Dec. 2, 1930. C. W. ELLIOTT 1,783,187

WOOD BENDING MACHINE

Filed March 11, 1927 2 Sheets-Sheet 1

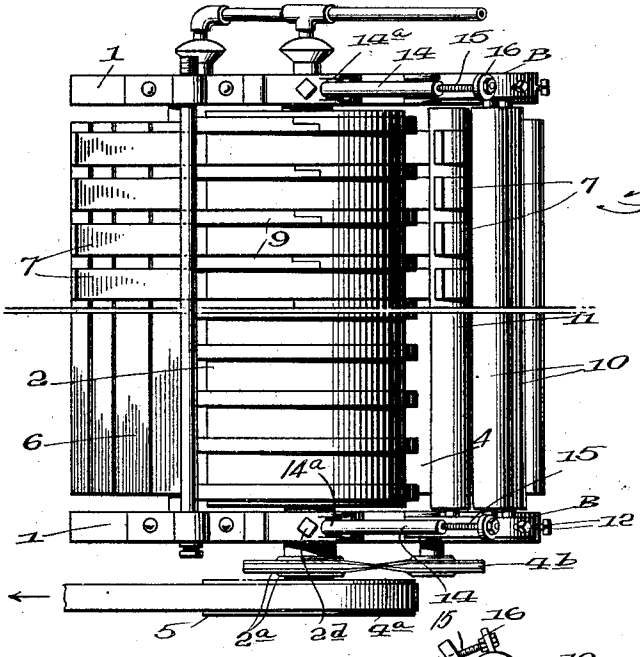


Fig. 1.

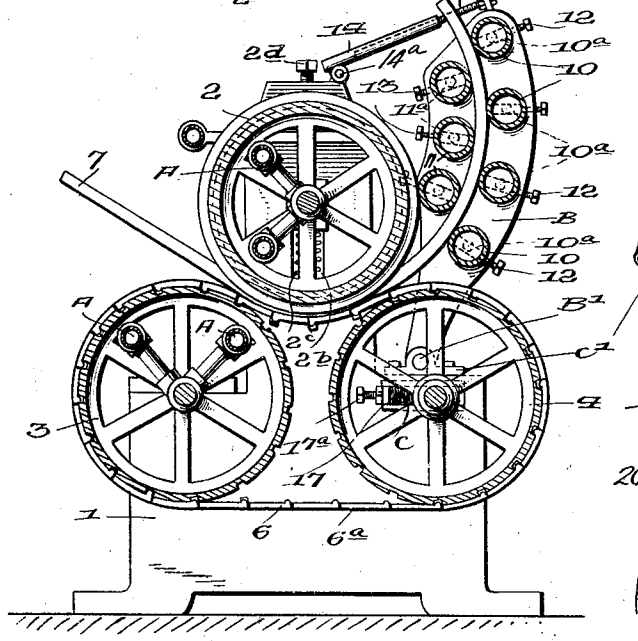


Fig. 2.

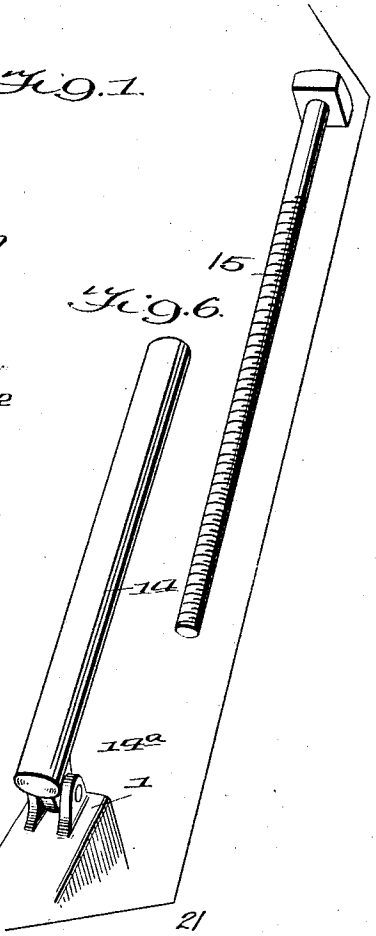


Fig. 6.

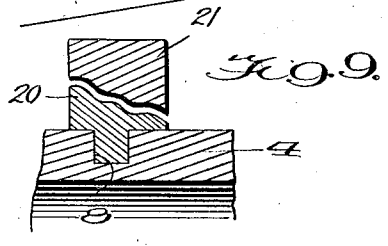


Fig. 9.

Inventor

Charles W. Elliott,

By Eugene E. Stevens.

