

June 10, 1924.

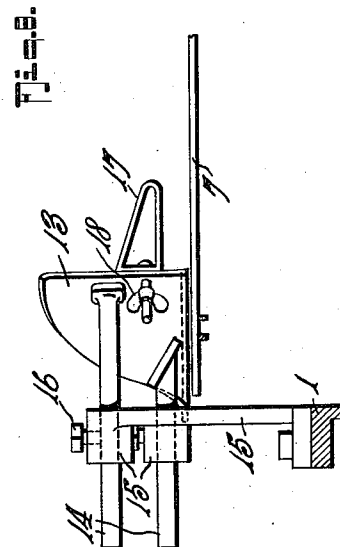
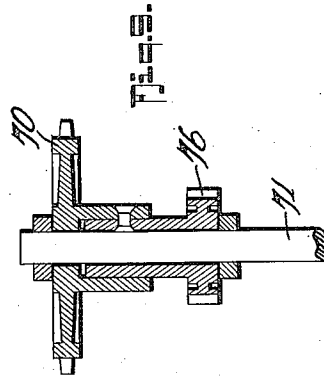
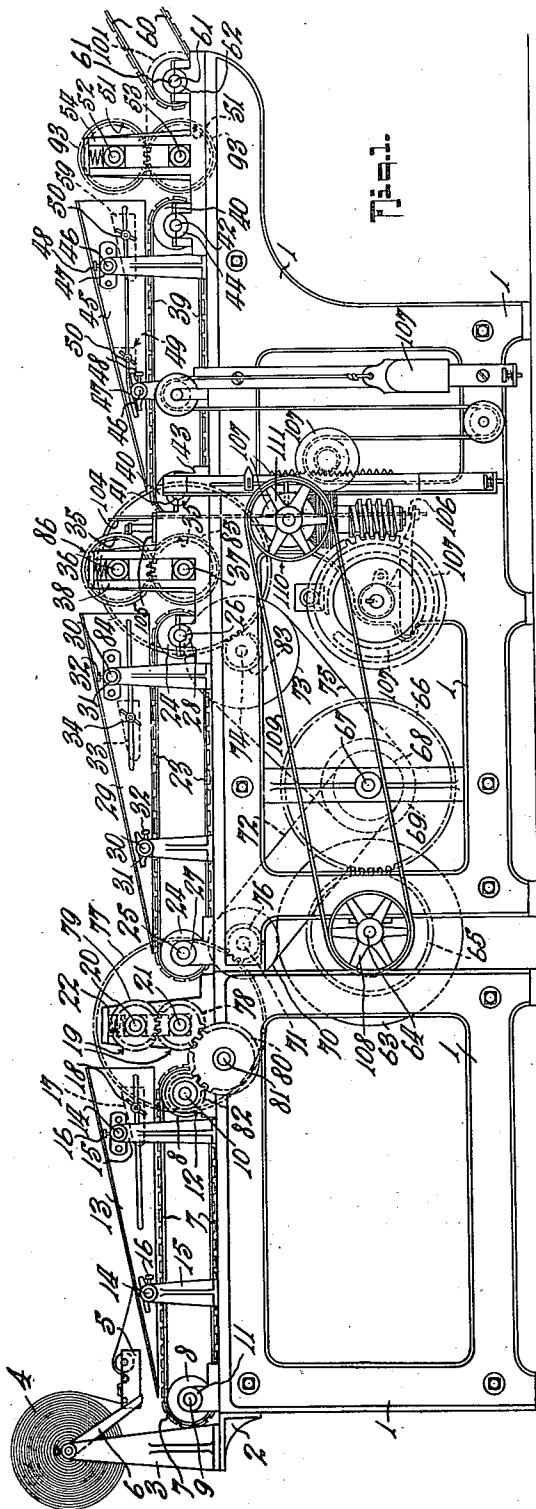
M. J. STACK

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TWISTING AND FOLDING MACHINE

