Dec. 25, 1951 H. A. GENEST ET AL 2,579,814

HAT BAT SHRINKING MACHINE

Filed June 9, 1949 3 Sheets-Sheet 1

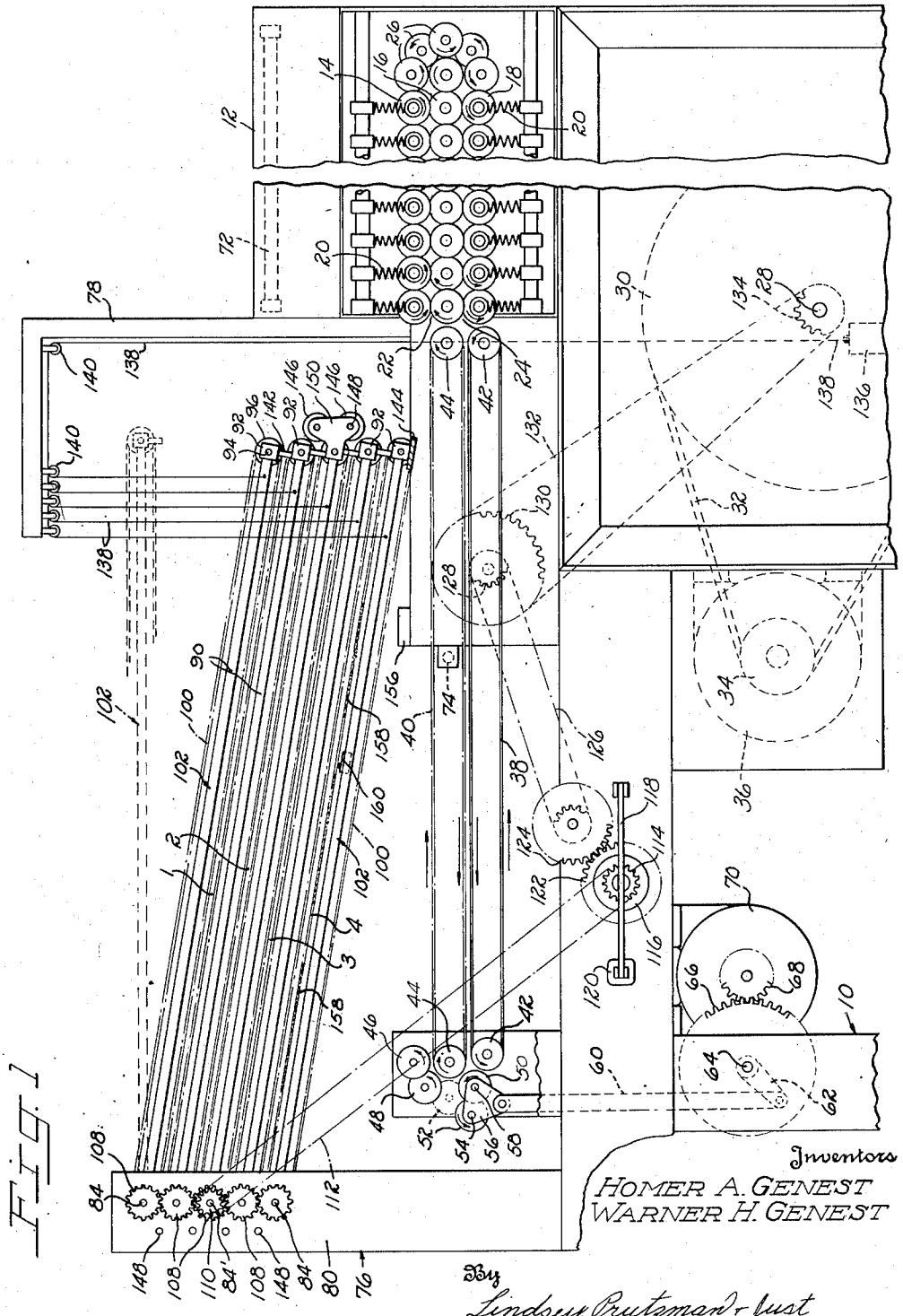


Fig. 1

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Filed June 9, 1949 3 Sheets-Sheet 2