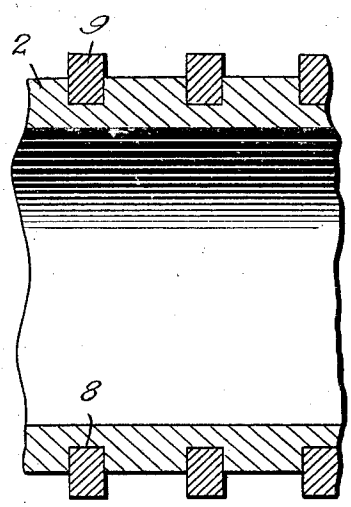
Attorney

Dec. 2, 1930. C. W. ELLIOTT 1,783,187

WOOD BENDING MACHINE

Filed March 11, 1927 2 Sheets-Sheet 2

Fig. 7.



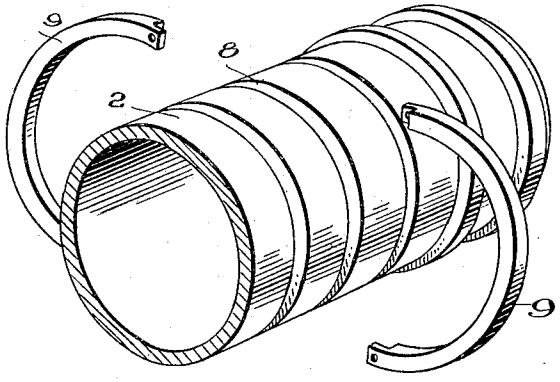


Fig. 4.

Fig. 8.

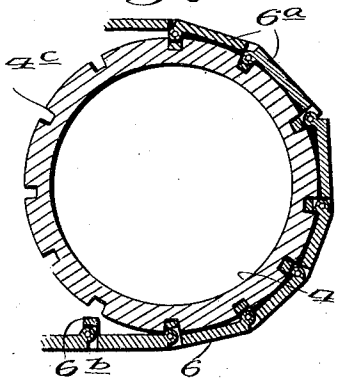
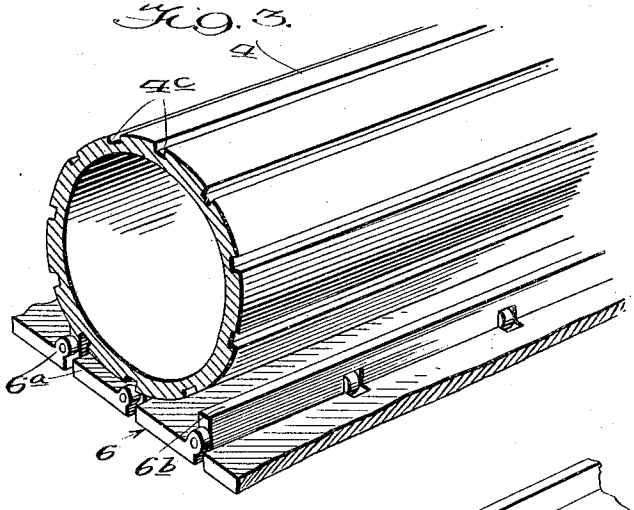


Fig. 3.



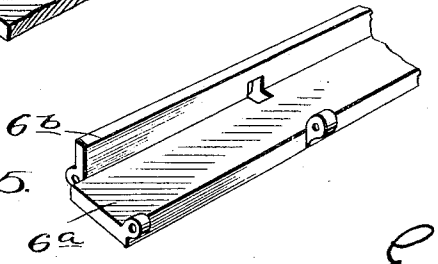


Fig. 5.

Inventor
Charles W. Elliott,
By Eugene E. Stevens.
Attorney

Patented Dec. 2, 1930 1,783,187

UNITED STATES PATENT OFFICE

CHARLES W. ELLIOTT, OF SEYMOUR, INDIANA

WOOD-BENDING MACHINE

Application filed March 11, 1927. Serial No. 174,533.

This invention relates to machines for bending wooden strips such as are used in the manufacture of orchestra and band drum shells, automobile wheel rims, chair rockers molding and the like.

It is my primary aim to generally improve upon prior patented and marketed machines of this class, but more particularly to improve upon my prior Patents Numbers 960,525 and 1,507,368.