Filed Nov. 6, 1923

2 Sheets-Sheet 1



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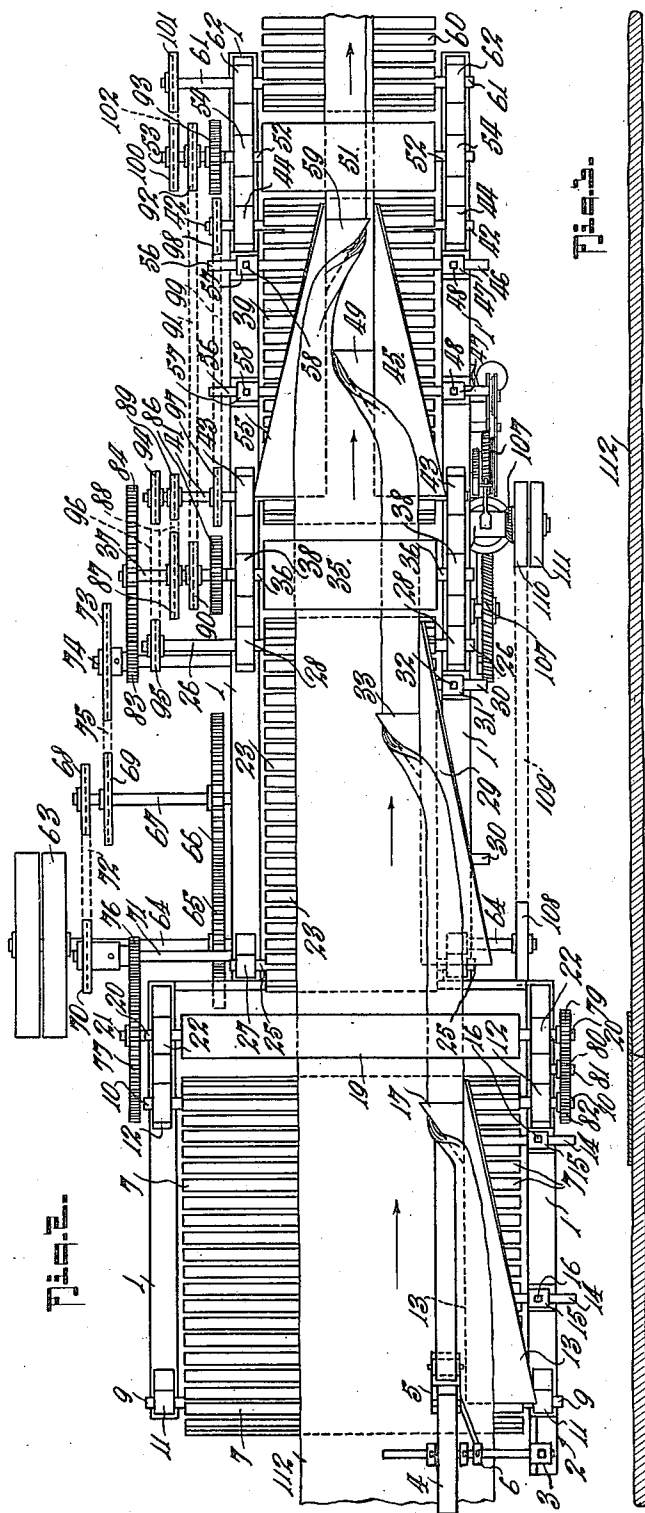


Fig. 2.

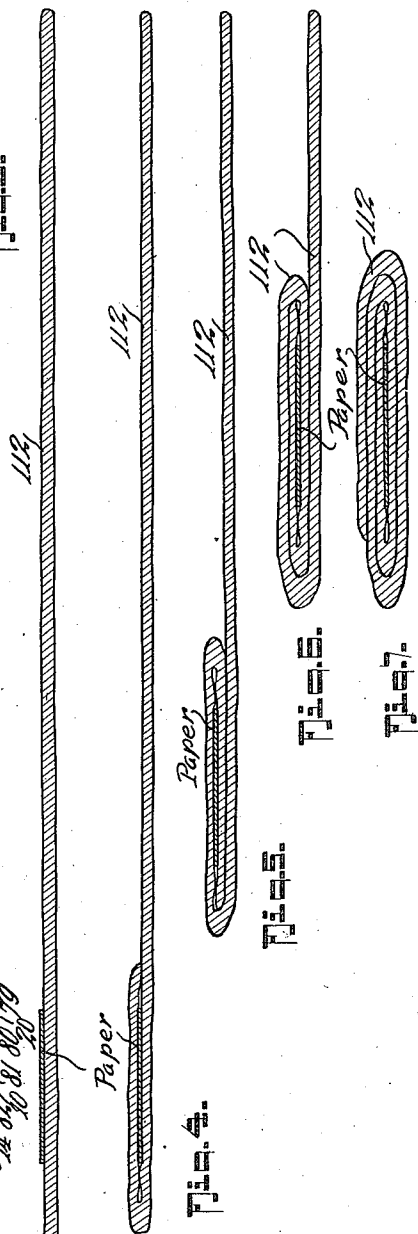


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

MAURICE J. STACK, OF WATERFORD, NEW YORK.