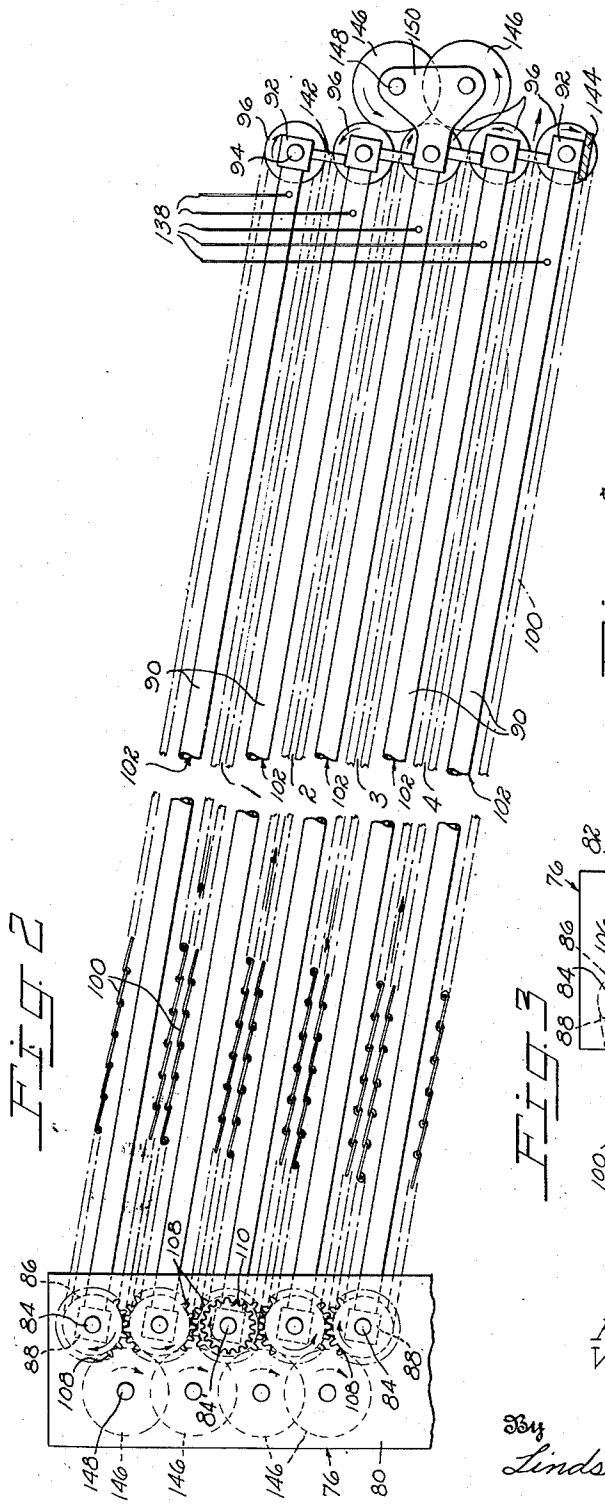


Fig. 2

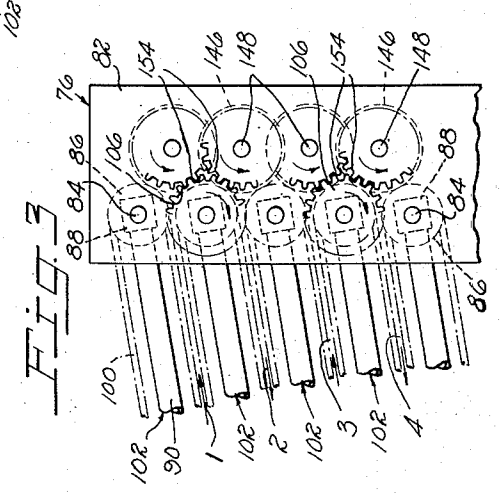


Fig. 3

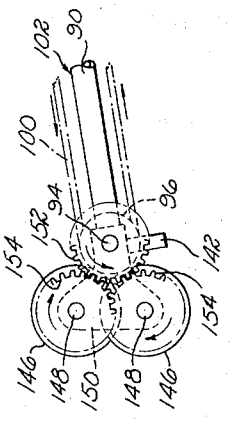


Fig. 4

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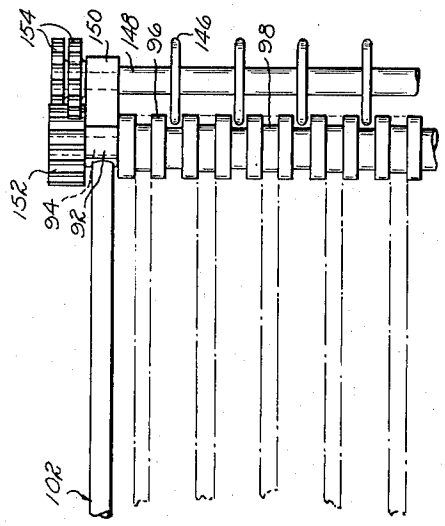
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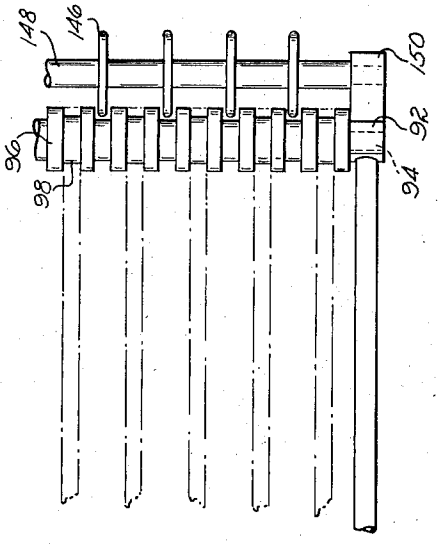
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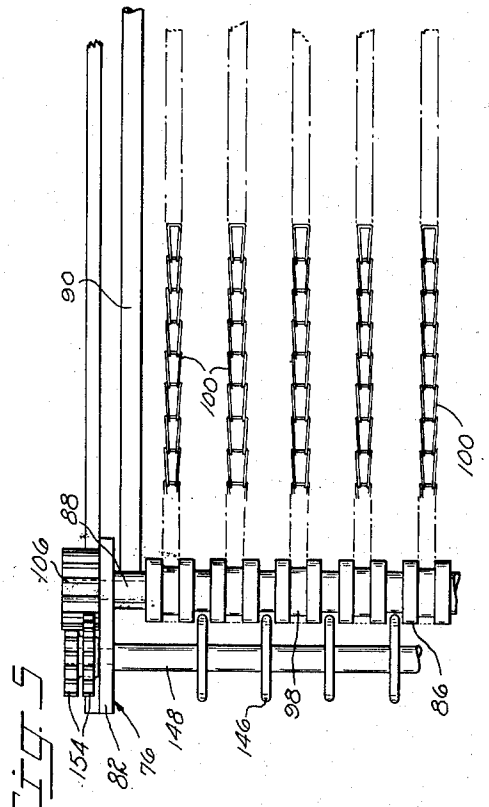
Dec. 25, 1951 H. A. GENEST ET AL 2,579,814

