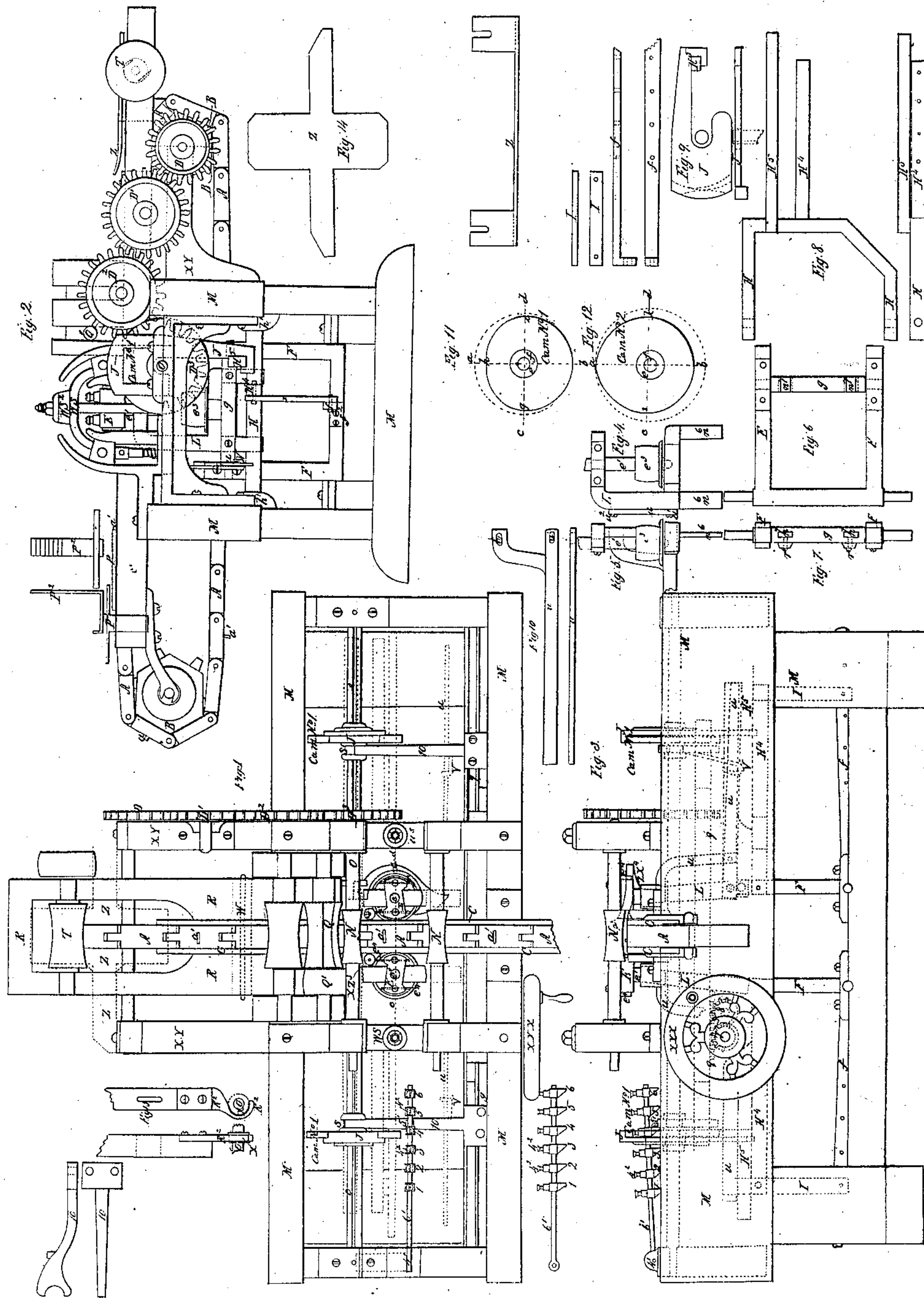


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Stave Machine,*

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# UNITED STATES PATENT OFFICE.

EDWARD HOLMES AND BRITAIN HOLMES, OF BUFFALO, NEW YORK.

## STAVE-MACHINE.

Specification of Letters Patent No. 31,169, dated January 22, 1861.

