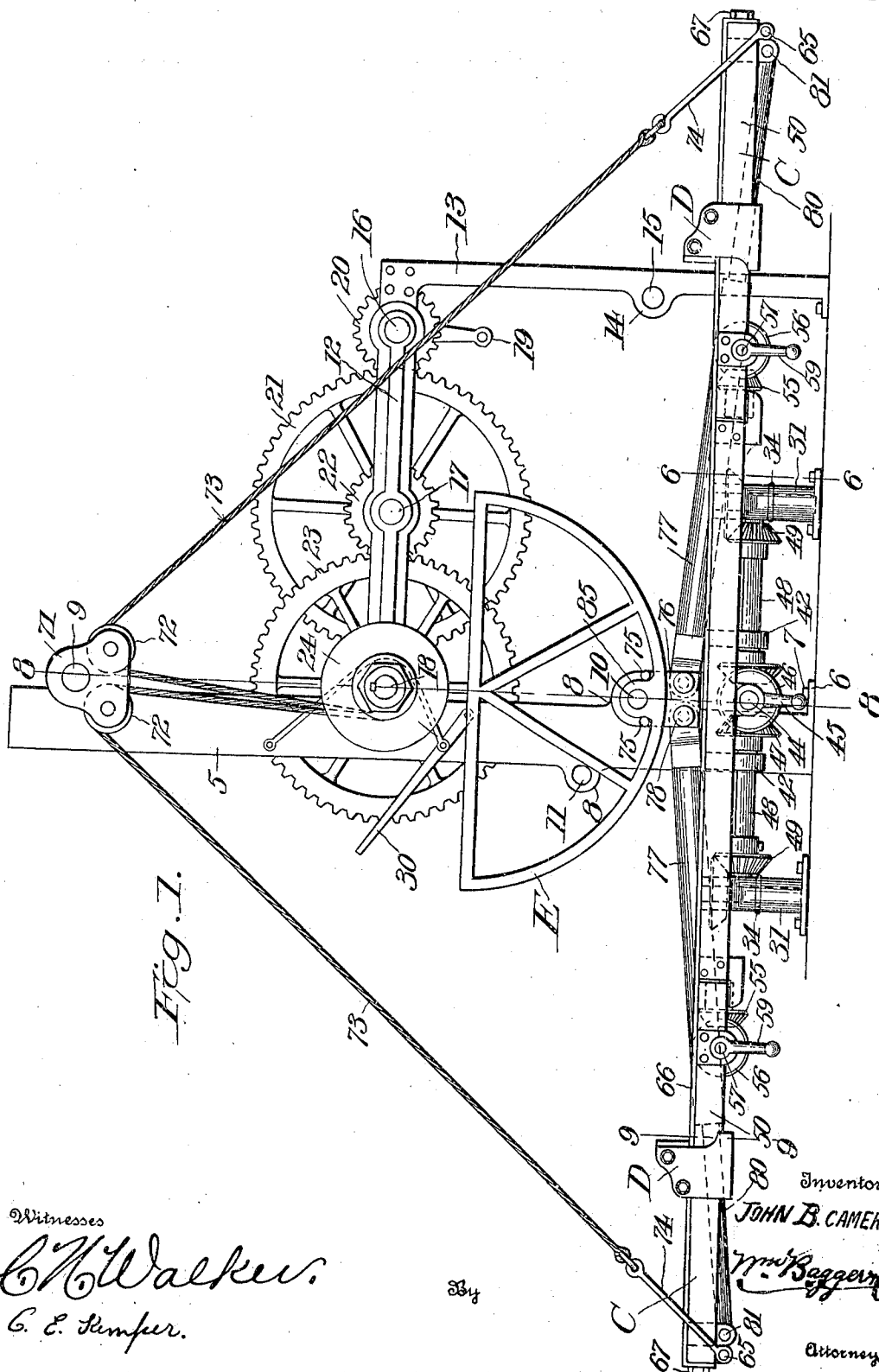


959,993.

J. B. CAMERON.
WOOD BENDING MACHINE.
APPLICATION FILED APR. 17, 1909.

Patented May 31, 1910.

5 SHEETS—SHEET 1.



Witnesses

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G. E. Rumpfer.