HAT BAT SHRINKING MACHINE

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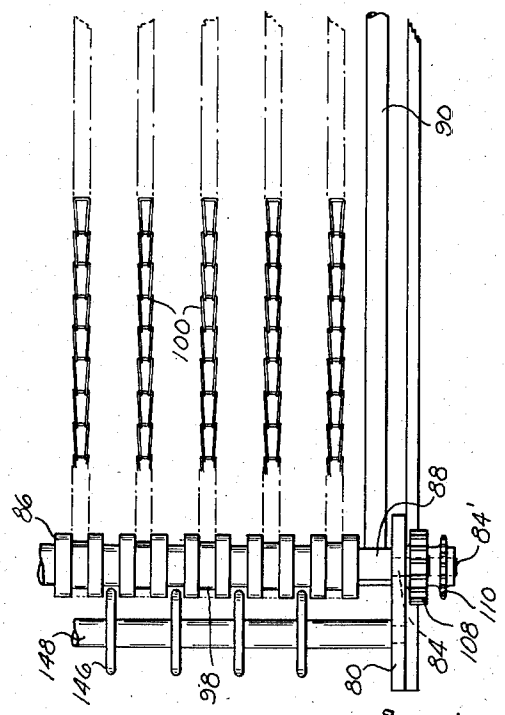


FIG. 5

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UNITED STATES PATENT OFFICE

2,579,814

HAT BAT SHRINKING MACHINE

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Application June 9, 1949, Serial No. 98,106

9 Claims. (Cl. 28—5)

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This invention relates to improvements in hat bat shrinking machines and especially to shrinking machines including means by which bats may be recycled in such machines as well as initially fed or loaded into such machines.

Hat bat shrinking machines now in use are of the type having a passageway through which hat bats pass from one end to the other. While moving therethrough, the bats are shrunk and felted. It is necessary to introduce the bats to the passageway in such a manner that they will be suitably spaced in order that the shrinking and felting may best be accomplished. According to present practice, the bats are manually introduced to said passageway. Likewise, as the bats emerge from the passageway, they are now manually returned to the entrance of said passageway.

Such manual operations are not only costly and time consuming but are the source of considerable discomfort to the operator due to the bats being continuously saturated with water or solutions approaching boiling temperatures while traversing said passageway. One operator is constantly employed to operate each shrinking machine to initially load it and also return or refeed the bats to the passageway so that they may be recycled through the machine a predetermined number of times. At the completion of such shrinking and felting, the bats are generally stacked and taken to different machines for further operations in making finished hats. The shrinking machine is then again manually loaded with another batch of bats which are recycled therethrough so as to be shrunk and felted.

It is an object of the present invention to provide in a shrinking machine means to automatically and successively return the bats of one batch from the exit to the entrance of said machine so that the bats may be automatically recycled for an interval of predetermined extent, and also provide means in such machine upon which another batch of bats may be disposed while said one batch of bats is being recycled through the shrinking machine to shrink and felt them. It is a feature of this object that at the completion of such recycling of said one batch of bats, the bats thereof are automatically removed from the machine, and it is another feature of this object to then cause said second mentioned means to operate so as to automatically load the shrinking machine by feeding thereto, in spaced relationship, said another batch of bats which has been placed upon said means by the operator while the machine was automatically recycling the previous batch.

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Due to the automatic recycling possible with the present invention, and the short time required to place the bats of another batch on the automatic loading means of the invention, it is possible that one operator can oversee and perform all manual operations required by a number of machines embodying the present invention. Thus the time of a single operator may be used much more advantageously with a consequent material reduction in operating costs of such shrinking machines as compared with the cost of operating currently available machines.

Among other objects and features of the invention are: the provision of adjustable means for controlling the operation of the recycling and loading means; the provision of counterbalancing means to facilitate the operation of the loading means; the provision of a superposed series of conveyors in the loading means and the resulting compactness and saving in space; and the arrangement of conveyors in the loading means so as to maintain bats in the relative positions in which they are originally placed upon the conveyors while the loading means is feeding the bats to the entrance of the passageway of the shrinking machine.

Details of the foregoing objects and of the invention as well as other objects thereof are set forth in the following specification and illustrated in the accompanying drawings forming a part thereof.

In the drawings:

Fig. 1 is a side elevation of hat bat shrinking machine embodying the principles of the present invention. In this view, part of the machine has been broken away as well as foreshortened by breaking out the midportion of one part of the machine.

Fig. 2 is a side elevation of the bat loading part of the shrinking machine illustrated in Fig. 1, said part being shown in this figure on a larger scale than Fig. 1.

Fig. 3 is a fragmentary side elevation of part of the mechanism shown in Fig. 2, this part being viewed from the opposite side of the machine from that illustrated in Fig. 2.

Fig. 4 is a fragmentary side elevation of another part of the machine illustrated in Fig. 2, said part being viewed from the opposite side of the machine from that shown in Fig. 2.

Fig. 5 is a fragmentary plan view of part of the machine shown in Fig. 2, this view being on a slightly larger scale than that used in Fig. 2.