*To all whom it may concern:*

Be it known that we, EDWARD HOLMES and BRITAIN HOLMES, of the city of Buffalo, county of Erie, and State of New York, have invented a new and Improved Stave-Dressing Machine; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure I is a top plan view of our improved machine. Fig. II is an end elevation of the main frame of the machine, showing a side elevation of the endless revolving iron bed, and a portion of the working gear. Fig. III is a side elevation. Fig. IV is an elevation of the jointer frame. It has an oscillating and reciprocating movement, and supports the jointer shaft and jointers which dress one edge of the stave. It is duplicated for dressing the other edge of the stave at the same time. Fig. V is an end view of same. Fig. VI is an oscillating frame, which supports the jointer frame. This also has its duplicate. Fig. VII is a plan of the roller, which is a part of the oscillating frame, (Fig. VI.) The long tenons  $n^6$  of the jointer frame pass through the mortises  $n^7$  of this roller. Fig. VIII is a plan of the lever H, (which is of an irregular shape) and gives the jointer frame its reciprocating motion. Fig. IX represents a cam bearer, which rides upon the face of the cam, and is connected to the arm  $H^5$  of the lever H. Fig. X represents an adjustable lever ( $u$ ) which is connected to the jointer by means of screws  $n^2$ , (as shown in Fig. IV.) The screws pass through slots  $n^1$  and the lever is thereby made adjustable, so that it may be placed at any given angle. Fig. XI is a diagram of cam No. 1. Fig. XII is a diagram of cam No. 2. Fig. XIII represents the end of the movable frame (R,) which hooks onto the cam shaft. Fig. XIV represents a pressure plate under which the stave must pass when acted on by the cutter in the movable frame R.

We have devised two forms of cam which we use in our machine for dressing barrel staves, and which are constructed according to the following formulas.

For cam No. 1, 1st, draw two lines  $a-b$  and  $c-d$ , of any length and at right angles to each other. 2d, the intersection of these lines being a center, strike a semicircle there-

from of any given radius, which semicircle shall commence and terminate on one of the right lines first described. 3d, determine the throw of the cam, (*i. e.* the greatest variation which you desire the cam to make from a true circle as it revolves). Then at one half the distance of said throw, from the center of the semicircle already described and on the right line which said semicircle commences and terminates, make two opposite centers  $e$  and  $f$ . 4th, with the center  $e$  strike an arc  $g-h$  which commences at the termination of the semicircle on the line  $c-d$  and terminates on the right line  $a-b$ . 5th, now with the center  $f$  strike the arc  $h-i$ , which commences at the other termination of the semicircle on line  $c-d$ , and intersects the arc ( $g-h$ ) on line  $a-b$ . The semicircles and arcs thus formed, will give the outline form of the cam. 6th, now make a center at one half the diameter of the cam on the line  $a-b$ . Then make another center at one half the throw of the cam from the last mentioned center on the line ( $a-b$ ) toward the point ( $h$ ), or extremity of the shortest radii of the cam, and the center thus found will determine the center of the cam shaft.

For constructing cam No. 2, observe the 1st, 2d, and 3rd parts of the formula already given for constructing cam No. 1. Then with the center  $e$  and radius ( $e-k$ ), (equal to the radius of the semicircle, plus one half the throw of the cam) strike the arc  $j-k$ . Then with the center ( $f$ ) and same radius, strike the arc  $j-l$ . The arcs and semicircle thus made will give the outline form of the cam. Now make a center at one half the diameter of the cam on the line  $a-b$ . Then make another center on the line,  $a-b$  at one half the distance of the throw, from the aforesaid center and toward the semicircle. This last mentioned center will be the center of the cam shaft.

We use other forms of cams in our machine, which are adapted to dressing staves for butter firkins, pails, and tubs. We can also use cams adapted to irregular form work.

Characters of like name and kind refer to like parts in each of the figures.

A represents an endless revolving iron bed of jointed links. It revolves around two hexagonal toothed pulleys B, one of which is connected with a gear wheel which



determines the velocity of the cam shaft. It also revolves over a grooved table *c*, by which table it is supported as against the downward and lateral pressure of the staves while being dressed. This bed has a number of guide stops (*a'*) against which the end of the stave rests as it passes in to the jointers, as represented in Fig. II. These stops are so placed in the bed as to bear a definite and determinate relation to the position of the jointers, while in the act of jointing the stave, and they also bear a determinate relation to the velocity of the cam shaft—that is to say, the bed is divided into an equal number of parts or sections (more or less) and a stop is placed in each division, an equal distance from each other. The number of the stops will determine the number of staves, which can be carried to the jointers at one revolution of the bed. A line *c—d*, (Fig. I,) is drawn across the bed, from center to center of the jointer shaft, which is called the central line of cut. The gear wheel D determines the velocity of the cam shaft, and is so proportioned with reference to the number of its cogs, as that the action of the cam upon the jointer frame, will carry the jointer heads and jointers to their greatest distance apart, at that point when the middle of the stave is on the said central line of cut.

The clutch bar 10 is connected to the rack 9, as also to the hub of the cam as shown at *s*, (Fig. I,) so that it will move laterally with the cam, and at all times preserve the same relative position therewith upon the cam shaft. A hook V drops down from this clutch bar, and hooks on to the lever (*w*). This hook is made adjustable on the clutch bar, so that it may be raised or lowered for the purpose herein described. The lever (*w*) is also made adjustable at its connection with the jointer frame, as before described, so that it may be placed at any required angle.