Inventor

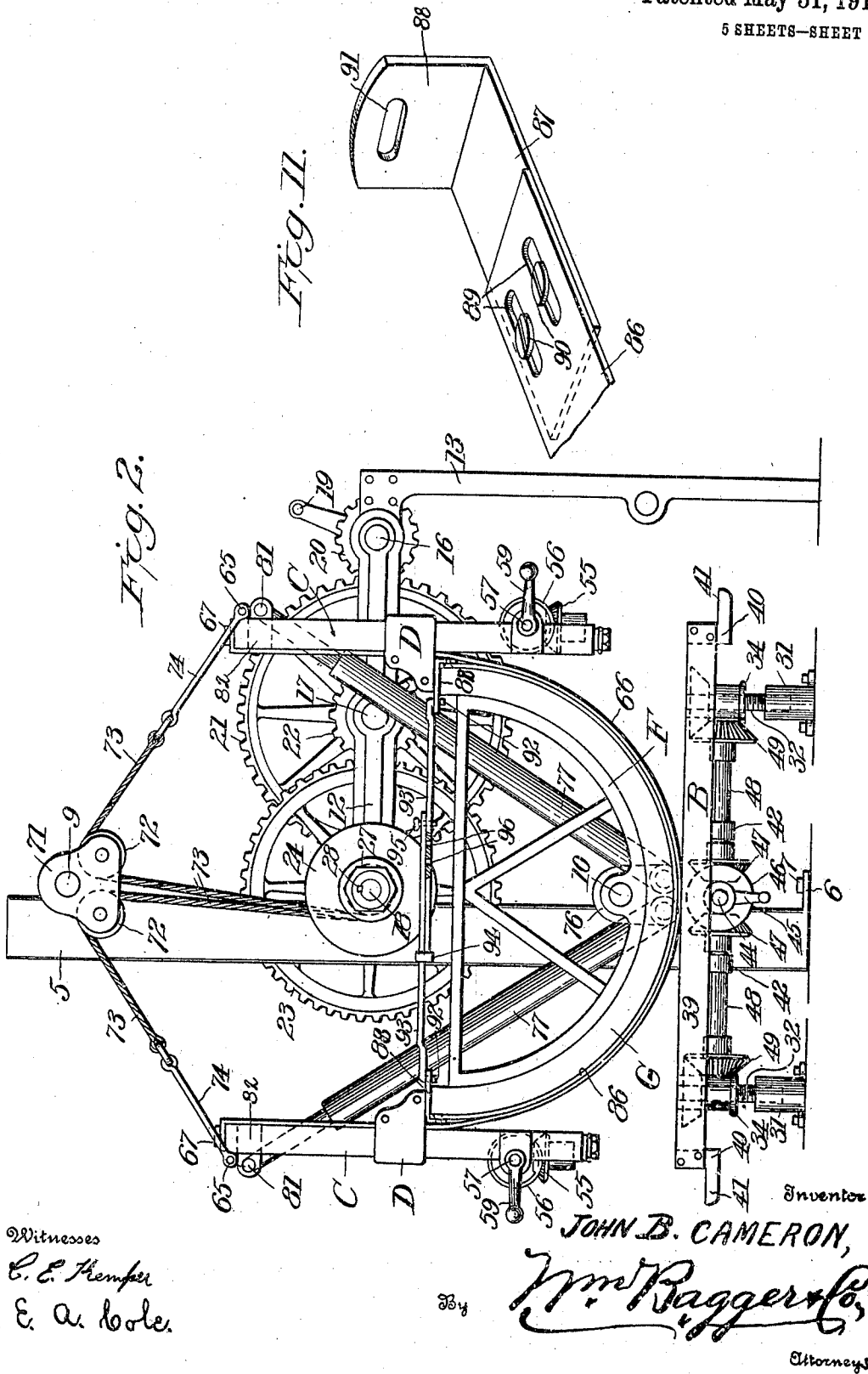
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APPLICATION FILED APR. 17, 1909.

