April 15, 1930. C. W. ELLIOTT 1,754,549

WOOD BENDING MACHINE

Filed July 8, 1927 2 Sheets-Sheet 1

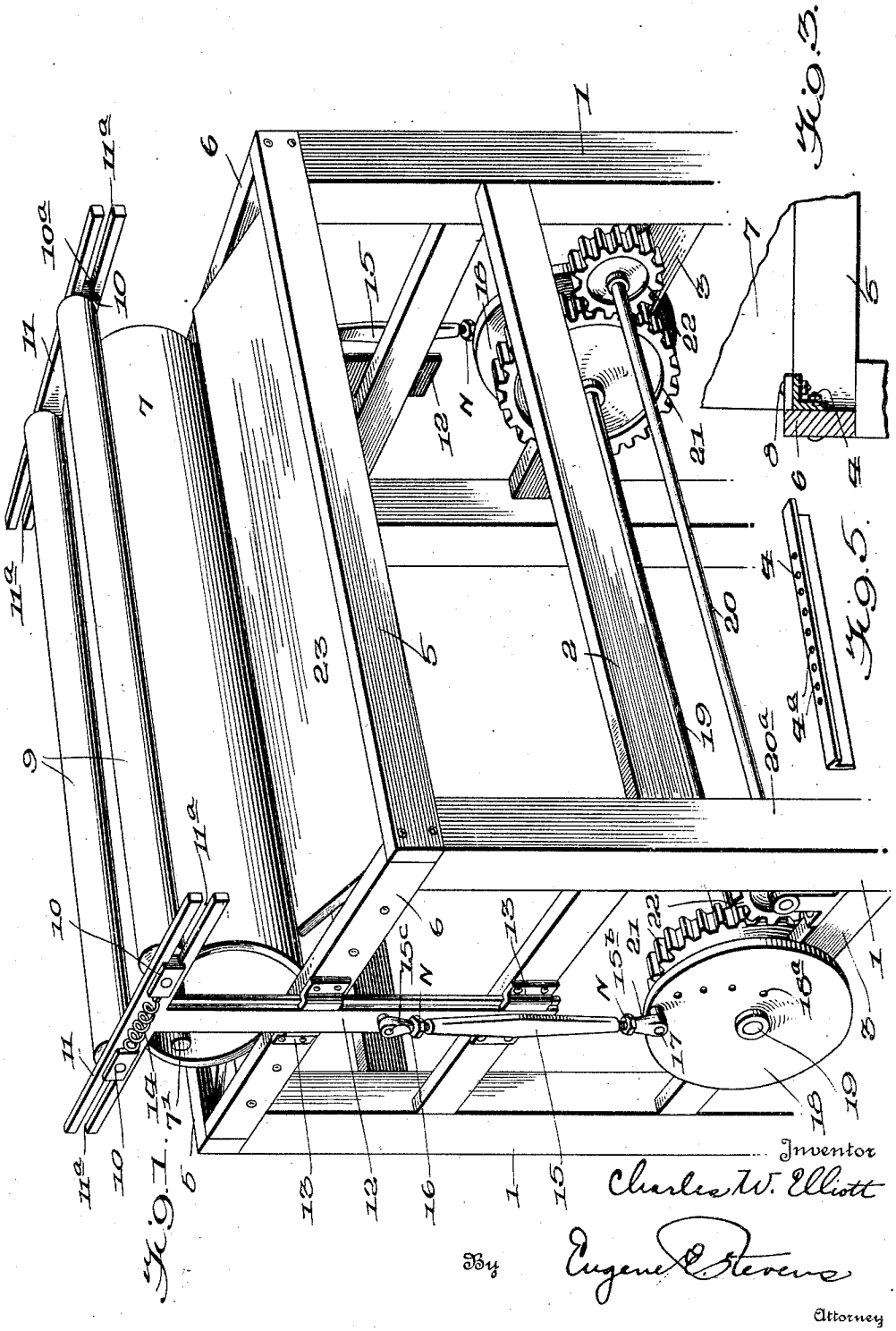

Fig. 1.

