Aug. 3, 1943. H. A. GENEST 2,325,909

MACHINE FOR SHRINKING AND FELTING HAT BATS

Filed June 1, 1940 4 Sheets-Sheet 1

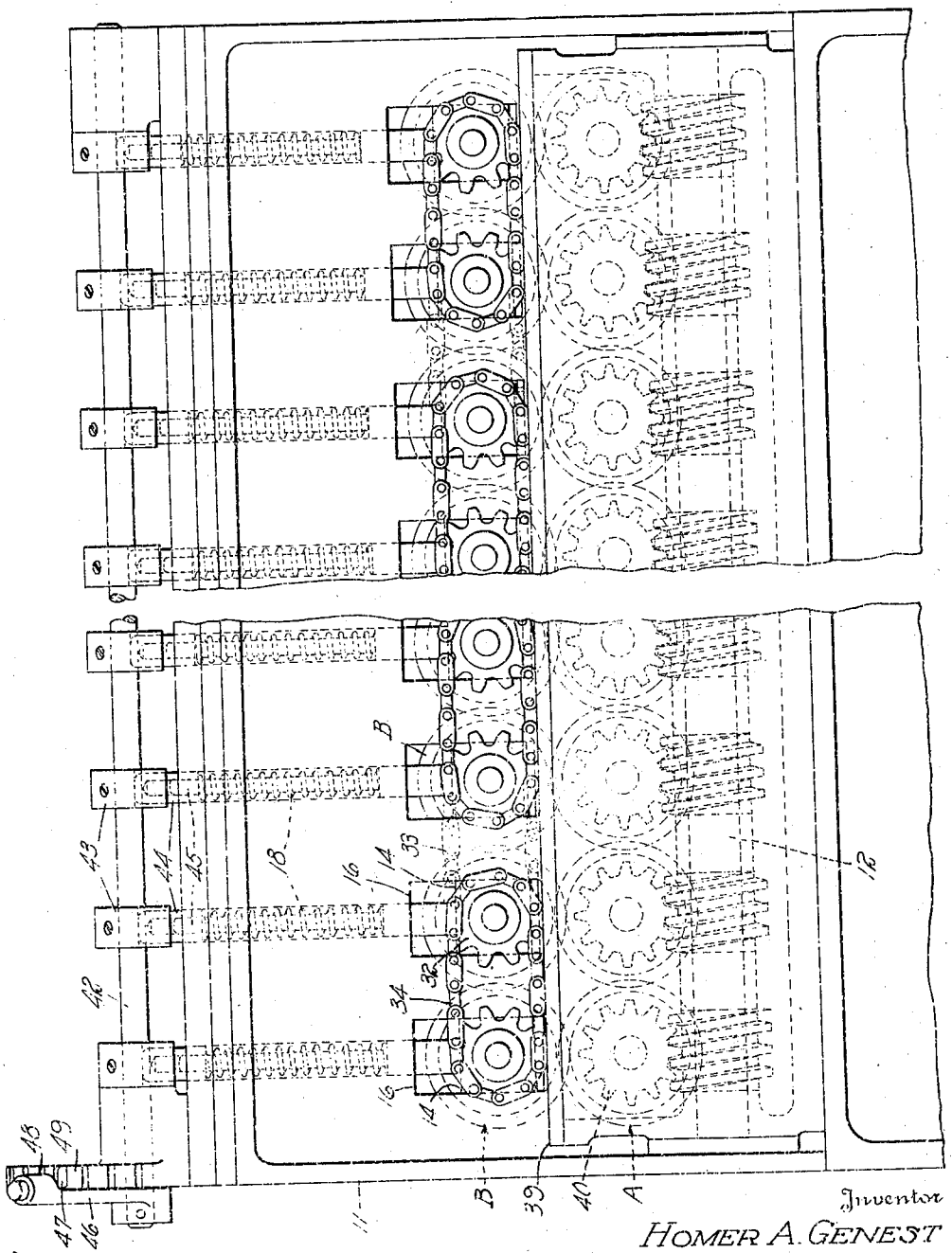


FIG. 1

Inventor
HOMER A. GENEST

By Lindsey & Pabellard