5 SHEETS—SHEET 2.

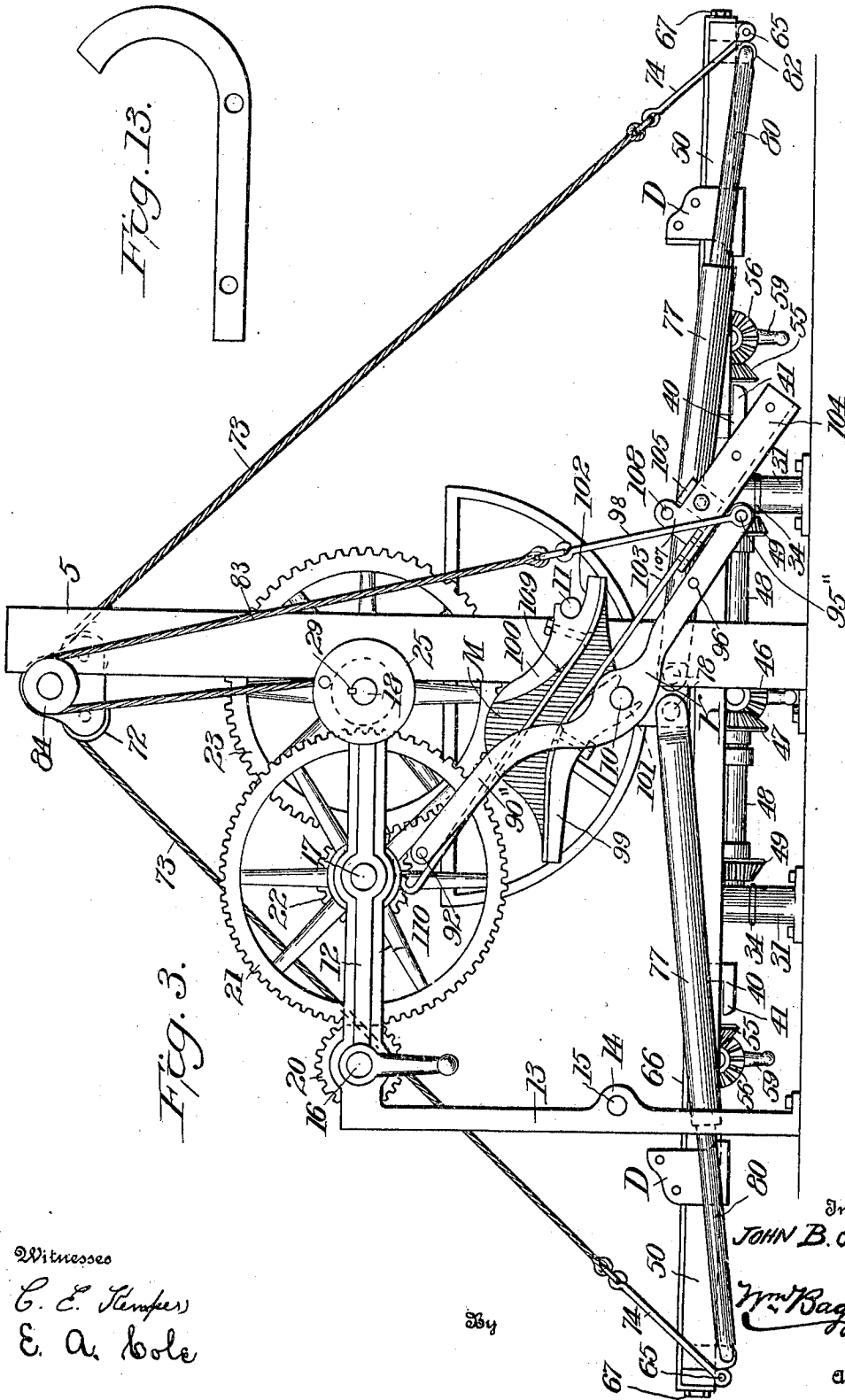


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5 SHEETS—SHEET 3.



Witnesses
C. E. Kemper
E. A. Cole

By

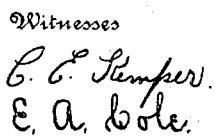
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959,993.

