed the bobbins to a battery in an orderly fashion.

According to the invention herein described and claimed, magazines with vertically disposed channels are used so that the bobbins are arranged in columns and released, one column at a time, to feed down into a battery, the magazine being indexed to the next column automatically.

These magazines are subject matter of copending application Serial No. 528,928 filed August 17, 1955, now United States Patent No. 2,778,382, and feed to batteries of the general type shown in United States Patent 2,566,880. The bobbins employed and to be handled in this loading machine are preferably, although not necessarily, filling wound and are formed with a so-called tip bunch and tail wind all as described in United States Patent 2,558,198.

The instant loading machine provides means to index and otherwise control the advance of magazines in general horizontal position with the bobbin receiving channels generally upright beneath the loader proper which includes a counting means, a conveyor to feed bobbins, one at a time, through the counter and to an accumulator by which a given number of bobbins is temporarily assembled in a loading channel preparatory to being lowered into an aligned cell of the magazine.

Instead of dropping these accumulated bobbins into the magazine, a support is so controlled as to rise into each channel or cell of the magazine as it is loaded, to a point just beneath the assembled group of bobbins whereupon, when they are released, the support controls their descent into the magazine so that they move slowly and without the shock and general tendency to disturb the wound package which would be experienced if they were allowed to fall freely. It is also effective in preventing cocking or tilting of bobbins, a thing which always occurs if they are dropped freely for anything more than a few inches.

The counting mechanism is supplemented by and governs an indexing control for the magazine which also functions from one magazine to another so it is merely necessary to place empties at one end and remove full containers at the other.

The invention will be described in detail by reference to one specific embodiment thereof as illustrated in the accompanying figures of drawing, wherein:

Fig. 1 is a side elevation of a complete loading machine.

Fig. 2 is an end view of the machine.

Fig. 2*a* is an enlargement of mechanism at the top of Fig. 2.

Fig. 3 is an enlarged view of the conveyor discharge, counter and accumulator.

Fig. 4 is a detail view of the movable bobbin lowering support and control therefor.

Fig. 5 is an enlarged view further illustrating details of the mechanism of Fig. 4 and also the indexing and a positioning lock means for the magazines.

Fig. 5*a* is a plan view of certain details of the locking means of Fig. 5.

Fig. 5*b* is an elevation of the mechanism of Fig. 5*a*.

Fig. 5*c* is a detail of the escapement pawl.

Fig. 6 shows parts of the mechanism of Fig. 5 as seen in section.

Fig. 7 is a partial section at line 7—7, Fig. 6.

Fig. 8 is a perspective view of part of the conveyor and control means thereat.

Fig. 9 shows the mechanism of Fig. 8 ejecting a bobbin which has been inserted in reversed relationship.

Fig. 10 shows the machine being stopped by a superimposed bobbin.

Fig. 10*a* is a detail view of part of the bobbin ejecting means.

Fig. 11 is a perspective view showing a stop motion which functions when no magazine is in position to be loaded.

Now referring to Figs. 1 and 2, the machine is built upon a frame having side members **20** at the lower end and **21** at the top interconnected by three uprights **22**, **23** and **24** at either side. These are tied together laterally by end members **25** at the top and **26** at the

bottom, feeding end of the machine and other lateral members at appropriate positions along the structure.

The lower rails 20 are extended as at 27 at the delivery end to sustain one end of a pair of inclined track members 28 and 29, Figs. 4, 5 and 6, also, further supported along their length by the various upright posts. These track members have a number of rollers 30 journaled in bearing holes therein. Each roller has reduced ends 31, Fig. 7, thus borne and a snap ring or other retaining means to prevent withdrawal. The rollers are close enough together so that a magazine—three of which are indicated generally by the letter M—may be supported to travel by gravity along the length of the machine as will be described. These are inserted on a platform 32 and in front of a vertical stop 33, and may be pushed into place on the roller track being stopped in proper position to descend under the influence of gravity by a side guide bar 34 which is attached to rail 29 by several angle brackets 35. At the front a similar bar 36 is attached by brackets 37 to rail 28. The magazines are constrained to progress down the track while being maintained within lateral limits by these bars.

The extensions 27 are further provided for carrying their load by braces 38 and 39, Figs. 1 and 2, connected to the uprights 24 and to the extensions near their ends. An end cross member 40 acts as a stop for filled magazines, one of which is shown in that position, Fig. 1.