Attorneys

Aug. 3, 1943. H. A. GENEST 2,325,909

MACHINE FOR SHRINKING AND FELTING HAT BATS

Filed June 1, 1940 4 Sheets-Sheet 2

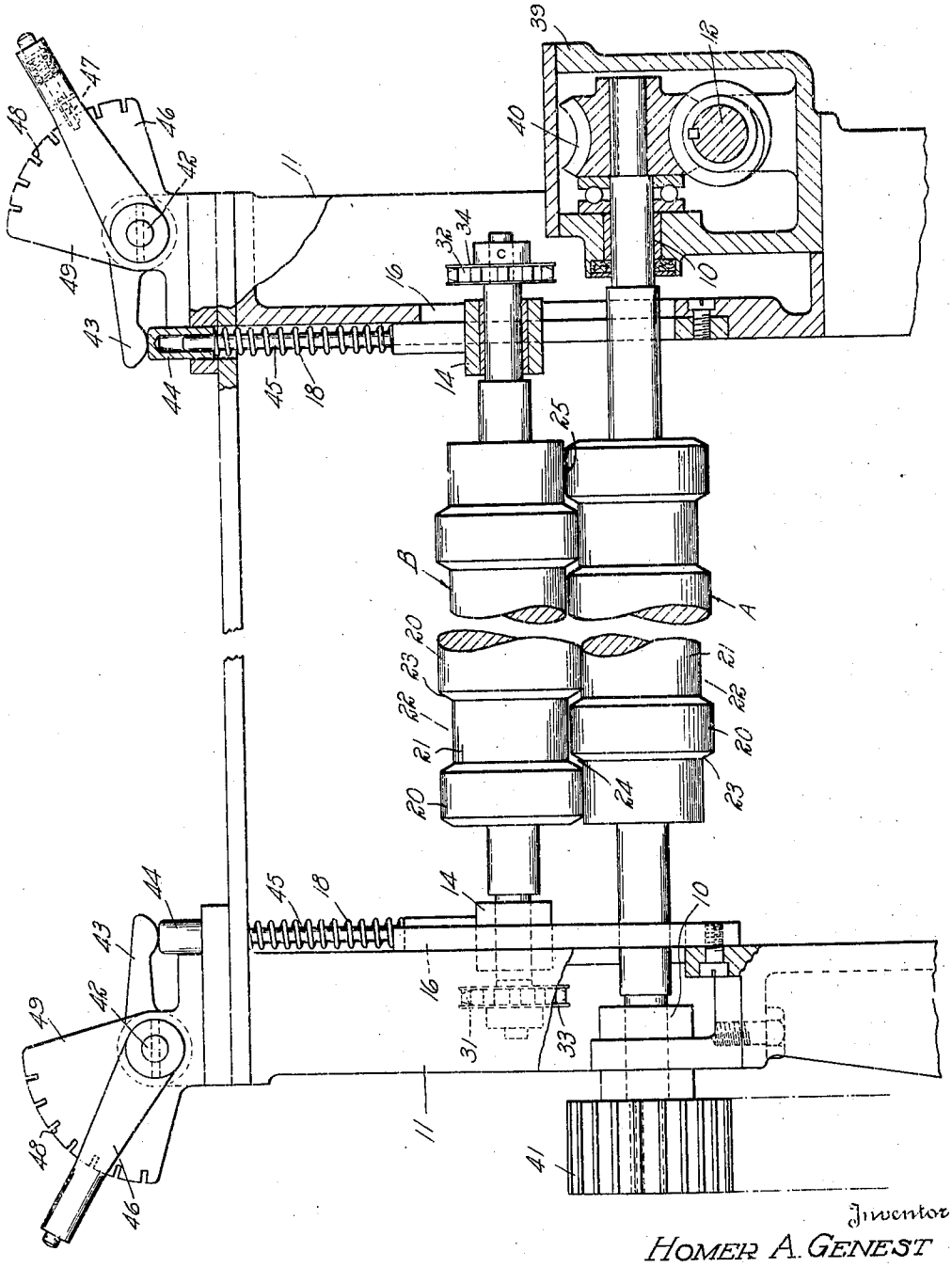


Fig. 2

Inventor
HOMER A. GENEST

By Lindsey & Pahlard