Fig. 3.

Fig. 5.

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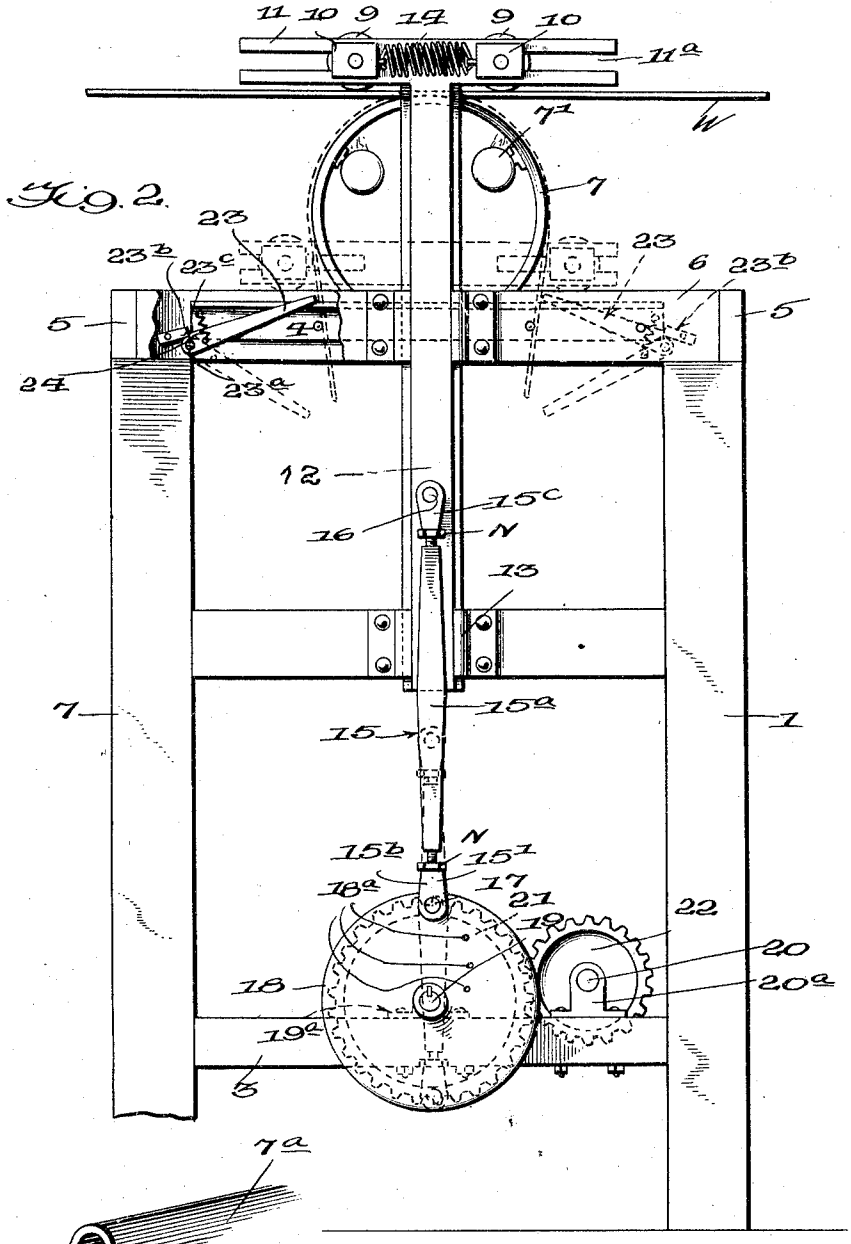

Fig. 2.

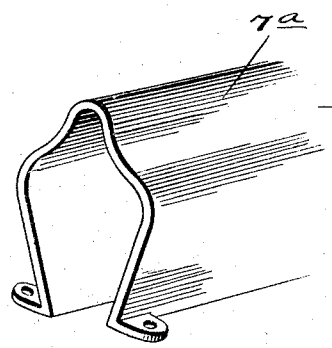

Fig. 4.