Adjacent the central part of the machine at which the actual loading takes place, there is provided an accumulator better shown in Fig. 3. This comprises slotted guides 41 in a nearly vertical position, but actually perpendicular to the track on which magazines move. There is one guide at each side, that at the near side in Fig. 3 being slotted to guide the bobbin tips, while a similar guide at the opposite side has a wider slot for the bobbin butts. The lower ends of these guides terminate just above the passing magazines while the top ends are positioned to receive bobbins from a conveyor generally indicated by numeral 42. This conveyor will be described in detail in due course.

The accumulator includes, in addition to the guides, moving support means in the form of plates 43 which move along and down in the direction of the guides to hold a number of bobbins equal to the number to be loaded in each cell of the magazine. These plates are fixed to spaced links of chains 44 and 45, Figs. 2, 2a and 3, guided over a number of sprockets and driven by a larger sprocket 46 fixed to shaft 47. The latter is rotatable in bearings in brackets 48 attached to the guides 41, in turn secured to rails 21 by brackets 49.

These chains are so guided by sprockets 50, 51 and 52 that a run of the chain long enough to accommodate the greatest number of bobbins to be loaded in one cell passes parallel to the guides. The total chain length is selected so as to be four times the distance required between successive plates, although it could be three or more times that. While one chain 44 and its sprockets are shown in Fig. 3, it is to be understood that chain 45 is behind it and identically constructed and guided. The plates 43 are held by both chains and are of a length to support by contact with the entire control portion of the bobbin package.

Conveyor 42 is inclined upwardly from a hopper 53 and comprises parallel chains 54 between which and carried by which are a number of plates or treads 55 of angular form and so spaced as to leave room for a bobbin to be carried between them. These operate between side members 56 which are curved as shown and which attach at their top ends to the guides 41 by bolted extensions 57. Chains 54 run over sprockets 58 on shaft 59 at the top and are driven at their lower ends by sprockets 60 fixed on shaft 61. Again these parts are duplicated at each side and numerals are applied only at the front as viewed in the figures.

There are actually only three functions of the loader which are power operated, these being the conveyor and the timing and accumulating units which are driven from shaft 47. To advance these mechanisms a motor 62, Figs. 1 and 2, is mounted at the rear side of the machine on a platform 63 and by a V-belt 64 drives a jack shaft 65. This belt is trained over a small pulley 66 on the motor shaft and a larger one 67 on shaft 65. The latter shaft also has fixed thereto sprockets 68 and 69 over which run chains 70 and 71. Chain 70 drives a large sprocket 72 rotatable on a short stud shaft 73, while chain 71 runs to another sprocket 74 fixed to the end of shaft 61 which is the driving shaft for conveyor 42.

Now referring to Figs. 1 and 3, the shaft 47 has fixed at the rear of the machine a ratchet wheel or disk 75 by which the shaft and timing parts carried by it are advanced step by step as bobbins are accumulated. At its opposite end (the front of the machine) there are a stop or index disk 76 and a cam disk 77. There are the same number of indexing grooves 78 in the disk 76 as there are teeth on the ratchet disk and the number is governed by and should equal the number of bobbins which are to be loaded in a single magazine cell.

The cam disk 77 fixed to the extreme end of shaft 47 is provided with a concentric periphery for about two-thirds of its circumference and has a cam face 79, a drop-off point 80 and a cam 81 attached at its outer face and another cam 82 at the inner face. The purpose of all these cams will be made clear in the following description.

The indexing disk 76 has a cam 83 fixed to its outer face for controlling the magazine indexing. The positions of these cams are capable of being varied within limits for timing purposes.

Now returning to Figs. 1, 2, 2a and 3, the shaft 47 and parts fixed for rotation therewith are advanced counterclockwise as viewed in the figures. Sprocket 72, continuously driven, has a crank pin 84 to which is hinged a connecting rod 85 the opposite end of which is pivoted at the free end of an arm 86 fixed to a shaft 87 to which is also fastened for swinging movement an arm 88. The latter is connected to a link 89 the opposite end of which is pivoted at 90 to an arm 91 freely pivotable on shaft 47 and carrying a claw 92 pivoted at 93 and having an extension 94 terminating in an enlarged end in which is set a pin 95. The link 89 is slotted at its lower end and the force of the pulling action incidental to movement of arm 88 is transmitted to the link through a spring 96 attached to the arm 88 or to the pivot and to the central portion of the link at 97. Thus the indexing stop for the disk 76 may limit the ratcheting motion precisely while the swing of arm 88 is adjusted to something greater than the movement required.