Attorneys

Aug. 3, 1943. H. A. GENEST 2,325,909

MACHINE FOR SHRINKING AND FELTING HAT BATS

Filed June 1, 1940 4 Sheets-Sheet 3

Fig-3

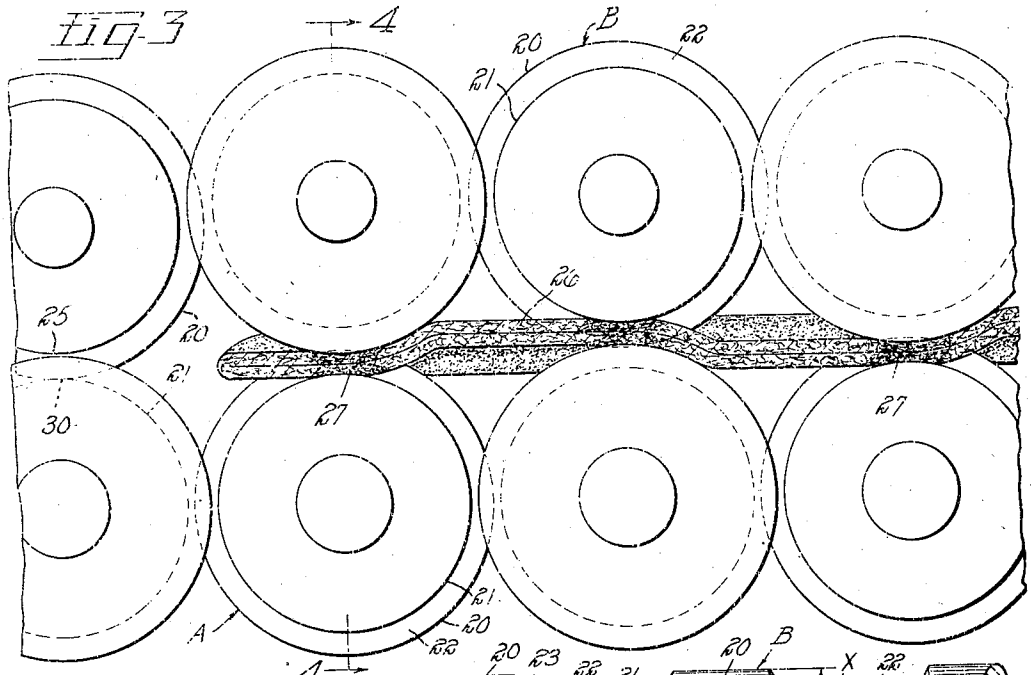
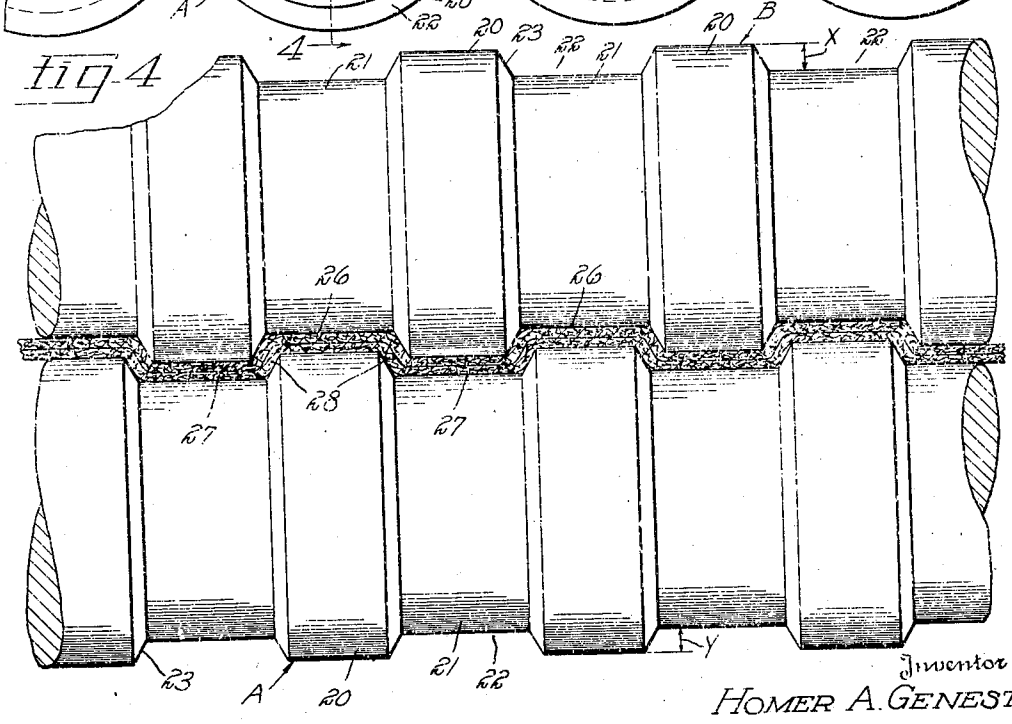