5 SHEETS--SHEET 4.



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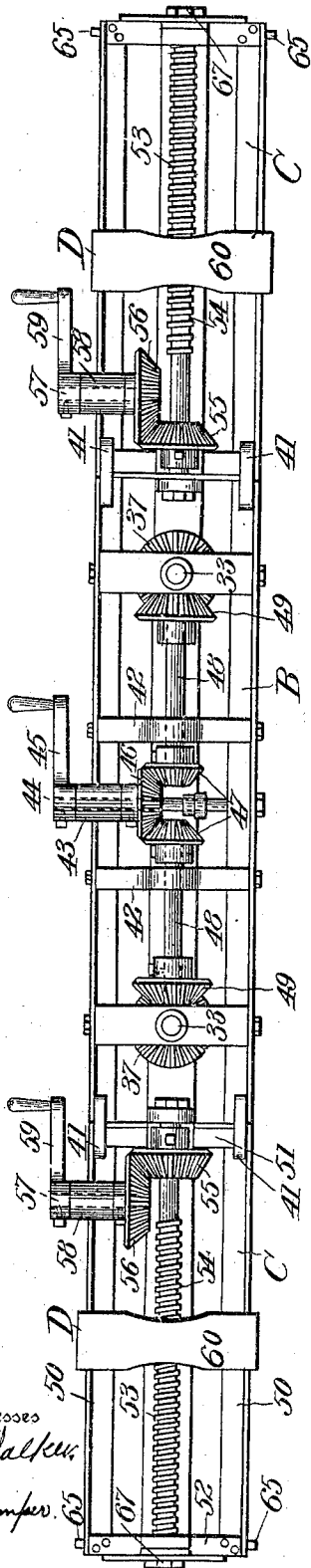
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5 SHEETS—SHEET 5.

Fig. 5.



Witnesses
C. H. Walker
C. L. Kumpfer

Fig. 6.

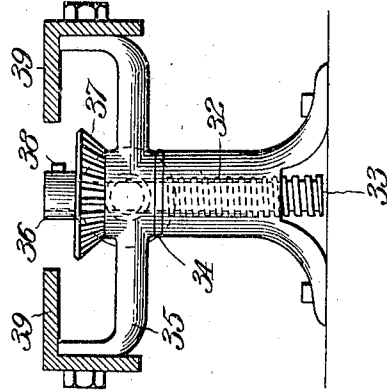


Fig. 10.

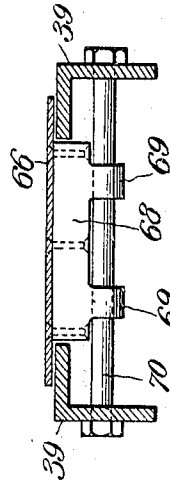
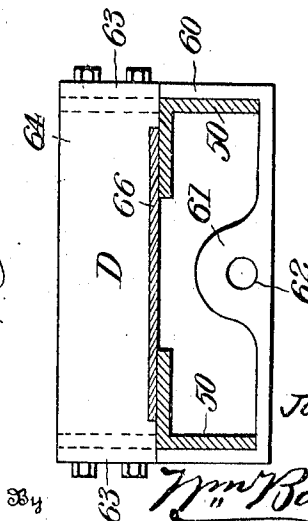


Fig. 12.



Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN B. CAMERON, OF LAWRENCE, MASSACHUSETTS.

WOOD-BENDING MACHINE.

959,993.

Specification of Letters Patent.

Patented May 31, 1910.

Application filed April 17, 1909. Serial No. 490,538.

To all whom it may concern:

Be it known that I, JOHN B. CAMERON, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Wood-Bending Machines, of which the following is a specification.

This invention relates to wood working machinery, and it has particular reference to an improved machine for bending and shaping wood for wheel rims, carriage poles, shafts and other similar purposes.

The invention has for its object to provide a machine of simple and improved construction which shall be primarily useful as a job shop or repair shop machine although obviously the use of the invention is in no wise limited or circumscribed.

Further objects are to simplify and improve the construction and operation of this class of machines and to provide an apparatus which shall possess superior advantages in point of simplicity, durability and general efficiency.

With these and other ends in view which will readily appear as the nature of the invention is better understood, the same consists in the improved construction and novel arrangement and combination of parts which will be hereinafter fully described and particularly pointed out in the claims.

In the accompanying drawings has been illustrated a simple and preferred form of the invention; it being, however, understood that no limitation is necessarily made to the precise structural details therein exhibited, but that changes, alterations and modifications within the scope of the invention may be resorted to when desired.

In the drawings—Figure 1 is a side elevation of a wood bending machine constructed in accordance with the invention, the machine being shown with a form for bending a wheel rim in position for operation. Fig. 2 is a side elevation showing the parts of the machine in the position assumed after bending the wheel rim into shape. Fig. 3 is a side elevation of the machine as seen from the opposite side, and showing, in position, a form for making a double bend. Fig. 4 is a detail view in elevation showing certain parts of the machine in the position occupied after shaping a piece of material to produce

a double bend. Fig. 5 is a bottom plan view showing the underside of the machine, parts of the frame being shown in section. Fig. 6 is a vertical transverse sectional view taken on the plane indicated by the line 6—6, in Fig. 1. Fig. 7 is a side elevation, partly in section, of one of the elements of the machine. Fig. 8 is a vertical transverse sectional view taken on the plane indicated by the line 8—8, in Fig. 1. Fig. 9 is a transverse sectional detail view taken on the plane indicated by the line 9—9, in Fig. 1. Fig. 10 is a sectional detail view illustrating the manner of connecting the flexible bending strap with the bed frame of the machine. Fig. 11 is a detail perspective view of one end of the flexible bending element used in this invention. Figs. 12 and 13 are modified forms of bending molds.