TWISTING AND FOLDING MACHINE.

Application filed November 6, 1923. Serial No. 673,219.

To all whom it may concern:

Be it known that I, MAURICE J. STACK, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Twisting and Folding Machines, of which the following is a specification.

My present invention relates to machines for handling fabricated cotton and more particularly that class of such machines wherein is provided means for twisting and folding the fabricated cotton into the shape of a cotton bat suitable for use as upholstery batting for the automobile trade or for other uses.

The invention has for its object to provide a machine of the class described in which means is provided for folding the fabricated cotton conveyed thereto into any desired width and to any weight and thickness required, in which the folding action is so performed as to effect a twisting action of the folds of the cotton as it is being formed into a continuous length of bat, and in which means is also provided whereby a strip of non-elastic material is so fed through the machine as to be wrapped into the innermost fold of the batting as it is being produced.

The invention further has for its object to provide means whereby the non-elastic strip will be caused to hold its desired position within the folds of the cotton batting as it is being formed and after it has been formed, and for so regulating the speeds of the various conveying aprons and batting pressing rolls as to effect a perfect passing of the bats being rolled through the various mechanisms: in other words, compensating for the draft and stretch of the batting as it is being rolled.

With the above and other objects in view, the invention further resides in those novel details of construction, combination and arrangement of parts, all of which will be first described, then be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of the machine.

Figure 2 is a plan view thereof.

Figures 3, 4, 5, 6 and 7 are diagrammatic cross sections illustrating the flat condition of the travelling batting, the first twist-fold, the second twist-fold, the third twist-fold, and the final fold, the sections all being taken at the successive positions, looking in

the direction opposite the travel of the batting.

Figure 8 is a detail end view of the first twist-fold effecting mechanism, looking in the direction opposite the travel of the batting.

Figure 9 is a detail section of the sleeved gear and sprocket which forms a part of the drive transmission for the first set of compression rolls.

In the practical development of my invention I provide a machine framing 1 adapted to support the various mechanisms of my machine and to one side of the upper front end of which is secured a small frame or bracket 2 which serves as a supporting medium for the standard 3 which in turn forms a supporting bracket for the roll of gummed paper 4. A moistening box is suitably supported from the standard 3 by a bracket 6 and through this moistening box the gummed paper from the roll 4 is threaded in such manner that when the machine is in operation the paper from the roll 4 will be drawn through the machine after being moistened by its passage through the box 5, and in the manner and for the purpose which will later be described.

A front slatted conveyor apron 7 is provided and is driven through the medium of the pulleys 8 mounted on the front and rear apron shafts 9 and 10 in a manner later to be described. The front apron shaft 9 has suitable end bearing in bearings 11 mounted upon the top of the framing 1 and the rear apron shaft 10 has suitable end bearing in the bearings 12 mounted upon the machine framing.

A folder 13 cooperates with the front apron 7 and is provided with a pair of laterally projecting carrier arms 14 which are laterally slidable through the hubs of the supporting bearings 15 and each of the hubs of these bearings is provided with a suitable set screw 16 to securely hold the carrier arms 14 at their adjusted position. By this means the folder 13 is supported in cooperative relation with the conveying apron 7 and is adjustable laterally across the conveying surface of that apron for a purpose later to be described. The folder is also provided with a folding horn 17 and this folding horn is secured to the folder 13 in an adjustable manner through the medium of the slot and wing nut adjustment 18, see Figure 8. From the foregoing, it will be readily apparent

that the folder 13 is laterally adjustable with respect to the conveying surface of the apron 7 and the folding horn 17 is longitudinally adjustably cooperative with said folder.

A pair of presser rolls 19 are positioned just beyond the delivery end of the apron 7 and in a manner whereby their batting engaging portions are approximately on a horizontal plane with the conveying surface of the apron 7. These presser rolls are provided with upper and lower driving shafts 20—21 respectively, which have suitable end bearing in the bracket 22 with which the bracket 12 is formed as an integral part.

An intermediate slatted apron 23 is also provided and is adapted to be operated to convey the batting rearwardly through the medium of the pulleys 24 driven by the front and rear cross shafts 27 and 28 respectively, the former having suitable end bearing in the bearings 27 secured upon the machine frame and the latter being similarly mounted in the end bearings 28.