Fig-4



Inventor

HOMER A. GENEST

By Lindsey & Pabst

Attorneys

Aug. 3, 1943. H. A. GENEST 2,325,909

MACHINE FOR SHRINKING AND FELTING HAT BATS

Filed June 1, 1940 4 Sheets-Sheet 4

Fig 5

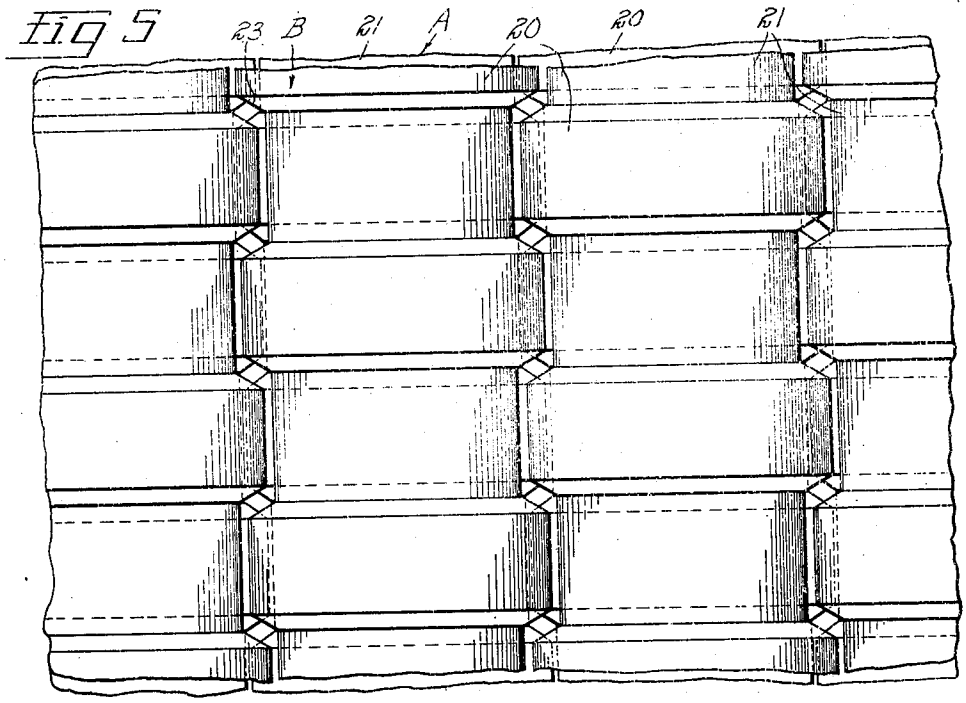


Fig-6

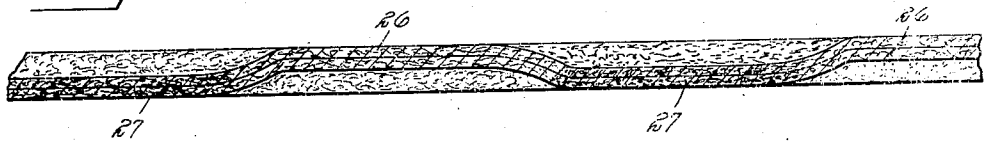
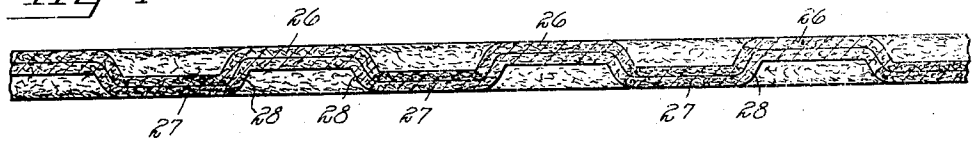


Fig-7



Inventor
HOMER A. GENEST

By Lindsey & Dalliard

Attorneys

Patented Aug. 3, 1943

2,325,909

UNITED STATES PATENT OFFICE

2,325,909

MACHINE FOR SHRINKING AND FELTING HAT BATS

Homer A. Genest, Danbury, Conn., assignor to United States Hat Machinery Corporation, New York, N. Y., a corporation of Virginia

Application June 1, 1940, Serial No. 338,321

12 Claims. (Cl. 28—6)

This invention relates to the felting and shrinking of bats from which fur or felt hats are made.

In my Patent No. 1,620,957, granted on March 15, 1927, to the United States Hat Machinery Corporation, as assignee, I show a method of and apparatus for shrinking and felting hat bats and wherein the bats are passed between rollers in an unrolled and saturated condition and a regular pattern of elevations and depressions spaced apart transversely and lengthwise of the direction in which the bats move is progressed through the bats so that the bats are repeatedly bent or flexed back and forth in a plurality of directions.