Corresponding parts in the several figures are denoted by like characters of reference.

The frame of the machine comprises a post or upright 5, which, in order to combine lightness with strength and durability, is preferably made of channel iron, said upright being provided at its lower end with a flange 6, for the passage of fastening means such as bolts 7, whereby it may be securely mounted upon a suitable base or upon the floor of the shop. The post 5 is formed with suitable ears or lugs 8, constituting boxes or bearings wherein shafts 9, 10 and 11 are supported for rotation, the shaft 9 being located near the upper end of the upright and the shafts 10 and 11 near the lower end of said upright and upon opposite sides thereof. A pair of laterally extending, approximately horizontal arms 12, 12, are bolted or otherwise suitably secured upon the front and rear sides or faces of the upright from which said arms extend in approximately parallel relation, the outer ends or extremities of said arms being connected with and supported by an upright 13, the lower end of which is bolted or otherwise secured upon the floor or base. The upright 13, which is preferably of channel construction, is provided with ears or lugs 14, constituting bearings in which a shaft 15 may be supported when desired; said shaft, however, is used only for special purposes and, when not in use, it may be readily detached. The arms 12, are constructed with boxes affording bearings wherein shafts 16, 17, and 18 are

supported for rotation; the shaft 16 being located near the outer extremities of the arms 12; the shaft 18, adjacent to the upright 5; and the shaft 17 in a position intermediate to the other shafts. The shaft 16 is equipped with a crank 19 whereby it may be conveniently rotated, and said shaft carries a pinion 20 meshing with a spur wheel 21, upon the shaft 17; the latter shaft also carries a pinion 22 meshing with a spur wheel 23, upon the shaft 18, which latter may thus be slowly rotated in such a manner as to develop a considerable amount of power.

It is obvious that the initial movement may be supplied manually but that, if desired, mechanical power of any description may be utilized in the working of the machine by applying such power in any suitable and well-known manner to any one of the shafts 16, 17 or 18.

The shaft 18, extends in front and in rear of the post or upright 5, and said shaft carries flanged sheaves or pulleys 24 and 25, which are loose upon said shaft but both of which are capable of being connected with said shaft for rotation by means of suitable clutch mechanism; thus the face of the pulley 24 is provided with a polygonal or non-circular recess 26, adapted to receive a correspondingly shaped clutch member or collar 27, which is slidable upon the shaft 18, with which it is connected for rotation by means of a key or spline 28; for the purpose of locking the pulley 25 upon the shaft 18, a detachable key or spline 29 has been shown. It is desired to be understood, however, that clutch mechanism of any suitable well-known construction may be utilized for locking the pulleys 24 and 25 independently upon the shaft 18, so as to rotate with said shaft when desired. A simple brake mechanism has been shown which includes a brake lever 30, which may be actuated to check the rotation of the pulley 24, when desired; said brake mechanism being of any suitable well-known and approved construction.

Upon the floor or base, adjacent to the front side of the post or upright 5, are mounted standards 31, having internally threaded sockets 32, wherein jack-screws 33 are mounted for vertical movement. Upon each of the jack-screws 23 is shrunk or otherwise secured a collar 34, supporting a yoke 35 in which said jack-screws may freely rotate; the upper ends of said jack-screws being preferably deprived of threads so as to form upwardly extending cylindrical stems 36, upon the upper extremities of which bevel pinions 37, faced downwardly are secured by set-screws 38 or other suitable means; these bevel gears will serve to prevent upward displacement of the yokes 35; the latter are vertically adjustable by rotating the jack-screws 33 in their sockets.