According to the set up herein taken by way of example, twelve bobbins are accumulated and loaded in each magazine cell and thus there are twelve clawing motions imparted to the ratchet disk. If a different number of bobbins is to be loaded at each cell, then disks 75 and 76 are changed and will have the same number of teeth and depressions as the bobbins accumulated. Of course, that will change the effective stroke of the claw, but arm 88 is so moved as to give the greatest movement required while spring 96 permits the link and claw to move only as far as required for a single ratcheting movement of the cams.

The indexing lock consists of a roller 98 at the end of an arm 99 pivoted at 100 on a depending bracket 101. This arm is urged upwardly by a spring 102 connected at the end of the arm and to an eyebolt or other means attached at the end of the bracket 48. The roller engages in the grooves 78 temporarily locking the disk and entire timing assembly in position at each ratcheting movement, but does not prevent a fairly easy movement of the assembly under influence of the claw 92.

The above described, periodic motion imparted to

the shaft 47 and attached parts is governed by the delivery of bobbins from the conveyor 42 to the accumulator and that control is exercised through a counting means. Each bobbin as delivered by one of the treads which go to make up to conveyor apron passes under a restraining spring 103 carried on extension 104 of vertical support 105 and then past a counting arm 106 pivoted at 107. This arm has a curved end 108 which bears against and is moved outwardly by a passing bobbin. Pivot 107 in the form of a short spindle also has an arm 109 fixed to it and this arm, curved as shown, rests upon a stop pin 110 in vertically adjustable bracket 111, except when raised by a bobbin passing beneath counter shoe 108. The conveyor treads are notched centrally to pass the shoe 108 without contact between the parts. The end 112 of this curved arm bears upon the pin 95 by which it normally holds arm 94 downwardly and claw 92 out of engagement with the ratchet disk. Of course, the claw 92 is continuously reciprocated but may impart a movement to the disk and other parts on shaft 47 only when arm 109 is lifted by a bobbin passing under shoe 108. The curvature and extent of that shoe is such that it elevates the arm 109 long enough for the claw to effect one complete ratcheting motion and then drops to raise it out of action until the next bobbin passes. The curve of the end 112 of the arm cooperates with the combined movement of other parts to keep claw 92 at about the same distance from the disk 46 except when it is in active engagement therewith.

While it is conceivable that the claw will fall by gravity except when positively raised and that shoe 108 and arm 109 normally tend to fall, springs (not shown) are preferably employed to make more certain the action of the parts. A coil spring at the hub of the claw and arm 94 at pivot 93, however, is of less strength than a similar one at pivot 107 so that the arm 109 always dominates unless a bobbin is being counted by shoe 108.

As the bobbins are advanced by the conveyor to pass under shoe 108, they are doffed from the conveyor by end guards 113, one at either end of the bobbin just outside the treads 55. These extend under the plane of the conveyor apron at the top, but guide bobbins forwardly to clear the conveyor and into the vertical accumulator guide members 41. A weighted, V-shaped member having a bobbin engaging lip 114 and a depending part 115 at the end of which is a weight 116 serves to level and slow up the fall of the bobbins. This member is merely hung on the top edges of the guard at that side of the bobbin channels.

The indexing means for the magazines is so devised as to stop an empty magazine in position to start loading and to permit it to advance one cell at a time as loading continues, then to release it and to position the next magazine. The movement down the roller ramp is entirely by gravity and since that may lag a little or not be too forceful, a positioning lock is employed along with a double pawl escapement.

The magazines themselves are fitted with a rail 117 at the side at which the control is effective, this rail being notched to leave projections or lugs 118. The leading end of the rail is raised or widened all as shown in Figs. 5 and 5a to present an initial stopping abutment 119. There are as many projections 118 as there are cells to be loaded in the magazine. Here eight are used.