The aim of the present invention is to provide an improved method and machine by means of which hat bats may be more expeditiously felted and shrunk and a higher quality of product is secured.

A further aim of the invention is to provide certain improvements in the method and machine shown in my said Patent No. 1,620,957.

By proceeding in accordance with the present invention, the cost of felting and shrinking hat bats is materially reduced, a saving in time and in amount of fur used is effected, the bats are properly felted and shrunk throughout the thickness of the plies thereof, and bats of smoother and better texture are obtained.

A further aim of the invention is to provide an improved machine which is simple in construction and economical in operation and upkeep, and which is capable of use through a wide range of felting and shrinking operations, and wherein the bats are expeditiously shrunk, felted and crozed.

In the accompanying drawings, wherein I have shown for illustrative purposes one embodiment which the present invention may take, and which machine is particularly adapted for use in carrying out my improved method of shrinking and felting;

Figure 1 is a side view showing more or less diagrammatically my improved machine;

Fig. 2 is an end view of the machine with parts broken away;

Fig. 3 is a fragmentary view showing some of the rollers in end elevation and also showing a bat in longitudinal section passing between the two sets of rollers;

Fig. 4 is a detail view of a pair of rollers with the bat in cross section therebetween; it being assumed that this view is taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is a top plan view of a portion of the machine; and

Figs. 6 and 7 are respectively longitudinal and transverse sectional views through a bat in a condition which exists at any one time as the bat passes through the machine.

Referring to the drawings in detail, A and B respectively designate the rollers of lower and upper sets between which the bats are passed during the shrinking operation. The rollers A (which may be termed supporting rollers) are respectively positioned immediately below the rollers B (which may be termed pressure rollers) so that the rollers of the two sets are arranged in pairs. The shafts of the rollers A of the lower set are journalled in suitable bearings 10 in the gear box 39 and bracket 51. The rollers A are positively driven in any suitable manner—in the present instance by means of a worm shaft 12, as hereinafter described more in detail. The rollers of the upper set are journalled in bearings 14 mounted for vertical movement in slots 16 in the side frames. By preference, these rollers are urged into frictional engagement with the lower set of rollers by springs 18, the pressure of which may be adjusted as later described. In order to automatically croze the bats (i. e. slightly shift one ply relative to the other), the upper rollers are driven at a slightly lesser peripheral speed than the lower rollers through frictional engagement with the lower rollers and the bats passing through the machine.

Each of the rollers is provided with spaced apart cylindrical grooves so that each roller has spaced apart cylindrical rings thereabout separated by grooves, the base surfaces of which are cylindrical. Thus each roller has cylindrical portions of alternately larger and smaller diameters. In the present instance, the ring-like portions or portions of larger diameter are designated by the numeral 20, the portions of smaller diameter by the numeral 21, and the grooves by the numeral 22. The portions of larger diameter are of lesser width than the width of the grooves for a purpose later described. The end walls 23 of the rings 20 (and which end walls are the side walls of the grooves 22) are beveled or inclined preferably at an angle substantially 30° to a plane normal to the axis of the roller. The rollers of the two sets are of like construction, except that the radial height or extension of the ring-like portions of the rollers of one set is slightly greater than that of the ring-like portions of the other set of rollers, which is the

same as saying that the grooves in the rollers of one set are slightly deeper than those in the rollers of the other set. In the present illustrative disclosure shown in the drawings, the ring-like portions 20 of all of the rollers are of the same diameter but the reduced portions 21 of the rollers of the upper set are of lesser diameter than the reduced portions 21 of the rollers of the lower set. Thus the height X (see Fig. 4) of the ring-like portions of the rollers B is greater than the height Y of the ring-like portions of the rollers A.

From the drawings, it will be noted that the rollers are assembled in a series of pairs, each pair comprising an upper roller and a lower roller. It will further be noted that the ring-like or enlarged portions 20 of each roller of each pair register with and normally extend into the grooves 22 of the other roller of such pair. The enlarged portions 20 of the rollers of the upper set engage the peripheries of the reduced portions of the rollers of the lower set when no bat is passing therebetween. In such condition, there is a slight space 25 between the peripheries of the ring-like portions of the rollers of the lower set and the reduced portions 21 of the rollers of the upper set, this space being of less height than the thickness of a bat. As previously stated, the ring-like portions 20 are of lesser width than the reduced portions 21, the purpose of this arrangement being to provide spaces between the opposing end walls of the rings on the rollers of each pair. Such spaces, which are indicated by the numeral 24, are preferably slightly wider than the thickness of the two plies of a bat so that the portions of the bat which are within such spaces, as the bat passes between the two sets of rollers, is not compressed or under pressure. By preference, the upper rollers may float to a limited extent in an axial direction.