Upon the arms of the yokes 35 are bolted a pair of angle-irons 39, the ends of which are spaced and connected by means of blocks 40 having lateral extensions that form supporting brackets 41. The under sides of the angle-irons 39 are provided with hangers 42 and a box or bearing 43 is suitably mounted upon the under side of the forward angle-iron 39, about centrally between the ends of the same. Supported for rotation in the box 43 is a shaft 44 having a crank 45 whereby it may be rotated; the inner end of the shaft 44 carries a bevel pinion 46 meshing with a similar bevel pinion 47, upon the inner ends of the shafts 48 which are supported for rotation partly in the hangers 42 and partly in suitable bearings formed for the reception of said shafts in the yokes 35, adjacent to which said shafts are equipped with bevel pinions 49 meshing with the bevel pinions 37 upon the upper ends of the jack-screws 33. It will be seen that by manipulating the crank 45 to rotate the shaft 44, the jack-screws 33 will be simultaneously rotated to effect any desired vertical adjustment of the yokes 35 and of the bed frame including the angle-irons 39 carried by said yokes. The bed frame of the machine which is designated B, and which includes the angle-irons 39, is provided at the ends thereof with extension members C, which are composed of angle-irons 50 disposed in parallel relation to form continuations of the members 39; the angle-irons 50 which constitute the front and rear sides of the frames or extension members C are spaced and connected at their inner and outer ends by means of blocks or castings 51 and 52, which are equipped with boxes or bearings for shafts 53, the greater portions of which are provided with screw threads, as shown at 54. The shafts 53 are provided near their inner ends with bevel pinions 55 meshing with similar bevel pinions 56 upon shafts 57 that are supported for rotation in boxes 58, upon the under sides of the forward angle irons 50; said shafts being equipped with cranks 59, whereby they may be rotated for the purpose of transmitting rotary motion to the screw-threaded shafts 53. Slides D are mounted for longitudinal movement upon the frames or extension-members C; said slides being composed of rectangular collars 60 that surround said frames or extensions and are provided with lugs 61, having threaded apertures 62, engaging the screw-threaded shafts 54; said collars 60 being provided with upward extending flanges 63, upon which angle plates 64 constituting abutments, are securely bolted or otherwise secured. The blocks or castings 51 that serve to space and connect the inner ends of the angle irons 50 which constitute the side members of the extension frames C, are adapted to rest and to be firmly supported

upon the brackets 41, extending from the blocks 40 at the ends of the bed-frame B; the castings 52 at the outer extremities of the extension frames, are provided with terminal lugs or trunnions 65.

The extension frames C, C, are connected with the main bed frame B, by means of a flexible strap 66, preferably made of steel, said strap being supported upon the upper sides or faces of the bed frame and the extension frames and provided at its ends with downturned flanges 67, that are securely bolted upon the terminal castings 52 at the outer ends of the extension frames, which will thus be securely supported against any tendency to drop; the inner ends of said extension frames being supported, as described, upon the brackets 41. The flexible strap 66, is secured intermediate its ends, about centrally between the ends of the bed frame upon a supporting block 68, which is fitted between the angle irons 39, and provided with downward extending apertured ears or lugs 69, for the passage of a bolt or fastening member 70, that extends through the depending vertical flanges of the angle irons; as will be best seen in Fig. 10 of the drawings. The flexible strap 66 is thus securely connected with the main bed frame, and it serves to support the extension frames or members C, C, in such a manner as to permit the outer ends of said extension members to be elevated, as will be hereinafter described.

The shaft 9, at the upper end of the post or upright 5 extends in front and rear of said upright and it carries upon its front end a hanger or bracket 71, in which a pair of guide wheels or pulleys 72 are supported for rotation. A pair of flexible elements such as ropes or cables 73, are securely fastened upon the flanges of the sheave or pulley 24, said cables being guided over the pulleys 72 and provided at their terminal ends with links or stirrups 74, that are mounted upon the lugs or trunnions 65 upon the blocks or castings 52 at the outer extremities of the extension frames C, which latter, as will be readily seen, by rotating the sheave 24 to wind the cables 73 thereon, may be raised or elevated to the position indicated in Fig. 2 of the drawings.

Suitably supported upon the shaft 10, adjacent to the front side or face of the upright 5, is a hanger E, which may consist of a suitable casting, provided upon its face with a pair of lugs or bosses 75. The casting constituting the hanger is provided with downward extending ears 76, upon which tubular arms 77, are pivotally supported by means of pins or bolts 78. Slidably mounted in the tubular arms 77, and forced in an outward direction from the latter by means of springs 79 coiled within said tubular arms, are extension arms 80 provided at

their outer ends with hooks 81 that are placed in engagement with apertured lugs or brackets 82, which are secured upon the sides of the extension arms C, near the outer extremities of the latter.