A second or intermediate folder 29 is also provided and this folder is likewise laterally adjustably mounted through the medium of the lateral arms 30 supporting brackets 31 and set screws 32. A folding horn 33 is also cooperative with this folder 29 and is adjustably secured thereto as at 34.

A second set of presser rolls 35 is located just beyond the delivery end of the intermediate apron 23 and in position for cooperating with the conveying surfaces thereof, these rolls being mounted upon the upper and lower driving shafts 36 and 37 respectively which have suitable end bearing in the bracket 38, of which the bracket 28 forms an integral part.

A third or rear apron 39 is provided and adapted to be driven by the pulleys 40 over which it takes and which are driven by the front and rear cross shafts 41 and 42 respectively in a manner later to be described and which shafts have suitable end bearing in the front and rear bearings 43 and 44 respectively.

The third folder 45 cooperates with the apron 39 and, like the aprons 29 and 13, is laterally adjustably supported as at 46—47 and 48, and cooperative with the folder 45 is the usual folder horn 49 which is adjustably secured thereto, as at 50.

A third set of presser rolls 51 is provided and located just beyond the delivery end of the rear apron 39 and are mounted upon, to be driven by, the upper and lower drive shafts 52 and 53 respectively, which have suitable end bearing in the bracket 54 of which the bracket 44 is an integral part.

A fourth or final folder 55 is provided to cooperate with the rear apron 39, and, as is clearly illustrated, is positioned just opposite the folder 45 and like the rolls of the folders

is laterally adjustably supported above the framing 1 and in cooperation with the said apron as at 56, 57 and 58 and the usual folder horn 59 is adjustably secured thereto, as is the case with all of the rest of the adjustable horns. It will be observed that the folder horns 49 and 59 which cooperate with the folders 45 and 55 above the rear apron 39 are positioned in a manner whereby they will not interfere with each other or either thereof with the folding action of the opposite folder, as is clearly indicated in Figure 2 of the drawings.

It will be observed from Figure 2, and by further attention to the enlarged diagrams illustrated in Figures 3 to 7 inclusive that as the cotton batting is conveyed across the machine bed by the aprons, the folder 13 effects the first operation thereupon, that is, starts the first twist-fold which is completed by the horn 17 in the manner illustrated at the left of Figure 2, the position of the paper roll 4 so that the said paper will be positioned centrally of that fold, as is further clearly indicated in Figure 4. It should be remembered that all of these diagrammatic figures are taken as cross sections looking in the direction opposite the direction of travel of the conveyed batting and it should be understood that Figure 3 illustrates the flat condition of the batting with the relative position of the paper thereupon and before any fold has been made.

As the batting leaves the conveyor apron 7 it passes between the presser rolls 19 where the fold and the batting is compressed to a certain degree and which, of course, effects a tight adherence of the gummed paper strip to that portion of the fold which opposes its gummed surface. The batting then passes on to the conveyor apron 23 and over the folder 29 where the second fold, or rather a twist, is started by the folder 29 and completed by the horn 33, as is clearly indicated at the central portion of Figure 2 and more clearly indicated in Figure 5.

After this second fold the twist is completed and the batting then passes through the presser rolls 35 where the same and the folds are again compressed and passed on to the third apron 39 where the third fold or a twist is started by the folder 45 and completed by the horn 49, during the completion of which the fourth folder 55 comes into play and starts the final fold which is completed by the horn 59, completing the bat which then passes between the final presser rolls 51 to be compressed thereby and therefrom onto the takeoff conveyor 60 to be carried away, preferably in a continuous length to be rolled and stored or handled in any approved manner, preferably rolled into a roll of determined or continuous length and of a standard predetermined weight.

The conveying surfaces of the aprons 7, 23 and 39 are all on the same horizontal plane, which horizontal plane passes through or approximately through the point at which all of the presser rolls contact with the bat-
ting being conveyed therethrough.

In practice I find that perfect function of a machine of this type depends largely upon the grade of material being used upon the machine, some of such material having greater tensile strength and elasticity than others naturally affecting the speed at which the various aprons and rolls must be operated to obtain the most perfect result possible. I also find that it is impractical to operate all of the aprons and rolls at the same speed because to do so would cause a piling up of the stock at some points and a tendency to tear the stock at others. In the development of a practical machine, such as is illustrated in the drawings, consideration must be given to the retarding action of the folding or twisting mechanisms and the natural quality of the fabricated cotton itself.