As shown in Figs. 3 and 5, the enlarged portions of adjacent rollers of each set are internested or interlocked; that is to say, the enlarged portions of one roller extend into the grooves of the next preceding and the next following rollers without, however, being in actual engagement with such rollers, this arrangement being of advantage in that it will prevent the bats from winding themselves upon a roller or inadvertently passing between two rollers of the same set.

With the arrangement so far described, it will be clear that the lower set of rollers is so constructed and arranged as to provide parti-cylindrical elevations which are arranged in diagonal lines, that is, in a checkerboard-like pattern, and the surface provided by the under side of the upper rollers is complementary to the upper surface provided by the lower rollers. The elevations provided by the enlarged portions of the rollers and the depressions provided by the grooves of the rollers are of substantial width in a direction parallel to the axis of rotation of the rollers. As a bat is fed through the machine, the operation is generally similar to that described in my said Patent No. 1,620,957 in that the first pair of rollers will wave or bend the bat in the direction of the length of these rollers and, as the bat is advanced, the second pair of rollers will wave the bat in the opposite direction; that is to say, those portions of the bats which formed the elevations and the depressions of the preceding wave respectively become the depressions and elevations of the wave made by the second pair of rollers. Each succeeding pair of rollers will change the elevations into depressions and the depressions into elevations. However, in the present instance, the top portions 26 of the elevations and the bottom portions 27 of the depressions formed in the bat are generally plane or level and are generally horizontally disposed with respect to the general plane of movement of the bat, and the level portions of the depressions are joined with the level portions of the elevations by angular sides 28. Also, in accordance with the present invention, as a bat passes between a pair of rollers, the level bottom portions 27 of the depressions are compressed to an appreciable extent between the cylindrical enlarged portions 20 of the upper roller and the cylindrical reduced portions 21 of the lower roller, the lines of contact between these portions of the rollers in the directions of the length of the rollers being substantial. The upper portions 26 of the elevations are likewise compressed, but to a lesser degree, between the peripheries of the enlarged portions 20 of the lower roller and the reduced portions 21 of the upper roller. The angular sides 28 of the bats, which are located within the spaces 24, are not compressed but are under tension. Thus, as the bats are advanced they are repeatedly waved or bent back and forth in the direction of the length of the rollers and in the direction in which the bats pass through the machine, and the bat is repeatedly compressed, the compression action taking place each time the bat passes between a pair of rollers, and the compression being along lines extending longitudinally of the rollers but spaced apart longitudinally thereof. It is, of course, understood that as the bat passes through the machine it becomes somewhat reduced in size, that is, it shrinks, the fibres being so manipulated that they work into each other and become securely interlaced.

Furthermore, with the arrangement described, the bats are automatically crozed as they pass through the machine; that is to say, one of the plies is progressively shifted to a slight extent relative to the other ply on each pass of a bat. The angular positions of the bats as they pass into the machine are changed or varied so that the crozing action takes place in different directions and the proper shape of the bat is maintained. The crozing action is effected by the fact that the upper rollers are driven through their frictional engagement with the lower rollers at a slightly lesser peripheral speed than the lower rollers. It will be recalled that when a bat is not passed between a pair of rollers, the upper roller is frictionally driven by a lower one due to the engagement between the reduced portions of the lower roller and the enlarged portions of the upper roller; and also that the reduced portions of the upper rollers are of slightly lesser diameter than the reduced portions of the lower rollers. Thus, at the points of contact (one of which is designated by the numeral 30 in Fig. 3) between the ring-like portions 20 of an upper roller and the reduced portions 21 of the companion lower roller, the surface speed is the same but the surface speed of the ring-like portions and the reduced portions of the upper roller are slower than the respective surface speeds of the ring-like portions and the reduced portions of the lower roller. When the tip of a bat enters the throat between a pair of rollers, the upper roller, having a somewhat lesser peripheral speed, will somewhat retard the movement of that portion of the bat which engages the upper roller so that the line of fold is slightly changed at that point. The total

amount of shifting on each pass of the bat through the machine is relatively slight but it is sufficient to prevent "streaks" and "rods."