As seen in Figs. 1 and 5, combined brackets 120 and 121 mounted on the track member 28 carry a double pawl 122, better shown in Figs. 5a, 5b and 5c, which has a first pawl 123 and a second 124 which act as the pawls of an escapement in connection with the projections 118. These pawls are abount one and one-half projections apart. A third pawl or stop 125, shorter than pawl 123 and extending laterally, functions only at the first indexing from cell one to cell two. The double pawl is pivoted at 126 to the bracket 121 and is connected to or forms a part of an extension or arm 127 to which is connected a control link 128.

Bracket 121 has two projecting arms 129 and 130 through which abutment screws 131 and 132 are threaded. These stop or limit the angular movement of the pawls and may be adjusted and locked in position. When pawl 123 is lowered to engage a projection 118, the pawl 124 will be raised above the projections, and vice-versa. Thus to index a magazine from one cell to the next, it takes two movements of the pawl, one by pulling the link 128 up and then one by lowering it. The magaine moves about one-half a cell length at a time.

When a magazine first comes down the roller ramp, or when magazines change as a full one is released, the pawl 124 is in lowered position to engage the first lug 118. The first cell will then be in position to be loaded. At the first move, that is, as the second cell is brought up, the double pawl escapement cannot function normally since there is no lug for the pawl 123 to work upon at the time. At that time, or as the pawl 124 is raised from its lug, the latch 125 engages the initial or special stopping abutment 119. Then on the return or second escapement movement, that releases and the pawl 124 engages lug number two of the magazine, the second cell then being in place.

Since the magazines move by gravity, there may be a slight lag at times or a failure for a lug 118 to be in exact engagement with the pawl 124. To obviate any trouble which might occur as a result, a positioning lock 133 at the end of arm 134 of a two-armed lever pivoted at 135 and having its other arm 136 connected to both a link 137 and a spring 138, is adapted to enter between each pair of lugs 118 as the magazine is indexed, thereby to lock it in position. If the magazine is not fully advanced the lock being wedge shaped will force it into that position.

Now having described these indexing devices, the control therefor is derived from cams in the timing group and to that end, the cam 83 on disk 46 acts on a lever 139 pivoted at 140 and connected to link 128 to control the double pawl. The cam 82 at the inner side of disk 77 acts on an arm 141 of a bell crank lever pivoted at 142, the other arm 143 of which is connected to spring 138. This cam tensions the spring to pull the locking lever into position. Actually, this cam functions during two moves of the ratcheted parts as will be explained. A spring 144 connected to lever 139 tends to pull it down and to maintain pawl 124 in engagement with lugs 118 except when cam 83 is effective. The positioning lock 133 is raised by gravity, the heavier end 136 weighted by link 137 quickly raises the end 133 as soon as the tension in spring 138 is relaxed.

The large ends of bobbins naturally may be passed from the accumulator guide to the magazine cells without difficulty and there is little danger of that end of the last bobbin remaining in a position above the top of the magazine. However, the small ends are a little less predictable and at times the top bobbin may rest with its tip slightly above the intended position. That does no particular harm except it could jam against the guide 41 at that side as the magazine is indexed. To remove that possibility, a trap 145 is hinged at 146 and extends in front of a cut out part or gap through which a bobbin tip may move when the trap is free to swing, but which acts to close the gap at all times when bobbins may be in process of moving from the guides 41 to a cell.

The link 137, as better seen in Fig. 3, is lifted when the latch is in lower position and vice versa. The upper end of the link is slotted at 147 to slide on and be guided by the pivot 146. It also has a hook 148 which locks the trap in place when the link is raised, or when loading takes place. When the latch 133 is disengaged,

the trap is released so that it may not interfere when the magazine is indexed.

When the prescribed number of bobbins is accumulated they are released as will be described and without more than has been included to this point would be dropped to the bottom of the cell in the magazine, that being something not desirable since the rough handling is not to be tolerated from the point of view of damage to the wound package. Also, a drop of that distance is likely to result in cocking of a bobbin or bobbins until their ends escape from the guiding channels in which they are to be retained.

To overcome these, a movable support is elevated in the cell to be loaded, to a point just below the lowermost bobbin in a group and as the group is released they fall to that support which is so governed as to let them descend at a greatly reduced speed as compared to a free fall and thus to prevent any tendency they have for one end to move down faster than the other.