By experience I find that perfect results may be obtained by driving the front conveyor 7 slightly faster than the first set of rolls 19; the second set of rolls a little faster than the first set and the third set of rolls a little faster than the second set with the speed of the aprons 23 and 29 increasing in successive and proportionate degrees over that of the apron 7.

The perfect drive of the various mechanisms is effected as follows: 63 designates the master power transmission pulley mounted upon the main power shaft 64 upon which is also mounted a large diameter gear 65 which is adapted to mesh with a larger diameter gear 66 mounted upon the countershaft 67. This countershaft 67 also has mounted thereupon a drive sprocket 68 and a larger diameter sprocket 69. The sprocket 68 drives the like sized sprocket 70 sleeve mounted to be rotatable upon the stud shaft 71, through a chain transmission 72, while the sprocket 69 drives the slightly larger sprocket 73, sleeve mounted to be rotatable upon the shaft 74, through a chain transmission 75, the purpose for which will later appear.

A small diameter gear 76 is sleeve connected with the sprocket 70 (see Figure 9) to be rotatable therewith and upon the stud shaft 71, and is adapted to mesh with the large diameter gear 77 mounted upon the lower presser roll shaft 21, upon the other end of which is secured a gear 78 which meshes with the like sized gear 79 on the upper presser roll shaft 20 and with an idler gear 80 rotatable upon the stud shaft 81 and which is adapted to impart motion about the rollers to the apron 7 through the medium of the gear connection 82.

A small pinion gear 83 is sleeve connected

with the sprocket 73 to be rotatable therewith and upon the stud shaft 74 and serves to impart rotation to the large diameter gear 84 mounted upon the lower presser roll shaft 37, upon the other end of which is mounted a gear 85 adapted to mesh with the like diameter gear 86 mounted upon the upper presser roll shaft 36 to impart rotation thereto. The shaft also has mounted thereupon a large sprocket 87 adapted to impart rotary motion to the apron shaft 41 through the medium of the chain transmission 88 which takes thereover and over the small sprocket 89 mounted upon said apron shaft.

The lower presser roll shaft 37 also has a sprocket 90 mounted thereupon and over which takes a transmission chain 91 which also takes over the slightly smaller sprocket 92 mounted upon the lower presser roll shaft 53 to impart rotary motion thereto, which said rotary motion is also imparted to the upper presser roll shaft 52 by the usual like sized gear transmission means 93.

The apron shaft 41 also has mounted thereupon a sprocket 94 over which, and over the slightly larger sprocket 95 mounted upon the apron shaft 28 of the apron 23, takes the transmission chain 96 to impart motion to the said apron 23, and still another sprocket 97 is mounted upon the said apron shaft 41 over which, and over the like sized sprocket 98 mounted upon the other shaft 42 of the apron 39, takes the transmission chain 99 for effecting proper drive of the said apron 39.

The lower presser roll shaft 53 has mounted thereupon a sprocket 100 over which and over the smaller sprocket 101 takes the transmission chain 102 to effect the proper driving of the takeoff apron 60 upon the shaft 61 of which the sprocket 101 is mounted.

While it is more practical, and therefore more desirous, that the folded bat be run to as great a length as is possible considering the possibilities of the machine and the stock and the practicability of handling, it may be desired to cut the bat into desired lengths as it is being folded. For this purpose I provide a severing mechanism which I preferably locate at a point just beyond the second set of presser rolls 35. This means includes the knife 104 which is operated through the medium of operating rods 105 guided in the brackets 106 supported upon the brackets which provide the bearings 28, 38 and 43. This mechanism is properly operated by suitable driving and timing mechanism which is similar to that disclosed in my Patent #1,196,993 and therefore a detailed disclosure here is thought to be unnecessary and the said mechanism will be but generally pointed out by the numeral 107. Power is transmitted to this mechanism from the main power shaft 64 through the medium of the pulley

108, belt 109 and pulley 110, the latter forming a part of the mechanism and illustrated in the patent referred to. A loose pulley 111 may also be provided so that the belt 109 may be shifted thereonto so that the knife operating mechanism will not operate.

It should be understood that the gears 78—79, 85—86, 93—93, are long toothed gears such as will permit movement away from each other, as may be effected by variance in thickness of the stock passing through the rolls for effecting power transmission by these gears.

By reason of providing the twisting folders 13, 29, 25 and 55 with laterally adjustable mountings and by also providing a similar laterally adjustable mounting for the paper roll 4, it will be readily apparent that the machine may be adjusted to make various sizes of folds and, of course, various sizes of batting, as the trade may require, the adjustment being very simple and effective so that quick change of the machine may be readily effected with practically no waste of time. For this purpose, it will be observed that the apron 7 is made much wider than the other aprons.

