(No Model.)

3 Sheets—Sheet 1.

G. MILLS.

STAVE JOINTING MACHINE.

No. 523,225. Patented July 17, 1894.

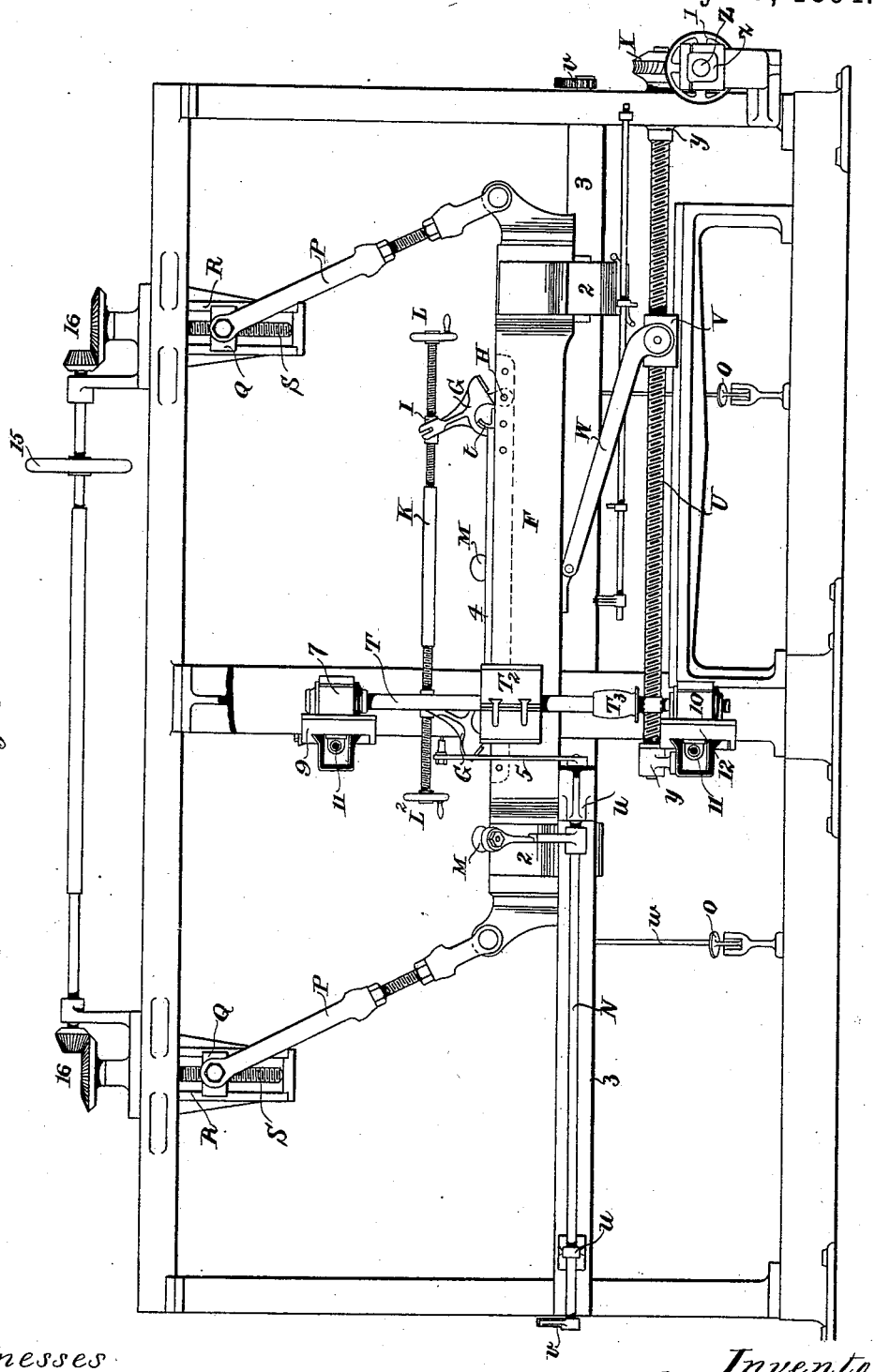

Fig. 1.