Referring to the drawings, and particularly Fig. 1, the shrinking machine is supported by a suitable frame 10. In Fig. 1 of the drawings, the

right hand portion of said frame has been materially foreshortened in order to condense the view. Said frame supports a housing 12 in which are contained means to shrink and felt hat bats. Such shrinking and felting means may be one of a number of different mechanisms. Exemplary means which may be used for the purpose are those shown in Patents Nos. 1,533,350 and 1,586,551, in the name of one of the present inventors, Homer A. Genest. Both of these machines provide a passageway through which flat hat bats are passed while being worked upon to shrink and felt the bats. In the earlier patent for example, one side of the passageway is defined by a belt, while the other side is defined by a plurality of rollers which coact with the belt. In the later patent, both sides of the passageway for the greatest portion of its length, is defined by a plurality of co-operating rows of rollers.

A suitable mechanism which may be utilized to manipulate hat bats to shrink and felt them has been shown for exemplary purposes in Fig. 1 of the present drawings. Therein is shown a plurality of co-operating horizontal rows of rollers 14, 16 and 18. These rollers are pivotally mounted within the housing 12. The rollers 16 of the central row are preferably rotatably mounted in fixed bearings supported by portions of the frame 10. The upper and lower rows of rollers 14 and 18 are preferably mounted so as to be movable away from the central row of rollers 16. The rollers 14 and 18, however, are all biased toward the rollers 16 of the central row by suitable means such as springs 20 which are engageable with either the shafts or bearings of the rollers 14 and 18.

In said figure it will be seen that the rollers 14 and 16 of the upper and central rows rotate in the directions indicated by arrows in the figure to define part of a passageway leading into the innermost end of the housing 12 from an entrance 22 defined by the outermost rolls 14 and 16 of the upper and central rows thereof.

The central row of rollers 16 and the lower row of rollers 18 co-operate to define therebetween another part of said passageway which terminates at the exit 24, directly below the entrance 22, the exit being defined by the outermost rollers 16 and 18 of the central and lower rows. Surrounding the innermost roller 16 is a plurality of transfer rollers 26 which are rotated in the direction of the arrows shown in Fig. 1 for purposes of moving the bats from the upper portion of the passageway, defined by the central and upper rows of rollers, to the lower portion of the passageway, defined by the central and lower rows of rollers. Both portions of the passageway constitute the entire passageway which extends from the entrance 22 to the exit 24.

The transfer rollers 26 are shown in overlapping relationship in Fig. 1. This is possible due to the fact that each roller comprises a shaft on which a series of circular disks are mounted in spaced relationship, the disks on adjacent rollers being mounted so as to be disposed in between the disks of the first mentioned roller.

Suitable drive means for actuating the rollers defining these passageways may be provided but is not shown in the present drawings since the same is believed to be unnecessary. Such means, for example, may comprise sprockets fixed to the shafts of each roller, said sprockets being driven by a suitable sprocket chain, which in turn, may be driven from a shaft 28. Said shaft

may be driven by a suitable pulley or large sprocket 30 which is fixed to the shaft, and in turn, is connected by a belt or sprocket chain 32 to the pulley or sprocket 34 of an electric motor 36 or any other suitable source of power.

As has been mentioned hereinabove, in presently available machines, it is customary and necessary to have an operator manually receive the bats as they successively emerge from the exit 24 and return them or feed them back to the entrance 22. The present invention includes means for automatically returning the bats from the exit 24 to the entrance 22. Said bat returning means comprises a plurality of endless conveyors 38 and 40 which are each supported between pairs of rolls 42 and 44. These rolls are suitably supported at their ends in appropriate bearings mounted in suitable portions adjacent the opposite sides of the frame 10.

Said conveyors may be of a number of appropriate forms, that is, they may be either webs which are continuous throughout their width or they may comprise a plurality of relative narrow belts mounted side by side. Also, the webs or belts may be either imperforate or perforated. The belts travel in the direction indicated by the arrows and they have the same speed as the peripheries of the rollers defining the passageway of the shrinking machine referred to above. Therefore, the pairs of rolls which support said conveyors, may be driven by any suitable means from the shaft 28, for example, whereby hat bats are moved by the conveyors 38 and 40 relative to the frame 10 at the same speed at which they move through said passageway defined by the rollers 14, 16 and 18.

When the bats have moved between conveyors 38 and 40 to the outermost rolls 42 and 44 which support said conveyors, shown at the left hand end of Fig. 1, they are transferred to the upper course of conveyor 40 by means of a plurality of transfer rollers 46, 48, 50 and 52. These rollers, with the exception of roller 52, are fixed to and driven by horizontal shafts rotatably supported at their ends in suitable bearings provided in the left hand portion of frame 10 shown in Fig. 1. Said shafts, for example, may be driven by appropriate meshing spur gears, not shown, fixed to the ends of the shafts which support the transfer rollers and one end of one of the shafts which support the left hand rolls 42 or 44 as viewed in Fig. 1. The transfer rolls referred to are rotated in the direction of the arrows shown in Fig. 1.

Transfer rollers 46, 48, 50 and 52 are shown in Fig. 1 in overlapping relationship. This is possible due to the fact that these transfer rollers are formed similarly to the transfer rollers 26 described above. That is, each roller comprises a series of disks fixed to a shaft in spaced relationship and the disks or adjacent rolls are positioned so that the same inter-fit between each other.

Transfer roller 52 is rotatably supported by a shaft 54, the ends of which are mounted in a pair of spaced triangular shaped plates 56. Said plates are pivotally mounted at the ends of the shaft 58 which supports the transfer roller 50. These plates 56 are disposed adjacent opposite side members of the frame 10. Also pivotally connected to one corner of each of the plates 56 is a link 60. The links 60 extend downward from the triangular plates 56 and the lower ends thereof are connected with the outer ends of cranks 62 which are fixed to a shaft 64 extending trans-

versely between bearings disposed in opposite sides of the frame 10.