By reason of positioning the folding mechanisms as they are indicated in Figure 2, it will be observed that all of the twist-folds with the exception of the final fold are in the same direction. By folding all in one direction and particularly by the utilization of the twist accomplished by 29—33 and 45—49 the fibres of the fabricated cotton are compacted in the direction of the twist only in a manner whereby the tensile strength of the said cotton will be increased and not flexed back and forth in a manner which would tend to weaken the same.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, the manner of operation and the advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:

1. A machine of the class described, comprising a plurality of conveying aprons, a plurality of twist-folding devices cooperative with said aprons, a series of said twist-folding devices being positioned for effecting their folds in like direction, means for laying a non-elastic strip within the first fold, presser rolls for pressing the folds as they are made, and means for driving said aprons and rolls.

2. A machine of the class described, comprising a plurality of conveying aprons, a twist-folding device cooperative with each apron, a series of said twist-folding devices being positioned for effecting a lateral fold in the same direction, means for feeding a non-elastic strip into the innermost fold as

it is being made, presser rolls for pressing the folds as they are made, and means for driving said aprons and rolls.

3. A machine of the class described, comprising a front conveying apron, a twist-folder cooperative with the front aprons for effecting a lateral fold in one direction, means for laying a non-elastic strip into the first fold to travel with that fold through the rest of the functions of the machine, an intermediate conveying apron, a twist-folder cooperative with said intermediate apron, a rear conveyer apron, a twist-folder cooperative with said rear apron in a manner for effecting a twisting of the first and second folds and a folding of the same over upon the stock passing through the machine, presser rolls for pressing the folds, and means for driving the aprons and rolls.

4. A machine of the class described, comprising a front conveying apron, a folder cooperative with the front apron for effecting a lateral fold in one direction, means for laying a non-elastic strip into the first fold to travel with that fold through the rest of the functions of the machine, an intermediate conveying apron, a twist-folder cooperative with the intermediate apron in a manner for effecting a twisting of the first fold and a folding thereof over upon the stock passing through the machine, a rear conveying apron, a twist-folder cooperative with said rear apron in a manner for effecting a twisting of the first and second folds and a folding of the same over upon the stock passing through the machine, another twist-folder cooperative with the said rear apron for effecting a folding over of the final lap of the stock upon the folds already made, a presser roll associated with each apron for pressing the folds and means for driving the aprons and rolls at dissimilar speeds.

5. A machine of the class described, comprising a plurality of conveying aprons, a twist-folding device cooperative with each apron, a series of said twist-folding devices being positioned for effecting a lateral fold in the same direction, means for feeding a non-elastic strip into the innermost fold as it is being made, presser rolls for pressing the folds as they are made, means for driving said aprons and rolls, said folding means being laterally adjustable across the aprons for effecting the twisting and folding of bats of varied widths and thicknesses, and said driving means being so cooperatively arranged as to effect a dissimilar speed of aprons and presser rolls to compensate for draft and stretch of the stock.

6. A machine of the class described, comprising a plurality of units each consisting of an endless conveyor apron and twist-folding devices and presser rolls cooperative therewith, means for driving the apron and rolls of each successive unit at a greater

speed than those of the preceding unit, and means for driving the rolls of each unit at a greater speed than that at which the apron of that unit is driven.

- 5 7. A machine of the class described comprising a plurality of units each consisting of an endless conveyor apron and twist-folding devices and presser rolls cooperative therewith, means for driving the apron and
10 rolls of each successive unit at a greater speed than those of the preceding unit, means for driving the rolls of each unit at a greater speed than that at which the apron of that unit is driven, means for so mounting
15 a series of the twist-folding devices cooperative with their respective aprons that they will effect their twist-folding action all in

one direction, and means whereby the said twist-folding devices may be adjusted laterally with respect to and in cooperation with 20 the conveying surfaces of said aprons.

8. A machine of the class described, comprising a plurality of conveying aprons, a plurality of twist-folding devices cooperative with such aprons and positioned for effecting a series of folds in like direction, 25 means for laying a non-elastic strip within the first fold, another twist-folding device associated with the final apron for effecting a fold in an opposite direction to that of the 30 other twist-folding devices, presser rolls for pressing the several folds, and means for driving said aprons and rolls.

MAURICE J. STACK.