Furthermore, in accordance with the present invention, the arrangement is such that while the upper rollers are frictionally driven by their engagement with the lower rollers or by the bats passing between the two sets of rollers, the upper rollers are interconnected so as to insure that the bat will pass between each set of rollers without becoming bunched up in the throat between any pair of rollers. To this end, each of the upper rollers has a driving connection with the next succeeding one. These connections may be of any suitable sort but are here shown as being in the form of sprockets **31** and **32** and sprocket chains **33** and **34**. There is preferably a slight slack in each of the chains. In the present instance, the rollers are connected in succession by chains located at opposite ends of the rollers. The sprockets and chains at the right hand side of the machine, referring to Fig. 2, are respectively designated by the numerals **32** and **34**. Assuming that a bat is passing through the first pair of rollers, the upper roller of that pair is, of course, being driven by its frictional engagement with the upper surface of the bat, and the upper roller of the second pair is being driven through its frictional engagement with its companion lower roller. When the forward edge of the bat engages in the throat between the rollers of the second pair the upper roller is lifted slightly and there may be a tendency for it to stop rotating with the result that the bat will become bunched up in the throat. With the present arrangement, this is avoided because the tendency of the roller of the second pair to stop rotating is overcome by the driving action on that roller from the preceding upper roller.

As previously stated, the rollers of the lower set may be driven in any suitable manner. For example, as shown in the drawings, the drive may consist of the worm shaft **12** journalled in a gear box **39** extending along one side of the machine, and worms **40** meshing with the worm shaft and respectively fixed to the right hand ends of the shafts of the rollers A. On the left hand end of the shaft of the first roller of the lower set (see Fig. 2) there may be a gear **41** for driving transfer rolls (not shown).

The pressure rollers B may be of themselves of such weight that the springs **18** are not required, but, by preference, these springs are provided and the pressure of the springs may be adjusted to vary the pressure between the rollers in accordance with the particular stage of the felting and shrinking operation to be performed. If the bats are relatively tender, the spring pressure may be relatively light and as the felting operation is proceeded with and the bats become harder and tougher, the spring pressure may be increased. The means for adjusting the pressure of the springs may, of course, be of any suitable type. In the present instance, there is shown along each side of the machine a rock shaft **42** having arms **43** which bear upon caps **44** located on the upper ends of the plungers **45** which are encircled by the springs **18**. Fixed to an end of each of the rock shafts **42** is an adjusting handle **46** which carries a spring pressed dog **47** adapted to be selectively engaged in the notches **43** of the fixed segment plate **49**. By adjusting the position of these handles, the pressure of the springs may be correspondingly adjusted.

It is, of course, understood that during the felting and shrinking operation, the bats are maintained in a saturated condition. As any suitable means may be used for this purpose, none is shown in the drawings, it being sufficient here to say that the sprinkling arrangement shown in my said Patent No. 1,620,957 may be employed for this purpose.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In a machine for shrinking hat bats, a plurality of rollers, each of said rollers having generally cylindrical ring-like portions spaced apart by cylindrical reduced portions to form a surface having crosswise spaced apart depressions and elevations of generally particylindrical form, and a second plurality of rollers forming a surface complementary to the surface formed by the first rollers, the height of the ring-like portions of some of the rollers being greater than the height of the ring-like portions of the other rollers.

2. In a machine for shrinking hat bats, two sets of rollers between which the bat is advanced, the rollers of each set having alternate cylindrical portions of enlarged and reduced diameters, the enlarged portions of one set of rollers extending into the grooves provided by the reduced portions of the other set of rollers, and the portions of larger diameter of one set of rollers being of greater height than those of the other set.

3. In a machine for shrinking hat bats, a plurality of rollers, each of said rollers having generally cylindrical ring-like portions spaced apart by cylindrical reduced portions to form a surface having crosswise spaced apart depressions and elevations of generally particylindrical form, and a second plurality of rollers forming a surface complementary to the surface formed by the first rollers, the end walls of the ring-like portions being inclined to a plane normal to the axes of the rollers, and the ring-like portions of the rollers of one set being of slightly greater height than those of the other set.

4. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with an urged towards said supporting rollers, said rollers having alternate cylindrical portions of enlarged and reduced diameters, the enlarged portions of each roller of each pair registering with the grooves of the other roller of the pair, said enlarged portions being of lesser width than the reduced portions and the enlarged portions of one roller of a pair being of greater height than those of the companion roller.