Also fixed to shaft 64 is a gear 66 which meshes with a pinion gear 68 secured to the shaft of a torque motor 70 which is supported by the frame 10. The torque motor 70 is the reversible type. Normally it operates in a direction to rotate the gear 66 and cranks 62 so as to move the links 60 upward and thus move the transfer roller 52 into the dotted line position thereof, shown in Fig. 1. When the motor is operated in a reverse direction by means explained hereafter, the links 60 are moved downward to move the transfer roller 52 to the full line position thereof shown in Fig. 1.

The transfer roller 52 is driven in the direction of the arrow thereon by gearing the same to transfer roller 50. Suitable spur gears for this purpose, for example, which are not shown in the drawings, may be mounted on the ends of the shafts supporting the rolls 50 and 52.

When the transfer roller 52 is disposed in the dotted line position thereof, shown in Fig. 1, and the conveyors 38 and 40 are being actuated to move bats from the exit 24 to the entrance 22, the bats will be supported on the upper course of conveyor 38 and be moved to the left, as viewed in Fig. 1, until the transfer rollers 46, 48, 50 and 52 are engaged. These rollers move in a direction to pass the bat around the left hand roll 44 while the bat is in engagement with the upper conveyor 40, and the bat will then be moved onto the upper course of conveyor 40, and, while thereon, back to the entrance 22 of the passageway of the shrinking machine described above.

As long as the transfer roller 52 is disposed in the dotted line position referred to, bats will be continuously re-cycled through the passageway, from the entrance 22 to the exit 24, and then along the conveyors 38 and 40 and back to the entrance 22 for a predetermined interval to shrink and felt the bats. The bat return means comprising the conveyors 38 and 40 thus eliminates a very appreciable amount of manual work now required when using currently available shrinking and felting machines in which return of the bats from the exit to the entrance must be made manually.

Also, while the bats are traversing the passageway from the entrance 22 to the exit 24, they are maintained in a saturated condition by an appropriate sprinkling means represented in an exemplary manner by a sprinkler head 72 shown in the upper portion of the housing 12 in Fig. 1. Since the conveyors 38 and 40 automatically return the bats from the exit 24 to the entrance 22 for re-cycling, the operator or attendant of the machine does not experience any hardship as is now experienced while using currently available machines due to handling the bats which emerge from the exit of the passageway saturated with water or a solution which is generally maintained at a temperature approaching the boiling point.

If desired, mechanism may be associated with the bat return conveyors 38 and 40 for purposes of periodically shifting the position of the bats on the conveyors so that the crease in the bats may be varied between successive passes through the passageway of the sprinkling machine. By the use of such mechanism, which is not illustrated in the drawings, the bat will not possess any hard lines known as rods in the industry, which rods result from lack of sufficient shifting of the crease in the bat.

After the bats have been recycled through the passageway of the shrinking machine a predetermined number of times or for a predetermined time, whichever is the most desirable, they are ejected from the shrinking machine by the torque motor moving transfer roller 52 to the full line position thereof shown in Fig. 1. When said roller is in such position, the bats will not be transferred to the upper course of conveyor 40. Movement of the roller 52 to the full line position referred to is controlled by either appropriate timing means, not shown, connected in the circuit of the motor 70, or control means such as an electric-eye 74, connected in the circuit of the motor 70, and positioned so as to be adjacent the path of movement of the bats between conveyors 38 and 40. The control means is preferably adjustable so as to function following the passage of any desired predetermined number of bats, to energize the torque motor 70 in a direction to move the transfer roller 52 to the full line position referred to above.

Another feature of the invention comprises means shown in the various figures for automatically loading the shrinking machine after a batch of bats has been recycled for a predetermined interval and finally ejected from the machine in the manner described above. The loading mechanism is illustrated in the upper portion of Fig. 1 and details thereof are shown in the other figures of the drawings. Said mechanism comprises a frame 76 and auxiliary frame 78, both of which may be attached to frame 10. The frame 76 comprises a plurality of spaced side members 80 and 82. Extending between the side members 80 and 82 and rotatably supported within suitable bearings therein are a plurality of transverse shafts 84. The shafts 84 are disposed in substantially vertical alignment and have a plurality of functions. One function is to support on each shaft a roll 86, said rolls being disposed between the side members 80 and 82. There is a space between the ends of each of the rolls 86 and the inner surfaces of the side members 80 and 82.

Rotatably mounted on each of said shafts 84 and disposed within the aforementioned space adjacent the side members 80 and 82 is a bearing 88. Fixed to each bearing 88 is a longitudinal frame member 90. Another bearing 92 is fixed to the opposite end of each frame member 90, said bearings 92 being spaced apart similarly to bearings 88. The pair of bearings 92 rotatably support a transverse shaft 94 which rotatably supports another roll 96 extending between the bearings 92. Roll 96 is similar to roll 86 and said rolls are preferably provided with a plurality of annular grooves 98. Longitudinally opposed grooves in the rolls 86 and 96 receive part of an endless conveyor comprising, for example, a ladder chain 100.

The shafts 84 and 94, in conjunction with the frame members 90 and bearings 88 and 92, comprise frames 102. Since the shafts 84 of the various frames 102 are pivotally supported in vertical alignment in the side members 80 and 82 of the frame 76, it will be seen that the loading mechanism primarily comprises a plurality of superposed frames 102 each of which movably support an endless conveyor which passes around the rolls 86 and 96 of each frame.