The mechanism which has thus far been described is utilized more particularly for the purpose of bending wood into semi-circular shape to form the rims of vehicle wheels; when double bends, or bends of a special nature are to be formed, I propose to avail myself of a flexible member such as a rope or cable 83, one end of which is attached to the flange of the sheave or pulley 25, upon shaft 18, said rope or cable being guided over a pulley 84, upon the rear end of the shaft 9 to the bending mechanism which will be presently more fully described.

The forms that are utilized for bending the wood to the desired shape are supported upon the shaft 10, adjacent to the front or rear sides of the upright 5, according to the work that is to be performed. The form F that is utilized for bending wheel rims is of the customary semi-circular shape, and is provided intermediate its ends with an apertured lug 85, whereby it is temporarily mounted or adjusted upon the shaft 10, the lugs or bosses 75, of the hanger E, serving to engage the form and to keep it from tilting when the machine is in operation. In connection with this form there is used a thin flexible strap 86, made preferably of steel plate, and provided at one or both ends with angle plates 87, having upward extending flanges 88, and provided with longitudinal slots 89 for the reception of screws or bolts 90, whereby said angle plates are adjustably connected with the body of the strap 86, which latter is thus made adjustable with regard to the length so that it may be used in connection with forms of different dimensions for the purpose of bending wheel rims of different sizes. In the drawings, the strip 86 has been shown as being provided with an adjustable angle plate at each end, but it may be provided with an adjustable angle plate at one end only, in which event, however, the opposite end of the strap will have to be bent to form a stationary or permanent flange to mate with the flange 88 of the angle plate at the opposite end of the strap. The flanges 88 are provided with slots or apertures 91, for the reception of hooks 92, formed upon rods 93, 93', one of which 93', is provided with a terminal loop 94 encircling a slidably engaging rod 93, the latter being provided with a set-screw 95, engaging any one of a plurality of apertures 96 in the rod 93' which latter may thus be adjustably connected with the rod 93.

In the process of bending a piece of wood, shown at G, into semi-circular shape, the flexible strap 86, is placed upon the bed

frame of the machine and the strip or blank G, is then placed and supported upon said strap; the angle plates 87 at the ends of the strip being adjusted so that the upward extending flanges 88 will abut upon the ends of the blank. By turning the crank of the shaft 44, vertical adjustment of the bed frame may be effected until the blank G is securely clamped between the bed frame and the under side of the form F, which latter has been mounted, as herein before described upon the shaft 10. The shafts 57 are now rotated by means of the cranks 59 to effect longitudinal adjustment of the slides D, until the latter bear or abut upon the angle plates 88 at the ends of the blank; the latter will thus be held very securely while the bending is in progress, said bending being effected by imparting rotary motion to the shaft 18 with which the sheave or pulley 24 has been previously connected for rotation, thus winding the ropes 73 upon the said pulley 24 with the result that the extension frames C, C, are gradually elevated thus forcing the blank G gradually into contact with the semi-circular form F throughout the entire periphery of the latter.

While the bending is in progress the spring actuated arms 80 will exert pressure in an outward direction upon the extension arms C, and hence upon the flexible bending strap, causing the latter to bear against the wooden blank very tightly, and forcing said blank to bend first at the center, while the extension arms C, C, are being gradually elevated, will be kept in a circular course, so that the blank will be caused to hook or engage the form very tightly and compactly, and causing it to assume precisely the required shape without the presence of kinks or irregular places. After the extension arms have been elevated to the required extent, that is to say, when the wooden blank has been brought into contact with the form F, throughout the length thereof, the locking device composed of the rods 93, 93', is placed in position to connect the angle plates 87 at the ends of the strap 86, as will be best seen in Fig. 2 of the drawings; the clutch mechanism connecting the sheave 24 with the shaft 18, may now be released, thus permitting the extension frames to drop to the initial position; while the extension frames are thus being restored to initial position the rotation of the sheave 24 may be retarded by means of the brake mechanism including the lever 30, and it furthermore will be seen that the spring actuated arms will assist in supporting the weight of said extension frames and related parts so that the restoration of said parts to initial position may be effected easily and gradually and without causing any shock or jarring to the machine.