Such means may take different specific forms, but in order to avoid adding to the machine height, a flexible elevating means is used. Referring to Figs. 1, 2, 4, 5 and 6, a bar or support **149** extends across between the roller rails **28** and **29** and has its ends notched vertically as at **150** so that when raised, the bar will be guided by the edge **151** of the channel of the cell then aligning with it and to be loaded. Each end is the same except the position of the notch at the end of the smaller channel (that for bobbin tips) is nearer the center of the bar. This bar has set into it adjacent each of its ends a flexible member **152** and **153** which is adapted to exert considerable force under compression. A closely wound spring has been found to work very satisfactorily and, while sufficiently flexible, will also support the weight of the bobbins without appreciable deflection.

At the other end these springs **152** and **153** are fixed in a bar **154** the ends of which are guided to slide freely in grooves in the members **155** and **156**, Figs. 1, 6 and 7. The springs **152** and **153** are guided over rollers or sheaves **157**, around larger sheaves **158** to make about a 90° turn and then upwardly within sheaves **159**. These are all freely rotatable on shafts carried in plates **160**. In Figs. 6 and 7, these parts are shown in full lines while at the opposite or front of the machine, the same parts are evident, but largely in dotted lines. A spring **161** running along the lower part of the framework connects to a depending lug **162** and to a fixed part of the machine at the opposite end. This spring is strong enough to elevate the support **149** and to move the other parts, but will not maintain them raised when the weight of the bobbins is brought to bear on them. However, it is strong enough to make the parts return slowly even when loaded with the bobbins.

To control this device a lever having a very long arm **163** is pivoted at **142**, Figs. 1, 2*a*, 3 and 6, and has its lower end offset laterally at **164** and then downwardly at **165** to connect by pin **166** to the cross bar **154**, Figs. 2 and 4. The spring **161** is connected to the bar by a harness **167** which maintains it perpendicular to the path of travel.

The lever is forked to present arms **168** and **169** at the opposite side of pivot **142**. Each carries a roller follower **170** or **171**, as the case may be, and the arm **169** and its follower **171** are affected by cam disk **77** while follower **170** does not extend far enough in to engage the disk but is acted upon by the cam **81**. This follower is adjustable along the arm **168**. In operation the follower **171** falls from point **80** of cam disk **77** and the spring **161** then moves the entire structure just above described until the bar **149** is in nearly its top position. At the time the accumulated bobbins are released, cam **81** affects follower **170** and swings arms **168** and **163** to raise and hold the parts in extreme position. The next move releases the follower from that cam so the parts may return as the cell is loaded.

A stop **172** limits movement in that direction as follower **171** is moved by the cam surface **79** to the periphery of the disk. A weight W on arm **173** counterbalances the load to some extent to prevent acceleration as the bobbins are lowered to the bottom of the magazine.

The motor is controlled by the usual switch to start and to stop it. A manual control to start and stop the machine itself consists of a rod **174**. Figs. 1 and 3, which is connected by means (not shown) to a clutch which interconnects the motor with the jack shaft **65**. This rod is carried in bearings **175** at the upper frame member **21**. Control knobs and arms **176** are provided at spaced points so the operator may start and stop the machine from any position along its length at the front side.

Automatic stopping means is provided and functions to stop the machine upon attempted conveying of two bobbins in a recess in the conveyor apron, or upon any bobbin riding in a crossed position, and to eject all bobbins improperly oriented without stopping the machine.

Now referring to Figs. 8, 9, 10 and 10*a*, a combined means for accomplishing these purposes includes a plate **177** hinged at the side **178** to overlie the conveyor channel and apron. Bobbins carried in the conveyor compartment pass beneath this plate with a slight clearance, but if a bobbin is travelling in raised position due to there being two in a compartment or a bobbin in a crossed position, it will push up on the inclined leading edge **179** of the plate lifting it about hinge **178**. The front side of the plate has depending therefrom a hooked arm **180** which connects to an arm **181** through pin **182**. The arm **181** is part of a bell crank pivoted at **183** and having a curved, depending arm **184** which engages a projection **185** from shaft **174**. When the plate is lifted as described, the lower end of arm **184** presses the projection downwardly swinging shaft **174** to a position to stop the loader.