Constant use of the patented machines specifically named has conclusively shown that they are objectional in several respects. First, it has been found that in bending comparatively thick strips, slight beads or fins are sometimes formed on the inner side of the curved product. Secondly, it has been noted that where the grain in the strip is irregular or embodies knots, the finished article would not be perfectly true in shape. Moreover, since the wood is subjected to a heating process during the bending operation, it frequently straightens out somewhat and the bent pieces are not uniform in curvature. Thirdly, with the machines of the prior art it is impossible to bend a piece of molding or other wooden material having a transversely beaded or curved surface running longitudinally thereof, owing to the fact that the bending rolls tend to flatten or damage such surface.

With these defects in mind, I have now evolved and produced an improved structure which entirely overcomes the objections, and upon considering the following description, the novel details and their relative arrangements, will become clearly apparent.

I would direct attention first to the accompanying drawings in which:

Figure 1 is a top plan view of a machine constructed in accordance with the present invention;

Figure 2 is a central vertical section;

Figure 3 is a perspective view of the traveling bed and its drive roller;

Figure 4 is a group perspective view of the adjustable presser roll and work confining rings, disassembled;

Figure 5 is a perspective detail view of a portion of one of the slats or bed sections;

Figure 6 is a group perspective view of the adjusting means of a work holding frame;

Figure 7 is a fragmentary longitudinal sectional view through the adjustable presser roll and showing the work confining strips in place;

Figure 8 is a cross sectional view through the bed driving roller with the bed in place; and,

Figure 9 is a cross sectional view of a modified work confining strip and a piece of molding, the strip being shaped to conform to the face profile of the molding to prevent injury thereto in the bending operation.

Referring now to the drawings in detail, it will be seen that the reference characters 1 designates a pair of duplicate supporting plates, which may, in practice be fashioned to rest upon an appropriate supporting table or the like. Mounted in suitable bearings for rotation between the side plates are three rollers 2, 3 and 4 respectively. As in the aforesaid patents, these rollers are arranged in triangular relation, the roller 2 being at the top, and the remaining rollers 3 and 4 being in opposed and spaced parallelism beneath. The shaft of the roller 2, which is adjustably mounted in the manner shown, is provided with a driving gear 5 deriving its power from any suitable source. Roller 4 is driven by a crossed belt 4^a from pulley 2^a on the shaft of roller 2 and trained over a pulley 4^b on the shaft of roller 4. Roller 3 is an idler. I have also shown the patented arrangement of piping A for conducting a heating medium into certain of the rollers. These parts are all old in the patents and do not constitute the novelty of the present invention.

The first improved detail to which I shall direct attention is the endless bed 6 which surrounds the two bottom rollers 3 and 4. This bed 6, which is composed of transversely extending and pivotally connected links or metal slats 6^a, is rather loosely mounted and is driven by roller 4 by means of depending slat portions 6^b designed to engage in longitudinal recesses 4^c in the roller 4. Thus, bed 6 moves with and conforms to the curve in which the strip of wood or work 7 is bent by the rollers in the manner indicated in

Fig. 2. I might state here that the bed may be of any width, either less than or equal to the width of the rollers. One solid bed may be used, or a number of individual beds may be employed according to the conditions confronted.

Next, the improved construction of the top roller 2 should be observed. As now constructed, it is provided with a plurality of longitudinally spaced peripheral grooves 8, these being intended to receive sectional work confining rings 9 as seen more plainly in Fig. 4. The rings are made in sections to permit easy application and removal, the sections being connected together in any conventional way. In practice, any number of bands or rings 9 may be used, and here I might point out that a separate bed 6 may be used in conjunction with each pair of rings, the bed being equal or preferably slightly greater in width than the spaces between each pair. Thus, with the aid of the bed 6, the work 7 may be adequately confined between a pair of strips 9 to prevent formation of the objectionable fins at the sides from the pressure exerted by the rolls.

It has been theretofore stated that means is embodied in the improved structure to maintain the desired curvature of the wood after it has passed between the main rollers. While this means may be of some other design, it preferably comprises a pair of arms B pivoted as at B′ to ears formed upon the caps C′ of the bearings C at either side of the machine and which support the shaft of roller 4.

Each of the arms B has two longitudinally spaced series of spaced horizontal slots, designated at 10^a and 11^a respectively. Slots 10^a receive the journal ends of small work holding rollers 10 while slots 11^a accommodate the journals of similiar rollers 11. Set screws 12, 13 working through the outer edges of arms B and in slots 10^a, 11^a act as adjustable stops for the journals of the respective rollers 10, 11 so that the same may be located in a desired set position. It is understood, of course, that the work 7, on emerging from between the large bending rollers 2, 4, passes between the two sets of small holding rollers 10, 11. These rollers 10, 11 are so adjusted in spaced arcual series as to maintain the work 7 in the longitudinally curved form produced by the action of rolls 2, 3 and 4 and to prevent the work from straightening.