It has been found that a suitable form of conveyor is that illustrated as a specific example in the drawings and comprising a plurality of ladder chains 100 which are transversely spaced evenly across the full width of the frames 102.

It is to be understood, however, that this type of conveyor is not restrictive in the present invention since other types of conveyors may be used. This specific type of ladder chain conveyor is well suited to the purposes of the present mechanism in that, as the chains wear and become stretched, for example, during use, the length of each conveyor may be adjusted by either adding or removing links to a chain. The spaced grooves 98 in each of the rolls 86 and 96 serve to maintain the chains in suitably spaced relationship. Such grooves, however, could be adaptable to receive any other suitable form of narrow belt-like means which may be used in lieu of the chains 100.

Each of the frames 102 and the endless conveyors supported thereby are closely superposed so that the adjacent courses of the conveyors of adjacent frames will be juxtaposed to provide between said adjacent conveyors a passage or pass through or along which bats may be moved on said conveyors by means to be described. Thus, the loading means comprises a series of stacked passes resulting in a compact arrangement for accommodating a relatively large number of bats in a confined space. For convenience of reference, the passes are numbered 1, 2, 3 and 4.

Fixed to the outer end of the second and fourth shafts 84, as shown in Fig. 3 is a relatively wide gear 106. Fixed to the opposite ends of these shafts as well as the corresponding ends of the other shafts is a gear 108. All of the gears 108 on the various shafts 84 are meshed in driving relationship. One of the shafts 84 projects at one end 84' slightly beyond the corresponding ends of the other shafts 84 so as to additionally support thereon a sprocket gear 110 which is fixed to said shaft.

Sprocket gear 110 is connected by suitable sprocket chain 112 to a driving sprocket gear 114 which is controlled by a clutch 116. In the exemplary disclosure shown in Fig. 1, said clutch is the type actuated by a pivoted bar 118, movement of which is controlled by a solenoid 120. Other suitable types of clutch may be used. Also connected to said clutch is a driven gear 122 which meshes with a driving gear 124, the latter being connected by either a belt or a chain 126 to a pulley or pinion gear 128. The latter is driven by a larger gear or pulley 130, which, in turn, is driven by a chain or belt 132 actuated by power shaft 28 and a suitable sprocket gear or pulley 134 mounted thereon.

It will thus be seen that the power shaft 28 which operates another portion of the shrinking machine is also used to drive sprocket chain 112 which, in turn, drives the meshed gears 108 of the loading mechanism. Since the latter gears are meshed, all of the conveyors on the frames 102 will be simultaneously driven and the arrangement of gears 108 will cause adjacent courses of adjacent conveyors to move in the same direction and provide therebetween the series of stacked passes referred to above. However, the bats will move in opposite directions in adjacent passes as clearly indicated by the arrows in Fig. 2.

The plurality of frames and the conveyors supported thereby are capable of separative movement relative to each other since the frames 102 are individually pivotally mounted at one end relative to the frame 76. The right hand ends of the frames 102, as viewed in Figs. 1 and 2, may be moved pivotally about the shafts 84. To illustrate, the uppermost frame 102 is shown in dotted lines in Fig. 1 in raised position to facilitate such movement of the frames, suitable counterweights 136 are provided as shown in Fig. 1, there preferably being one weight for each frame.

The weights are supported by appropriate chains or ropes 138 which pass around pulleys 140 supported by auxiliary frame 78. One end of one chain or rope 138 is attached to the right hand end of each frame 102, as viewed in Figs. 1 and 2, and the opposite end of the chain or rope is attached to a counterweight. The counterweights 136 are such that, by their own weight, they will normally not be heavy enough to raise the free end of each of the frames 102 but slight lifting force applied by the operator to the free ends of each frame wil suffice to raise the frame so as to separate it from the adjacent next lower frame.

Such separating of the frames and the conveyors thereon from the next lower frame and conveyor will open up the pass between said adjacent conveyors so that bats may be readily placed upon the upper surface of the lower exposed conveyor. Preferably, the loading mechanism is charged with bats by first elevating all but the lowermost frame, then placing in predetermined spaced positions a certain number of bats upon the upper course of the conveyor of said lowermost frame, lowering the next uppermost frame against the lowermost frame and similarly placing bats upon the conveyor thereof, and so on, until the next to the uppermost conveyor has been loaded with bats. During such operations, the conveyors are stationary. The frames and conveyors are preferably sufficiently wide to accommodate a plurality of parallel rows of bats. The plan view of said frames 102 and the conveyors in Fig. 5 has shown them with the midportions broken out to more concisely illustrate the same.

The uppermost course of the conveyor of the uppermost frame is preferably not loaded with bats as far as the mechanism illustrated herein is concerned. However, it is possible that, in some installations, the loading of said uppermost courses of said conveyor may be desired and such is possible by merely installing additional means for transferring the bats from the upper course of said uppermost conveyor to pass No. 1. Such transfer means will presently be described. When the loading mechanism is fully loaded with a batch of bats, the frames, including the uppermost one, are in the positions illustrated in full line in Figs. 1 and 2. It will thus be seen that the adjacent courses of adjacent conveyors on the frames engage opposite sides of the bats to hold them in the position in which they are placed upon the conveyors by the operator, whereby they will be delivered to the entrance 22 of the passageway in the same relative position and spacing from the other bats as that occupied when initially placed upon the conveyors of the frames 102.