5. In a machine for shrinking hat bats, two sets of rollers between which the bat is advanced, each of said rollers having generally cylindrical ring-like portions spaced apart by cylindrical reduced portions of greater width so as to form a surface having crosswise, spaced apart depress-

ions and elevations of generally parti-cylindrical form, and a second plurality of rollers forming a surface complementary to the surface formed by the first rollers, the ring-like portions of the rollers of one set being of slightly greater height than those of the other set.

6. In a machine for shrinking hat bats, a series of pairs of rollers between which the bats are passed, the rollers of each pair having generally cylindrical ring-like portions spaced apart by cylindrical reduced portions and arranged to form and advance checker-board-arranged depressions and elevations through the bat as it is passed between the rollers, the enlarged portions being of lesser width than the reduced portions and the enlarged portions of one roller of each pair being of greater height than the enlarged portions of the other roller of the pair, the peripheries of said enlarged portions of greater height being adapted to frictionally engage the reduced portions of the other roller, the space between the reduced portions of one roller and the enlarged portions of lesser height of the companion roller being less than the thickness of a bat.

7. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with said supporting rollers, said rollers having alternate cylindrical portions of enlarged and reduced diameters, the enlarged portions of one set of rollers extending into the grooves provided by the reduced portions of the other set of rollers, and the enlarged portions of each roller of each set registering with the reduced portions of the preceding and following rollers of such set, the enlarged portions of the roller of one set having a greater height to an extent of less than the thickness of a bat than the enlarged portions of the other set, and the portions of reduced diameter being of greater width than the width of the enlarged portions.

8. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with and urged towards and adapted to engage said supporting rollers, the rollers of each set having alternate cylindrical portions of enlarged and reduced diameters, the enlarged portions of one set of rollers extending into the grooves provided by the reduced portions of the other set of rollers, means for positively rotating said supporting rollers, said pressure rollers being driven by their frictional engagement with the supporting rollers and the bats passing between the two sets of rollers, and a driving connection between successive pressure rollers and driven entirely thereby whereby to prevent stoppage of rotation of one of the pressure rollers and the bunching-up of a bat therebehind.

9. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with said supporting rollers, each of said rollers having alternate cylindrical portions of enlarged and reduced diameters, the enlarged portions of one set of rollers extending into the grooves provided by the reduced portions of the other set of rollers, means for urging the pressure rollers towards and into engagement with their companion supporting rollers, means for positively driving each of said supporting rollers, each of said pressure rollers being driven by frictional engagement with and at a lesser speed than its companion supporting roller, and chain connections between successive pressure rollers and driven entirely thereby whereby one pressure roller will prevent excessive lagging of another one.

10. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with and urged towards said supporting rollers, each of said rollers having alternate generally cylindrical portions of enlarged and reduced diameters, said portions being greater in width than the difference in diameters between the enlarged and reduced portions of the rollers, and the end walls of the enlarged portions of the rollers being inclined to a plane normal to the axis of the rollers, the enlarged portions of each roller of one pair registering with and extending through the major portion of the widths of the grooves of the other roller of the pair, and means for supporting said pressure rollers for movement towards and from close proximity to the supporting rollers so that the portions of the bats between the opposed enlarged portions and reduced portions of the rollers engage the same and are squeezed and compressed thereby.

11. In a machine for shrinking hat bats, two sets of rollers between which the bat is advanced, the roller of each set having alternate generally cylindrical portions of enlarged and reduced diameters of substantial widths, the enlarged portions of one set of rollers extending into the grooves provided by the reduced portions of the other set of rollers and the portions of larger diameter being of slightly lesser width than the portions of reduced diameter, means for urging each of the rollers of one set towards their companion rollers, and means for supporting the rollers of one set for movement relative to those of the other set to a position where the space between the rollers of the two sets is less than the thickness of a bat passing therebetween whereby the bat is squeezed and compressed between the directly opposed enlarged portions and reduced portions of the rollers of the two sets.

12. In a machine for shrinking hat bats, a set of supporting rollers, a set of pressure rollers paired with and urged towards said supporting rollers, said rollers having alternate generally cylindrical portions of enlarged and reduced diameters, the enlarged portions of each roller of each pair registering with and extending through the major portion of the width of the grooves of the other roller of the pair, the end walls of said enlarged portions being inclined and the reduced portions being of slightly greater width than said enlarged portions, means for urging the rollers of one pair towards the companion rollers of the other pair, and means for supporting the pressure rollers for movement towards and from the supporting rollers to a position where the space between the rollers of the two sets is less than the thickness of a bat passing therebetween whereby the bat is squeezed and compressed between the opposed enlarged and reduced portions of the two sets of rollers.

HOMER A. GENEST.