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WOOD-BENDING MACHINE

Application filed July 8, 1927. Serial No. 204,284.

My invention relates to improvements in wood bending machines, and is particularly designed for shaping the curved parts of chairs, sewing machine cabinets, radio cabinets and the like whereby the same may be readily produced in different designs and shapes,—it being understood, however that the invention is capable of other adaptations.

An important object of the invention is to provide a highly simplified machine of the kind stated requiring but a single operator,—and which will turn out work with far greater rapidity and facility than other machines of its class, regardless of the texture of the work.

A further object of the invention resides in the provision, in a machine of this kind, of a novel means whereby the same may be quickly arranged to bend material of different lengths into a variety of shapes.

The invention further contemplates a wood bending machine which incorporates an automatically operable means for engaging the work after it has been acted upon by the bending instrumentality and thereby holding it in the shape in which it has been bent, until it (the work) has had a chance to "set", so to speak.

The foregoing and other objects and advantages of the invention are attained by means of a novel combination and arrangement of parts,—to be hereinafter described and claimed,—and in order that the same may be better understood, reference is had to the accompanying drawings forming a part of this specification. The drawings illustrate the now preferred embodiment of the invention but it is to be understood that the same is capable of many changes and modifications without departing from the spirit and scope of the subject matter claimed.

In the drawings, wherein the same reference characters designate the same parts in all views,

Figure 1 is a perspective view of a machine constructed in accordance with my invention;

Figure 2 is an end elevation thereof, partly in section, and partly broken away;

Figure 3 is a detail cross-sectional view showing the means for attachment of the former to the frame;

Figure 4 is a detail perspective view of a different shaped former;

Figure 5 is a perspective view of one of the angle irons.

Referring specifically to the drawings, the machine comprehends a frame composed of legs 1 suitably connected by longitudinal bars 2, 5 and cross bars 3, 6 and having angle irons 4 secured to the inner faces of upper cross bars 6 to suppoort the longitudinally disposed former 7. The horizontal shelf portion of each angle iron 4 has a series of holes 4^a, through selected ones of which (depending on the size of the former 7) former-securing bolts 8 may be inserted.

In order that the work may be shaped to a desired predetermined form, a variety of different shaped formers may be mounted upon angle irons 4. Figure 1 illustrates a circular former 7 which is made of sheet metal and is co-extensive in length with the inside dimension of the frame,—although it may of course be shorter if desired. The former 7^a which is illustrated in Figure 4 is of a cross sectional shape to produce a peculiar curvature of the work,—as contrasted to the simple curve producted by former 7. Each former 7, 7^a is adapted to be heated by electrical or other heating elements 7′ which have been generally indicated in Figures 1 and 2. Thus the wood or other work W may be bent while in a dry state without the necessity of a preliminary steam or other fluid treatment.

In carrying out the invention, the wood or other work W to be bent is disposed over the former 7 and between the same and the bending rollers 9 as indicated in Figure 2. The bending rollers 9 are co-extensive in length with the former 7 and have their pintles journalled in bearing blocks 10 which are slidably mounted in the slots 11^a of the horizontal heads 11 of T-members whose vertical portions 12 are mounted for vertical sliding movement in guides 13 carried at either end of the frame. There are two bending rollers 9, as shown,—one at either side of the longitudinal axis of the former 7. The

adjacent end blocks 10 of the respective bending rollers are connected by a very heavy coil spring 14 which normally holds the said bearing blocks against the inner end walls of their slots 11^a. Figure 1 indicates that the top and bottom portions of bearing blocks 10 are longitudinally grooved as at 10^a so as to prevent lateral movement thereof in the slots 11^a of T heads 11.