The racks (9) are connected with pinions 7 and 8, and hence to the hand wheel X, Y, X, so that by turning the hand wheel the cams and clutch bars may be moved simultaneously in either direction on the cam shaft, as desired, and placed in any required position.

The cams No. 1 and No. 2, by means of the hanger or cam bearer J, are connected to the lever H so that the position of the cam (each being alike) on the shaft will determine the length of the acting leverage of H, and hence will govern the outward and inward movement of the jointers while jointing a stave—by which outward and inward movement of the jointers the bilge of the stave is determined. The lever (*u*), by means of its adjustments already described, may be set upon the required angle, to give the required width of stave.

The clutch bars and cams have a simultaneous lateral movement when being placed for dressing staves of different widths and bilge, each moves through an equal space, and hence the clutch bar, being connected to the lever (*u*) by the hook V, the angle upon which the lever *u* is placed will determine the distance the jointer heads will be moved to and from each other at each revolution of the cams, and hence the width to which the jointers will dress the stave will also thereby be determined.

The bevel angle upon which a wide or narrow stave is dressed will always be the same—that is to say, the bevel will bear the same relation to the radius of the circle, upon which the stave is dressed, whatever may be the width of the stave and whatever the diameter of the circle or size of the barrel in which the stave is to be used.

E and E, (Fig. I,) represent the jointer heads, which are supported upon their respective shafts (*e'*) in the jointer frame L, (Fig. IV.) The driving pulley on jointer shaft is shown at (*e<sup>3</sup>*) and the cutters or jointers at (*e<sup>4</sup>*). Long tenons *n<sup>6</sup>* are made on the ends of the posts of the jointer frame, which tenons pass freely into mortises, *n<sup>7</sup>*, in the roller (*g*) of the reciprocating frame F. These long tenons will allow the frame F to be raised or lowered, as may be necessary, in order to adapt the machine for dressing barrels of different diameter while the height and position of the jointer frame, remains the same. The set screws (*r*) will fix the tenons in the mortises at any point desired.

The pronged lever H, (Fig. VIII,) has journal bearings in the main frame, as shown at (*h'*), Fig. II. The lever *f* has a rigid connection to the journal piece of the frame F, as shown at *f<sup>2</sup>*, Fig. II. A short bar I connects the prong or arm H<sup>4</sup> of lever H to lever *f*. By means of a series of holes in each of these, the connection of the bar I to each may be changed as desired.

J, (Fig. IX,) represents a cam bearer, which rides on the face of the cam and rises and falls with the throw of the cam. It also hooks on to the arm H<sup>5</sup> of lever H, as shown in Fig. II, and hence the form of the cam, in the connection with the arrangement of the cam bearer, lever H, and frames F and L, is adapted to give the requisite movement to the jointers, in order to joint staves upon any required bilge and of any required width. This cam bearer may be made adjustable—*i. e.*, so that its length may be increased, or diminished, and thereby place the lever H upon different angles, which will have the effect to put the jointer in such different positions as required to dress staves to any given circle of barrel. A series of gages 1, 2, 3, &c., are arranged upon a bar 6', which bar is hinged to the main frame as shown at



4'. These gages, by means of the set screws 4<sup>2</sup>, are placed and fixed upon the bar at definite points, which points indicate the width of the stave when dressed. Each gage is  
 5 numbered with the width of the staves which it represents. By turning the hand wheel X, Y, X until the cam and clutch bar are moved so much as to bring the stop 5' in  
 10 contact with the gage representing the required width of stave, such movement will insure the proper arrangement and position of the several parts, so as to dress the stave to the required width bilge. M, main frame of the machine; N, feed and pressure rollers;  
 15 O, cam shaft; P, stave, as laid upon the revolving beds to be carried to the jointers, its end resting against the stops a'; D', D<sup>2</sup>, D<sup>3</sup>, series of gear wheels which communicate motion to the cam shaft; Q, cutter for  
 20 planing the outside surface of the stave; Q', pulley for driving the same; Q<sup>2</sup>, shaft of same.

R represents a movable frame which supports the cutter T, for the purpose of planing  
 25 the middle portion of the stave thinner than it is at the ends. The ends of this frame take the form of a hook, and hooks on to the cam X, which cam is placed on the cam shaft as represented at R<sup>2</sup> and X, (Fig. XIII.) The frame rests upon the pin or  
 30 bar W as a center upon which it has its oscillating movement. The cam X is so formed and arranged upon the cam shaft (O) with reference to the movement of the stave  
 35 through the machine that the cam will gradually lower the end of the frame containing the cutter, and bring it down to the stave so as to plane or chip out the middle portions of the stave, and then raise the cutter, so as  
 40 to leave the ends of the stave at their full thickness. Staves thus prepared will facilitate and render more easy the work of the cooper in springing the staves into form, when setting up barrels of the heavier kind,  
 45 such as beer barrels, &c. This device is not used for light work, and may be removed from the machine at pleasure.