While the range of relative adjustment of holding rollers 10, 11 is ample to suit the curve of the work in most instances I provide an adjustable connection between plates 1 and arms B whereby arms B may swing inwardly or outwardly and be held in a predetermined set position. Obviously this, with the roller adjustment greatly increases the range or degree of curvature of the work that can be held by rollers 10, 11. The connection referred to comprises a pair of internally threaded tubular arms 14 pivoted to plates 1 as at 14^a and receiving threaded bolts 15 which extend through bearing ears 16 at the upper ends of the arms B. Adjustment is had by applying a wrench to the heads of bolts 15 and turning the same.

A heavy pressure spring 17, suitably housed in each slotted bearing C and adjusted by a set screw 17^a bears against each journal of roller 4 and tends to force the same away from roller 3, thus tending to maintain the bed 6 taut and against the work 7 which is disposed between the same and the roller 2. In other words the bed 6 will, during the operation of the machine, maintain its portion intermediate the rollers 3 and 4 in a true arcual form which will vary according to the curvature given the work thus avoiding injury thereto. As shown, the journal boxes of roller 2 are vertically slidable in slots 2^b and are floatingly supported by heavy coil springs 2^c. Setting of roller 2 to produce a desired curvature of the work is secured through set screws 2^d in a conventional manner.

Rollers 2 and 3 are preferably dry heated by longitudinally extending gas jets A, the details of which are immaterial, so far as concerns the present invention. The heated condition of rollers 2, 3 greatly facilitates the bending operation. However, in the absence of the bend preserving rollers 10, 11 the work in its heated state would tend to straighten out after passing from the heated presser rollers 2, 3. By the time the work has passed from between the sets of rollers 10, 11 it has cooled or set sufficiently to hold its shape.

Figure 9 illustrates a modified form of ring 20 designed for use in lieu of rings 9 when bending molding or other longitudinally beaded or ornamentally grooved material. The outer portion of ring 20 is shaped to exactly conform to the beaded side of the particular molding 21 to be bent so as to avoid flattening, chipping and damaging the same. In view of the interfitting or mating relationship of the contiguous faces of ring 20 and molding 21 lateral stresses will be distributed intermediate the side edges of the latter and there will be no tendency to form fins at the edges of the molding.

Of course there is no limit to the number of styles of beaded or ornamentally faced molding that can be bent, it only being requisite that a ring 20 be used that exactly matches the style of molding.

I claim:—

1. A wood bending machine of the class described comprising a plurality of rollers, bearings therefor, said rollers being spaced apart and arranged in triangular relation to permit the work to pass therebetween, the

uppermost roller being a driven roller, said upper roller having a plurality of longitudinally spaced grooves in its surface, and sectional work confining rings removably seated in said grooves.

2. A wood bending machine of the class described comprising a plurality of rollers mounted in triangular relation and spaced from each other to allow the work to pass therebetween, the uppermost roller having its surface grooved, work confining rings seated in the grooves, an endless work contacting band surrounding the lower pair of rollers, and means arranged opposite the upper roller for coaction with the free end portion of the work to maintain the curvature of the same after it has passed thru the triangularly disposed rollers, said means being adjustably mounted and in the path of travel of said free end portion.

3. A wood bending machine comprising a pressure roll, a former comprising a pair of spaced pressure rolls, a flexible belt trained over said spaced pressure rolls and comprising transverse slats, said slats having interconnecting bearings by their longitudinal edges and provided with a lateral cleat at one edge, one of said last-mentioned pressure rolls being driven and having longitudinal grooves adapted to receive said cleats to drive said belt, bearings for said last-mentioned pressure rolls, and means for adjustably positioning one of said last-mentioned pressure rolls to vary the contour of said belt beneath said first-mentioned pressure rolls.

4. In a wood bending machine comprising a coacting former and pressure roll, the combination of a circumferential surface area of said roll having an irregular profile adapted to engage a correspondingly profiled surface of a piece of work whereby through distribution of the lines of force in a plurality of directions between the sides of the work to prevent lateral spreading of the work under pressure.

5. In a wood bending machine comprising a coacting former and pressure roll, the combination of a plurality of peripheral rings carried by said roll, the latter having seating means for axially spacing said rings, said rings having their peripheries of irregular profile to engage a correspondingly profiled surface of a piece of work whereby through distribution of the lines of force in a plurality of directions between the sides of the work to prevent lateral spreading of the work under pressure.

In testimony whereof I affix my signature.

CHARLES W. ELLIOTT.