As will be apparent from Figure 2, the work W is adapted to be bent about the former 7 by the downward movement of T members 11, 12,—the springs 14 being of sufficient strength to cause the bending rollers 9 to follow the outer surface contour of the former 7 and force the work thereagainst to give the work the same contour as the former. The means for effecting the simultaneous movement of the T members 11, 12 will now be described.

Each vertical T-member portion 12 has spacedly pivoted upon its outer face, as at 16, one end bearing of an extensible pitman 15 whose opposite end is pivoted as at 17 to a cam 18,—of which there are two, one at each end of a shaft 19 which is journalled in bearings 19^a upon cross members 3. As will be apparent from Figure 2, the lower ends of the T member portions 12 at the limit of their downward movement are spaced from the peripheries of the respective cams 18.

As shown, each pitman 15 comprises a rod section 15^a threaded at each end. One threaded end is adapted to take in an internally threaded offset sleeve portion 15′ of the bearing section 15^b and the other in the similarly offset sleeve of bearing portion 15^c. The length of the pitmen 15 can thus be varied in an obvious manner. Jam nuts N serve to bind bearing sections 15^b, 15^c in a set position. The pitmen may, of course, be of different constructions and made adjustable in other ways without departing from the spirit and scope of this invention.

The pivot pin or bolt 17 at the lower end of the pitman 15 may be located in any one of a number of cam holes 18^a which are spaced at varying distances from the center thereof. By adjusting the length of pitman 15 and locating its pivot pin 17 in different holes 18^a, the stroke of pitman 15 can be varied to conform to the particular size of work that may be used,—or to the shape of the particular former. For instance, when a short height former 7, 7^a etc., is used (or narrow work W), then the stroke of the pitman 15 and the consequent downward stroke of the T-members 11, 12 will necessarily be much shorter than otherwise.

Power is supplied to cam shaft 19 from a drive shaft 20 through two sets of gears 21, 22 located at opposite ends of the frame and inwardly of cross members 3, and upon which latter the shaft 20 is journalled in bearings 20^a. Shaft 20 may receive power from any external source.

Referring to Figure 1, and assuming that cams 18 are driven in a clockwise direction,—it is evident that the T-members 11, 12 will be drawn downwardly until the pivot pins 17 of pitmen 15 are at their low points of travel, and that subsequently the T-members will be actuated upwardly to their starting position, or until the pins 17 reach their highest points of travel. Before undertaking the bending of a particular piece of work the operator will adjust the length of pitman 15 and its lower pivot pin 17 so that the bending operation will be completed when the pivot pin 17 of the pitman reaches its lowest point.

In order to obviate the necessity of stopping the machine when the pitman pin 17 reaches its low point, so as to hold the work W in a bent state around the former 7 until it has "set", so to speak, to its new shape and will hold the same, I provide an automatic work holding means. This work holding means comprises a pair of panel-like prop members 23, one on either side of the former 7, and pivoted to the upper cross members 6 adjacent their outer ends as indicated at 23^a in any desired manner. Coil springs 24, or the like, may be availed of to normally actuate the prop members 23 upwardly to the position shown in full lines in Figure 2. Stop lugs 23^b engaging rear shoulders 23^c limit the upward movement of the prop members so that they cannot be disengaged from the work by the outward pressure of the latter.

In the down stroke of bending rollers 9 with their T-heads 11 the work W,—as suggested in Figure 2, engages the prop members 23 as its end edges move downwardly and inwardly under the influence of rollers 9, thus causing members 23 to be depressed to permit the inner edges of the same to engage the outer surface of the work as denoted in Figure 2. After the work has passed the inner edges of the prop members 23, their springs 24 cause them to assume the position shown in Figure 2 wherein they are shown propped against the sides of the work to hold it in bent position until it has had an opportunity to become set to shape. With the prop members 23 acting as aforesaid,—the cams 18 may be permitted to continue their rotation so that the T-members 11, 12 will be returned to their starting position leaving the machine ready for another piece of work W. When the work W has set sufficiently the prop members 23 are swung downwardly and the piece of work lifted from the former 7.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine of the class described comprising a frame, work bending means comprising a former carried by said frame, a movable element, one of said elements being