It is intended that all bobbins be passed through the machine with bobbin butts to the rear and tips adjacent the front. If a bobbin is directed reversely, it does not lift the plate. Normally, the tips of bobbins pass over an elevating cam **187**, at a gap **188** between the end **189** of plate **177** and the initial edge **190** of a triangular shaped plate **191**, Figs. 9, 10 and 10*a*, and then drop and pass under the second mentioned plate. However, when the larger or butt ends of the bobbins pass the cam they are raised so that they engage the front edge **190** with most of their bulk above it; that then further elevates that end of the bobbin and in combination with the inclined edge **192** of plate **177**, the curved upper ends **193** of the conveyor apron treads **55** and a flipping spring **194**, lifts and twists the bobbin to the top of plate **177**. It is then guided by abutments **195**, **196** and **197** to roll or slide down and to the side of plate **177** and to fall into a container **198**.

Now having described the mechanism, the operation will be reviewed. As shown, the camming and timing devices are set up to load twelve bobbins in each column or cell and let us assume that that number of bobbins have been accumulated in guides **41**. At that time one of the plates **43** will be coming over sprockets **50** to receive the first bobbin of the next twelve. Of course, the conveyor is continuously running and is being fed, preferably by some automatic means, although bobbins may be fed in by hand. It is not necessary to have a bobbin in each conveyor recess since the counting means functions only when a bobbin passes and thus, it takes twelve bobbins and not necessarily any particular number of conveyor steps to complete a cycle.

When bobbin #1 is fed under shoe **108** the arm **109** is lifted so that claw **92** acts on disk **75** to advance it a step along with other parts moving with it. The plate **43** is thereby brought to a horizontal position just in time to catch this first bobbin. The bobbin is released from the conveyor and drops to the lip **114** of the weighted member, including arm **115** and weight **116**, by which it is retarded in its travel.

This first move also releases the load of accumulated

bobbins which descend into their cell. The support **149** moves down with the bobbins as described being resisted by spring **161** and weight W. The support moves out of the way of the parts, but not to its fullest retracted position at that time. It is released as cam point **80** moves past follower **171**.

On counting of bobbin #2 the timing devices are ratcheted another step but no function other than the accumulation of the second bobbin is evident.

At bobbin #3 the parts move so that cam **82** releases the arms **141** and **143** to release spring **138** whereupon the weight of parts as described lifts the lock **133** to unlock the magazine preparatory to indexing. The disk cam **79** also engages roller **171** to force the support to fully retracted position and hold it there.

Bobbin #4 does nothing but to advance the timing one movement.

Bobbin #5 effects a further movement to bring cam **83** onto lever **139** and to pull upwardly on link **128** to raise pawl **124** and to lower the opposite end, that is, pawls **123** and **125**. If the first cell was being loaded, then this motion results in the magazine rolling forwardly until the pawl **125** stops it by its contact with special lug **119**. If at any other cell, then the magazine will be stopped as a lug **118** contacts pawl **123**. The indexing is actually about one-half a cell in length.

Bobbins #6 and #7 have no further effect than to advance the mechanism and this time may be used in letting the magazine come forwardly by gravity. If sluggish, this may be of value but normally the action does not require so much time as is provided.

At #8 the lever **139** is released and the pawl escapement reverses its position so that the magazine completes indexing as the next lug **118** is stopped against pawl **124**.

Bobbin #9 gives the magazine time to move.

Bobbin #10 brings cam **82** around to contact arm **141** thereby tensioning spring **138** and moving the lock **133** into position to engage the lug **118** between it and pawl **124**. This may actually help in indexing the magazine. The mass of the magazine, especially when it is full, is considerable so it takes time for it to move.

Bobbin #11 is effective in moving the cam **82** still farther to tighten spring **138** more until the magazine is fully indexed. The support is now raised since cam point **80** runs past roller **171**. The spring **161** and weight W force the support, springs **152**, **153**, etc., to the active position.

As bobbin #12 comes to position at the top of the stack of twelve bobbins, the cam **81** acts upon follower roll **170** and moves the long lever **163** all the way to raise the support completely if it should not be in that position already. The first action was only a releasing accompanied by a spring and weight acting to force the parts to position. It need not act with too much precision, but the second step, that controlled by cam **81** does act to position the parts very definitely.

After the twelfth bobbin, the cycle is repeated.