The form K, which is utilized for making a double bend, as in the formation of certain

carriage poles, shafts and the like, consists of a frame comprising side members 90'', mounted in spaced relation on the shaft 10 and freely rotatable thereon. The frame members 90'' are connected near one of their ends by a cross-bar 92'', carrying a roller 93''; at the opposite end of the frame the side members 90'' are connected by a cross-bar 94'', the projecting ends of which form trunnions 95''; at a suitable distance from the cross-bar 94'' the side members 90'' are connected by an additional cross-bar 96'', and a supporting plate 97 is suitably attached to and mounted upon the cross-bars 94'', 96''.

The frame K, which constitutes the shaper is in practice mounted upon the shaft 10, and the cable or flexible member 83 is provided at its free end with links 98, constituting a stud whereby connection is made with the trunnions 95''. The form for making double bends also includes a mold M, consisting of a plate having suitable flanges 99, and 100, equipped with seats 101 and 102, adapted to be placed in engagement with the shafts 10 and 11 upon which the said mold will thus be supported in position for operation. The lower flange 99 carries a flexible strap 103 upon which is secured a rectangular box 104, composed of side members or flanges between which a block or abutment 105 is longitudinally adjustable; said block or abutment being secured in any of the various positions to which it may be moved by means of a transverse bolt 106; the side members of the box 104 are provided at their inner ends, proximate to the body of the mold M, with ears or lugs 107 having apertures 108 for the passage of a pin or bolt which may be used for the purpose of confining the end of the strip of material that is to be operated upon when the latter is adjusted between the flanges of the mold with one end abutting upon the block 105 which is adjusted according to the dimensions of the strip that is to be bent. Secured upon the upper flange 100 of the mold M is a flexible strap 109 having a terminal hook 110. This strap 109 is preferably of spring steel and is so attached to the flange 100 that it projects normally upward as shown in Fig. 3 when not in use. When it is desired to make a bend of this description it is simply necessary to insert the end of the wood to be bent in the space between the straps 103 and 109. The key 29 having been inserted so as to lock the drum 25 to the shaft 18, the crank 19 is then rotated. This winds the cable 83 on the drum 25 and rotates the frame just described on the shaft 10. As this takes place the roller 93 engages strap 109 near the hook 110 and causes the strap 109 to move downward so that the wood bar is carried down therewith. Meanwhile the lower end of the wood bar has been bent upwardly by the strap 103 so that the

entire piece of wood has been brought to the form shown in Fig. 4.

It is obvious that the forms E and M may be varied to suit varying conditions, as for instance, the forms shown in Figs. 12 and 13, may be bent by using molds suitable in shape to replace the forms E and M respectively.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

Having thus described the invention, what is claimed as new, is:

1. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned bars, springs holding the telescopic bars extended, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold.

2. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned bars, springs holding the telescopic bars extended, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold, said connection including a winding drum and cables leading from the drum to said rigid bars.

3. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned bars, springs holding the telescopic bars extended, elements slidably mounted on said bars and embracing the flexible member adjacent its ends to limit the length of the flexible portion of said member and control the position of the article thereon, means to hold said elements in adjusted position on the rigid bars, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold.

4. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned

bars, springs holding the telescopic bars extended, elements slidably mounted on said bars and embracing the flexible member adjacent its ends to limit the length of the flexible portion of said member and control the position of the article thereon, means to hold said elements in adjusted position on the rigid bars, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold, said connection including a winding drum and cables leading from the drum to said rigid bars.

5. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned bars, springs holding the telescopic bars extended, a support attached to said flexible member, mechanism to move said support to and from said mold, elements slidably mounted on said bars and embracing the flexible member adjacent its ends to limit the length of the flexible portion of said member and control the position of the article thereon, means to hold said elements in adjusted position on the rigid bars, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold.

6. In a device of the kind described, a frame, a mold supported thereon, a flexible member adapted to support an article to be bent, rigid bars attached to the ends of said member, telescopic bars pivoted to the frame and connected to the first mentioned bars, springs holding the telescopic bars extended, a support attached to said flexible member, mechanism to move said support to and from said mold, elements slidably mounted on said bars and embracing the flexible member adjacent its ends to limit the length of the flexible portion of said member and control the position of the article thereon, means to hold said elements in adjusted position on the rigid bars, a power shaft, and an operative connection between the power shaft and the ends of the rigid bars to move the same and cause the flexible member to conform to the mold, said connection including a winding drum and cables leading from the drum to said rigid bars.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN B. CAMERON.

Witnesses:

MAY A. CAMERON,
SAMUEL MAY.