of the shape to which it is desired to make the work conform, means for actuating said movable element against the work and said other element whereby the work will be caused to conform to the form of said shaped element, and swingably supported work holding members having work engaging portions extended toward said former and lying in the path of movement of the sides of the work, means for yieldably supporting said work holding members with their ends disposed toward said former, and the sides of the work moving under the influence of said movable element pushing the ends of said work holding members aside whereby said yielding means may actuate the same to engage the outer surfaces of the work to hold it in close contact with the former at the completion of the bending operation.

2. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of said former, bending rollers journalled between said supports at opposite sides of the frame, means for mounting said rollers in said supports for movement in a plane substantially at right angles to the movement of said supports, and means for actuating said supports to draw the work about the former under the influence of said rollers, the latter having yielding means causing them to follow a path conforming to the shape of the former.

3. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of the former, bending rollers journalled in said supports at either side of said former, and adapted for movement in a plane angularly disposed with respect to the plane of movement of said supports, yielding means normally tending to draw said rollers against the former in the movement of said supports whereby to draw the work against the former to give it the shape of the latter, and means for actuating said supports.

4. A machine of the class described comprising a frame, a former removably mounted upon said frame,—T-members slidably carried by said frame at either end for movement transversely of the axis of said former, rollers slidably journalled in the heads of said T-members for lateral movement and positioned at either side of said former, spring means for drawing said rollers against said former in the sliding movement of said T-members whereby to confine the work between the rollers and the former and cause the work to assume the shape of the former, and a cam driven pitman for effecting a reciprocatory movement of said T-members.

5. The structure defined in claim 4, and means associated with said pitman for lengthening or shortening the stroke of said T-members.

6. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of the former, bending rollers journalled in said supports at either side of said former, and adapted for movement in a plane angularly disposed with respect to the plane of movement of said supports, means normally tending to draw said rollers against the former in the movement of said supports whereby to draw the work against the former to give it the shape of the latter, means for actuating said supports, and means independent of said supports and rollers for holding the work about the former after the action of the rollers, whereby the supports may be actuated to move the rollers away from the former and the work left thereon to set.

7. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of the former, bending rollers journalled in said supports at either side of said former, and adapted for movement in a plane angularly disposed with respect to the plane of movement of said supports, means normally tending to draw said rollers against the former in the movement of said supports whereby to draw the work against the former to give it the shape of the latter, means for actuating said supports, and means actuated in the work-bending movement of said rollers for holding the work about said former when the bending operation is completed and the rollers withdrawn therefrom.

8. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of the former, bending rollers journalled in said supports at either side of said former, and adapted for movement in a plane angularly disposed with respect to the plane of movement of said supports, means normally tending to draw said rollers against the former in the movement of said supports whereby to draw the work against the former to give it the shape of the latter, means for actuating said supports, and yielding means disposed in the path of movement of the work in its movement under the action of said rollers to a position about said former, said yielding means engaging said work for holding the same about said former whereby the rollers may be withdrawn and the work left to set to shape.

9. In a machine of the class described including a frame, a former and means for drawing the work about the former, a panel pivoted in the frame outwardly of and independently of the former and drawing means, and yielding means normally maintaining the

panel in a plane substantially perpendicular to the side of said former with its swinging end adjacent the same whereby such end of the panel will automatically engage the outer surface of the work when the same has been drawn about the former.

10. A machine of the class described comprising a frame, a former mounted thereon, supports slidably carried by said frame and movable transversely of the axis of the former, bending bars extending between said supports at opposite sides of the former, means for mounting said bending bars in said supports for movement in a plane substantially at right angles to the line of movement of said supports, means for actuating said supports to draw the work about the former under the influence of said bending bars and yielding means associated with the bending bars for causing them to follow a path conforming to the shape of the former.

In testimony whereof I affix my signature.

CHARLES W. ELLIOTT.