The free ends of the frames 102 are maintained in properly spaced relationship by a plurality of stop members 142, there being at least one stop member at each side of the free end of each frame 102. A convenient manner of mounting said stop members comprises fixing each stop member to the lowermost surface of each bearing 92. The lower end of each stop would engage the upper surface of the next lower bearing 92 and thus maintain the free ends of the

frames 102 in the same spaced relationship as the shafts 84 maintain the pivoted ends of the frames. No stop members need be fixed to the bearings 92 of the lowermost frame 102. In lieu thereof, a transverse positioning or stop bar 144 is provided on auxiliary frame 78 for engagement by the bearings 92 of the lowermost frame as is clearly shown in Figs. 1 and 2.

After a batch of bats has been recycled through the shrinking machine for a predetermined interval, in the manner explained above, transfer roller 52 is moved to the full line position thereof shown in Fig. 1. This causes the bats to be ejected as explained above. The operation of this roller, as also explained above, is controlled by suitable mechanism such as electric eye 74. At the completion of the ejection of the entire batch of bats, roller 52 is returned to the dotted line position thereof shown in Fig. 1.

Upon such return of the roller 52, the solenoid 120 is caused to actuate the clutch 116 for purposes of starting movement of the sprocket chain 112 which drives the conveyors of all of the frames 102 by means of the meshed gears 108. When the conveyors are thus actuated, the bats in the passes 1 through 4 will move in the directions of the arrows shown in Fig. 2. Thus, the bats in pass 4 will be moved toward the lower right hand end of the mechanism as viewed in Figs. 1 and 2 and be deposited upon the upper surface of conveyor 40 adjacent the entrance 22 of the passageway in the shrinking machine. The bats will be delivered from pass 4 in spaced relationship to the entrance 22. Meanwhile, the bats in the other passes will be moving in alternately opposite directions and it is necessary to transfer the bats in each pass to the next lower pass until they reach pass 4 from which they move to the entrance 22.

Means for transferring the bats from one pass to the next lower pass comprise sets of transfer rollers 146. These rollers generally resemble in construction the transfer rollers 46, 48, 50 and 52. Four such rollers are mounted in vertical spaced alignment in the frame 76, the shafts 148 of such rollers extended between the side members 80 and 82 and are supported in suitable bearings provided in said members.

The disks comprising part of each of the rollers 146 interfit in the same manner as the previously described transfer rollers 46, 48, 50 and 52.

One end of each of the shafts 148 has fixed thereto a gear 154. Adjacent gears are staggered laterally in vertical plan view as shown in Fig. 5. The uppermost pair of gears 154, as viewed in Figs. 2 and 3, mesh with the uppermost wide gear 106 and the lowermost pair of gears 154 mesh with the lowermost wide gear 106. All of the transfer rollers 146 will thus be driven in the same direction as indicated by the arrows thereon in Figs. 2 and 3. It will thus be seen that the uppermost pair of transfer rollers 146 move the bats from pass 1 to pass 2, and the lowermost pair of rollers 146 move the bats from pass 3 to pass 4.

Another pair of transfer rollers 146 are supported at the right hand end of the loading mechanism as shown in Fig. 2, the shafts 148 thereof being rotatably supported in a pair of spaced frame plates 150 which are fixed to and supported by suitable means such as the bearings 92 of the free end of the intermediate frame 102. The shaft 94 mounted in said end of said intermediate frame has fixed to one end thereof a wide gear 152 corresponding to gear 106. Fixed to the adjacent ends of the shafts 148 supported by frame plates 150 are a pair of overlapping gears 154 which mesh with wide gear 152. Movement of the conveyor on the intermediate frame 102 drives roll 96 at the free end thereof and also the gear 152 which is fixed so as to move with said roll. Movement of the gear 152 will thus drive gears 154 and the transfer rollers 146 fixed thereto which transfer the bats from pass 2 to pass 3.

Suitable control means such as a timer 156 is connected in the circuit of the solenoid 120 of the clutch 116. The timer 156 is preferably adjustable so as to maintain the clutch in driving position for any predetermined amount of time within reasonable limits. Such time will be sufficient to insure the discharge of all bats from the loading mechanism. After the complete discharge of the bats from the loading mechanism to conveyor 40 and entrance 22, the timer 156 will operate to cause the clutch 116 to operate so as to discontinue driving the sprocket chain 112.

Following this, movement of the conveyors of the loading mechanism will cease and the frame of said loading mechanism may then be moved to separated positions to permit the introduction of another batch of bats within said loading mechanism while the bats previously discharged therefrom are being recycled through the passageway of the shrinking mechanism so as to be shrunk and felted thereby. Since much less time is required to load the loading mechanism with bats than is required to recycle the bats through the passageway sufficiently to shrink and felt the bats to a desirable extent, a single operator may completely attend a number of machines comprising the present invention.

When the frames 102 and their conveyors are loaded with bats 158 the weight of the bats on the upper course of the conveyor will cause a certain amount of sagging of said course. The effect is used advantageously to operate a further control switch 160 connected in the circuit of the timer 156. Said switch is preferably of the type which is very sensitive so as to operate by the application of light pressure and/or a small amount of movement to the actuating member of the switch. Thus, the actuating member of the switch is positioned so that the movement of the upper course of the conveyor to sagged position on the frame carrying switch 160 will engage and operate the actuating member to close the switch.

When the timer 156 is operated to commence actuation of the loading mechanism, the circuit which actuates the solenoid of clutch 116 will be completed if switch 160 is closed. Such operation of the timer occurs when the transfer roller 52 is returned to dotted line position in Fig. 1, as explained above, after a batch of bats has been recycled a required amount by the shrinking machine, ejected therefrom, and another batch is to be fed thereto from the loading means. However, if no further batch is to be loaded into the shrinking machine, the loading mechanism will have no bats on its conveyors and thus the conveyors will not be sagged, whereby the switch 160 will remain open and clutch 116 will not function to operate the conveyors of the feeding mechanism.