Z, Fig. XIV, represents a pressure plate under which the stave passes when the cutter  
 50 is doing its work. It is connected to the lower frame X, Y, and is made adjustable thereon, for the purpose of accommodating it to staves of different thickness. The object of this pressure plate is to hold the stave  
 55 firmly to the cutter (T) while the cutter is doing its work.

Z X<sup>2</sup> represents a yielding pressure bar, which bears upon the rough edge of the  
 60 stave forward of the jointers, to prevent the jointers from splitting or slivering the timber.

X, Z<sup>3</sup> represent a pressure roller, which bears upon the smooth or dressed edge of  
 65 the stave in rear of the jointers for the purpose of imparting a more smooth and glossy

finish to the edge of the stave, (and also for the purpose of steadying the jointer head and preventing any vibration of the jointers.)

W S represent a circular pressure bar, its ends bearing upon the journal boxes of the  
 70 pressure roller, N.

P<sup>2</sup> is an overhanging adjustable gage, which is sufficiently elevated above the bed and stave to allow the rough edge of the  
 75 stave to pass under the gage. The inner face of this gage is set in line with the cutters, in one of the cutter heads when dressing the widest part of the stave, so that the operator can by his eye determine how much  
 80 to pass the stave under the gage, in order to insure a perfect dressed stave upon both edges.

Operation: Our machine is adapted to dressing barrel staves of every description, differing in lengths, widths, and bilge, and  
 85 of any required bevel. It is also adapted to dressing staves for butter firkins, pails, wash tubs, &c. Either form of cam herein described may be used when dressing barrel staves. When the machine is used for dressing other  
 90 kinds of staves, we use cams upon the same cam shaft, and in the same arrangement of parts, but differing somewhat from the cams herein described, in their outline form. To  
 95 prepare the machine for dressing any required form of stave, move the revolving bed along until one of its stops (a'), is one half the required length of stave past the central line of cut. Then place the cam No.  
 100 1 so that its longest radii will stand perpendicular to and above the cam shaft, when the middle of the stave is on said central line of cut. If cam No. 2 is used, then place  
 105 it so that the center of the half circle described on the face of the cam, will stand perpendicular to and above the cam shaft when the middle of the stave is on the said  
 110 central line of cut. The action and effect of both forms of cams when thus placed, will be the same. Then put in a gear wheel (D,) which has the requisite number of  
 115 cogs to give the cam shaft such proportional velocity as to cause the cam (through the described arrangement of parts,) to move the jointers to their greatest distance apart  
 120 (i. e. the required width of stave) at such time as the bed has carried the middle of the stave to the said central line of cut. Then turn the hand wheel X, Y, X, so as to move the cam and clutch bar laterally on the  
 125 cam shaft, until the stop 5' shall meet the gage, which indicates the required width of stave. The machine will then be ready for operation, and will dress most perfectly the kind of stave for which it has been set. The  
 130 machine may in like manner be set for any kind of stave required.

The frame R and cutter T may or may not be used, according to the kind of stave  
 being dressed. The distance between the



stops  $a'$  on the revolving bed, must be equal to, or greater, than the length of the longest stave to be dressed. The number of stops, placed in the bed, will determine the number of staves which can be dressed at each revolution of the bed.

What we claim as our invention, and desire to secure by Letters Patent is:

1. The endless revolving iron bed, A, constructed of jointed links, and having stops ( $a'$ ), in combination with cams whose velocity must be increased or diminished, according to the length of the stave to be dressed.

2. The arrangement of the jointers in frame L, said frame being operated by levers, which have a connection to a cam, which cam has a horizontal adjustable movement upon its shaft, so that the revolution of the cam (through the arrangement of levers) will communicate a reciprocating movement to the jointers, for the purposes set forth.

3. The combination of the adjustable lever

$u$ , with the frame L and hook or rest V, for the purpose of giving different widths to staves, substantially as described.

4. The arrangement of the frame R, (including the cutter T,) with the other parts of the machine, substantially as herein described, so that the said frame will have a periodical movement, which will cause the stave to be dressed thinner in the middle portions thereof, than it is at its ends.

5. The arrangement of the gages 1, 2, 3, 4, &c., in combination with the lever  $u$  and rest  $v$ , for the purpose of locating the rest  $v$  in the proper place, to bring the lever  $u$  to its proper angle, to give the required width of stave.

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