When a magazine is filled completely, the indexing means releases it and catches the next magazine which should be in position ready to move ahead as the filled one passes to the end of the roller track.

If the occasion arises, the machine is stopped by a misplaced bobbin acting upon the cover **177**, or an improperly directed bobbin is ejected by cam **187**, plate **191** and spring **194**.

In the event larger bobbins are to be handled and the same magazines used, the disks **75** and **76** are changed to have fewer teeth and notches respectively and the number may be reduced to about eight and possibly seven moves although for the normal height of a magazine, bobbins may not be used in any loom which would require less than nine or ten moves thereby making it possible to retain the idle moves at times when the magazine is indexed.

When the support rises and lever **163** swings under influence of spring **161** and weight W, there may be a tendency for a swing in the return direction until the cam **81** becomes effective. That is avoided by use of a frictional damping means acting on the lever, for example, a leaf spring or springs pressing against the sides of the lower part of the lever as it swings to prevent such tendency to rebound.

Referring to Fig. 11, a means for stopping the machine upon failure of a magazine to advance to loading position will be described. This may occur due to neglect or inability of the attendant to feed magazines to the loader as required.

The rocking motion of control rod **174** is carried to the clutch or other power transmission means through an arm **199**, link **200** and arms **201** and **202** fixed to pivot shaft **203**. A rod **204** connected at pivot **205** and passing through guide **206** is spring controlled by a compression spring **207** to form with arm **201** an overcenter means by which the power or clutch control is maintained in "on" or "off" positions.

A stopping means includes a moving actuator **208** fixed to sleeve **209** pivoted on stud **210** on bracket **211** and a detent pivoted at **212** on a bracket **213** attached to link **200**. Actuator **208** is swung to and fro as the machine is in operation by a link **214** connecting an arm **215** fixed to sleeve **209** and to an extension **216** to arm **88**.

The detent has a feeler or foot **217** at its lower end engageable on the top portion **218** of the magazines and also, an upwardly directed finger **219**. This finger is in the pathway of the actuator **208** in such position that if there is no magazine for foot **217** to contact, the arm **208** will push the detent and with it link **200** to stop the loader. So long as there is a magazine to be loaded, the foot is raised and finger **219** is held down or out of the path of the actuator. Thus the machine will be stopped and will not continue to deliver bobbins in the event there should be no magazine to receive them.

While it is preferred that a clutch be controlled to stop and start the loader once the motor is started, it is possible to employ means to start and stop the motor itself and to control it by means functioning from rod **174**, etc.

In the specification and claims the term "bobbin" is used with a broader meaning, that is, it generally denotes the bobbin or core with a thread package wound on it as is the general practice in the art.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means and a conveyor means for delivering bobbins through said counting means to a loading position, and means responsive to said counting means for entering the magazine from beneath and lowering a predetermined number of bobbins into an aligned magazine channel and for governing the indexing movements of the magazine.

2. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means and a conveyor means for delivering bobbins through said counting means to a loading position, support means including a transverse member adapted to be guided by and elevated to a position

adjacent the upper end of a channel, and means responsive to said counting means for controlling the raising and retracting of the support means for lowing a predetermined number of bobbins into an aligned magazine channel and for governing the indexing movement of the magazine.

3. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

4. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means comprising slotted guides and chain carried plates spaced to receive a plurality of bobbins equal to the number to be loaded in a channel, a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

5. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means comprising slotted guides substantially perpendicular to the path of movement of a magazine and a plurality of chain carried plates spaced to receive a plurality of bobbins equal to the number to be loaded in a channel, a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

6. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means comprising a shoe resiliently pressed to a position to be displaced by each passing bobbin, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

7. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, and means comprising a plurality of ratcheted cam members movable as controlled by said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

8. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means comprising a shoe resiliently pressed to a position to be displaced by each passing bobbin, a bobbin accumulating means comprising slotted guides substantially perpendicular to the path of movement of a magazine and a plurality of chain carried plates spaced to receive a plurality of bobbins equal to the number to be loaded in a channel, a conveyor for delivering bobbins through said counting means to the accumulating means, and means comprising a plurality of ratcheted cam members movable as controlled by said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle.

9. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, and means for lowering said accumulated bobbins into a channel in the magazine at a speed relatively retarded as compared to the speed at which they would fall freely comprising a support and means for raising it into a position just below the top of the magazine while guiding its ends in the channel to be loaded and for releasing it as the accumulated bobbins are dropped.

10. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, and means for lowering said accumulated bobbins into a channel in the magazine at a speed relatively retarded as compared to the speed at which they would fall freely comprising a support and means for raising it into a position just below the top of the magazine while guiding its ends in the channel to be loaded and for releasing it as the accumulated bobbins are dropped, which comprises a flexible means at either end of said support, guide means for restraining said flexible means to move generally horizontally and then vertically within the magazine, and means to reciprocate said flexible means which includes a lever, cams movable with the accumulation of bobbins and a resilient means for opposing the action of said cams.

11. Mechanism as defined in claim 10, wherein said cams are carried by a shaft rotated step by step as the

counting means is affected by delivery of bobbins to the accumulating means.

12. Mechanism as defined in claim 10, wherein said flexible means comprises closely wound springs and the guide means therefor includes sheaves about which these springs make a turn of approximately a right angle.

13. In a machine for loading bobbins in a magazine having generally vertically disposed bobbing receiving channels, the combination of a track along which the magazine may move, means to index the magazine step by step as its channels are loaded which comprises a series of stopping abutments at the side of the magazine and a double pawl escapement means engageable with said abutments, a rotatable cam means and means affected thereby for actuating said escapement pawls, a conveyor for delivering bobbins to a loading position and a feeler member for indicating each time a bobbin is so delivered, and means for advancing said cam means as controlled by said feeler member.

14. Mechanism as defined in claim 13, wherein said magazines are movable along an inclined track comprising side members between which a plurality of rollers are provided sufficient to support the magazine as it moves from one end to the other of the said track.

15. Mechanism as defined in claim 13, wherein said double pawl escapement is supplemented by a safety locking means and a cam control for governing the position of said locking means.

16. Mechanism as defined in claim 13 wherein said double pawl escapement is supplemented by a safety locking means, gravity means for disengaging said locking means and resilient means affected by a cam for moving it to effective relationship with the said abutments.

17. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means and a conveyor means for delivering bobbins through said counting means to a loading position, and means for lowering a predetermined number of bobbins into an aligned magazine channel and for governing the indexing movements of the magazine which comprises a shaft, a ratcheting disk fixed to one end of said shaft and cam disks fixed to the other end thereof, a continuously reciprocated pawl for moving the shaft and disks thereon normally held out of engagement with the ratcheting disk and means functioning from the counting means for causing said pawl to engage the disk and move it and the cam disks one step for each bobbin affecting the counting means.

18. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, a conveyor for delivering bobbins through said counting means to the accumulating means, and means

responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle, and means cooperating with said conveyor for stopping the loader upon attempted passage of more than one bobbin into the space occupied by a single tread of said conveyor.

19. Mechanism as defined in claim 18 wherein means for stopping the loader comprises a hinged plate overlying the conveyor and adapted upon passage of more than a single bobbin into the space of one conveyor tread, to be lifted and to actuate a loader stopping means.

20. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to control the indexing of the magazine along the track to present channels for loading in sequence, a counting means, a bobbin accumulating means, and a conveyor for delivering bobbins through said counting means to the accumulating means, and means responsive to said counting means for governing the accumulation of a predetermined number of bobbins at each cycle of the mechanism, lowering them into a channel in said magazine and indexing the magazine to the next channel while accumulating bobbins in a repeat of the cycle, and means cooperating with said conveyor for ejecting a bobbin passing in said conveyor while improperly oriented.

21. Mechanism as defined in claim 20, wherein said bobbin ejecting means comprises an end raising cam, a plate over one end of which the raised end of an improperly oriented bobbin is elevated by said cam, and a spring means for projecting a bobbin thus elevated beyond the range of said conveyor.

22. In a machine for loading bobbins in a magazine having generally vertically disposed bobbin receiving channels, the combination of a track along which the magazine may move, means to stop the magazine in successively advancing, step by step movement which comprises controlled escapement means, a counting means and a conveyor means for delivering bobbins through said counting means to a loading position, and means responsive to said counting means and guided for entering the magazine from beneath for lowering a predetermined number of bobbins into an aligned magazine channel and for governing the indexing movements of said magazine.

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