Summarizing the operation of the bat shrinking machine comprising the present invention,

and particularly the bat loading part thereof, assume a batch of bats is being cycled through the passageways between the rows of rollers within the housing 12 of the shrinking machine and the bats are being sequentially transferred from one passageway to the other therein. While this is occurring, an operator is charging the various conveyors of the bat loading mechanism, which are then idle, with bats of the batch next to be cycled through the bat shrinking machine.

Either suitable timing means or counting and control mechanism, such as electric eye means 74, determines the extent a batch is to be cycled through the shrinking machine. When the cycling has proceeded a predetermined extent, the circuit of the torque motor 70 is energized to cause transfer roller 52 to move to the full line position thereof shown in Fig. 1 and thus causes the cycled batch of bats to be discharged from the shrinking machine and bat returning conveyors 38 and 40. At the completion of such discharge, the roller 52 is returned to the dotted line position thereof in Fig. 1 which thereby causes solenoid 120 to actuate the clutch 116 to effect driving of the gear 110 of the loading mechanism and the other gears which drive the various conveyors forming the passes of the bat loading mechanism.

The bats in the lowermost pass are first deposited upon the upper course of bat return conveyor 40. The bats in the upper courses are meanwhile being progressively fed downward to the lower courses and finally onto conveyor 40. A timer 156 in the circuit of solenoid 120 limits the period of operation of the clutch 116 and the conveyors of the loading mechanism. From conveyor 40, all of the bats are fed seriatim to the entrance 22 of the bat shrinking machine. The entire batch is then cycled through the shrinking machine while still another succeeding batch of bats is being charged onto the conveyors of the bat loading mechanism.

To insure that the clutch 116 will not be actuated when no bats are in the passes of the loading mechanism a safety control switch 160, operated by sag introduced in the lowermost conveyor by the weight of bats thereon, is mounted in the circuit of the solenoid 120 which actuates the clutch 116. If no bats are on said conveyor to cause it to sag, switch 160 will be open and solenoid 120 cannot operate in response to the return of roller 52.

While the invention has been illustrated and described in its several preferred embodiments and has included certain details, it should be understood that the invention is not limited to the precise details herein illustrated and described, since the same may be carried out in other ways, falling within the scope of the invention as claimed.

We claim as our invention:

1. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, means operable to transfer automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with the entrance of said passageway and operable to feed a batch of bats to said entrance in spaced relationship to each other.

2. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, means operable to transfer automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with the entrance of said passageway and comprising conveyor means operable to feed a batch of bats to said entrance in spaced relationship to each other.

3. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, conveyor means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means operable to feed to said return conveyor means a batch of bats in spaced relationship to each other.

4. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, conveyor means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with said return conveyor means to automatically feed a batch of bats thereto and comprising a series of superposed endless conveyors movably mounted to progressively feed said batch of bats along the series of conveyors, and means operable to transfer bats successively to lower conveyors of the series, the lowermost conveyor thereof being positioned and operable to discharge bats from said loading means to said return conveyor.

5. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, conveyor means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with said return conveyor means to automatically feed a batch of bats thereto and comprising a series of superposed endless conveyors movably mounted, disposed in close proximity of each other to provide between the adjacent courses of each adjacent pair of conveyors a pass which bats traverse while engaged on opposite surfaces by said courses of said conveyors, the bats travelling in opposite directions in adjacent passes, means to drive said conveyors so that said adjacent courses of said adjacent conveyors travel in the same direction, and means operable to transfer bats successively to lower conveyors of the series, the lowermost conveyor thereof being

positioned and operable to discharge bats from said loading means to said return conveyor.

6. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, conveyor means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with said return conveyor means to automatically feed a batch of bats thereto and comprising a series of superposed frames mounted for movement toward and away from each other, an endless conveyor movably supported by each frame and extending between the ends thereof, and means operable to transfer bats successively to lower conveyors of the series, the lowermost conveyor thereof being positioned and operable to discharge bats from said loading means to said return conveyor.

7. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, conveyor means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically a number of times through said passageway, and bat loading means associated with said return conveyor means to automatically feed a batch of bats thereto and comprising a series of superposed frames each pivotally mounted at one end to permit movement of the frames toward and away from each other, an endless conveyor movably supported by each frame and extending between the ends thereof, and means operable to transfer bats successively to lower conveyors of the series, the lowermost conveyor thereof being positioned and operable to discharge bats from said loading means to said return conveyor.

8. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically to a predetermined extent by successive traversings of said passageway, means operable at the end of the recycling period to cause said return means to discontinue said recycling and eject the bats therefrom, bat loading means associated with the entrance of said passageway and operable to feed thereto a batch of bats, and drive means for said bat loading means operable at predetermined intervals to cause said bat loading means to operate.

9. A hat bat shrinking machine comprising in combination, means defining a passageway through which bats are passed in flat condition from the entrance to the exit thereof, said means being operable to manipulate said bats to shrink and felt them while traversing said passageway, means operable to return automatically hat bats from the exit to the entrance of said passageway, whereby a batch of hat bats may be recycled automatically to a predetermined extent by successive traversings of said passageway, means operable at the end of the recycling period to cause said return means to discontinue said recyling and eject the bats therefrom, bat loading means associated with the entrance of said passageway and operable to feed thereto a batch of bats, drive means for said bat loading means, and a clutch between said drive means and said bat loading means automatically operable upon ejection of said bats from said return means to cause said batloading means to operate.

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