Witnesses
George Baumann
John Revell

Inventor
George Mills
By his Attorneys
Howson and Howson

(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

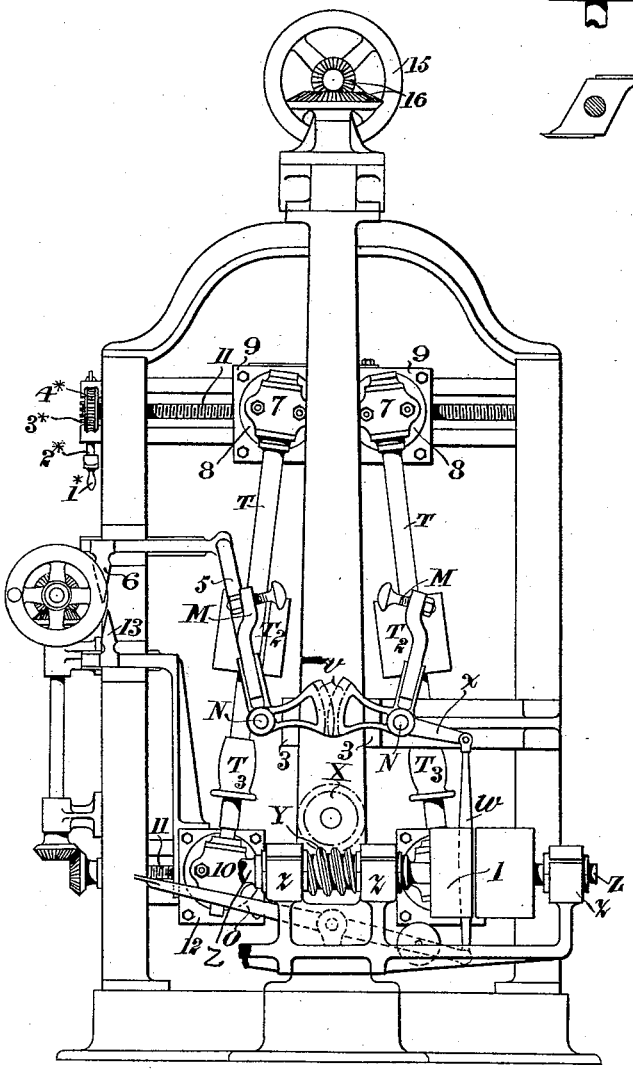

Fig. 4.

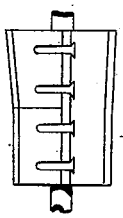

Fig. 3.

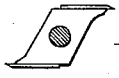

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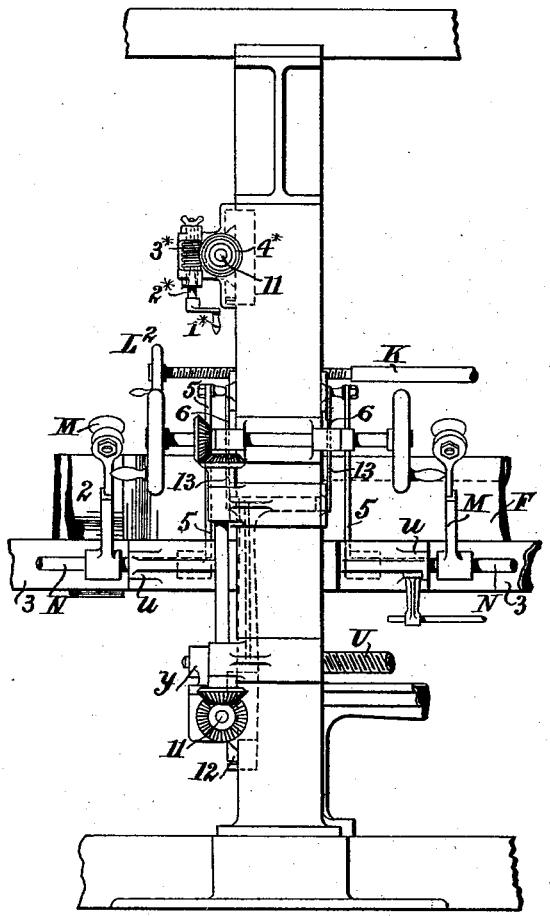
Fig. 5.



Witnesses
George Baumann
John Revell
George Baumann

Inventor
George Mills
By his Attorneys
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UNITED STATES PATENT OFFICE.

GEORGE MILLS, OF LONDON, ENGLAND.

STAVE-JOINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 523,225, dated July 17, 1894.

Application filed May 12, 1891. Serial No. 392,434. (No model.) Patented in England June 17, 1890, No. 9,404, and in Germany April 24, 1891, No. 61,967.

To all whom it may concern:

Be it known that I, GEORGE MILLS, cooper, a subject of the Queen of Great Britain, and Ireland, residing at Castor Street, West India Dock Road, London, in the county of Middlesex, England, have invented certain Improvements in Machinery for Manufacturing Casks or Barrels, (for which I have obtained Letters Patent in Great Britain, No. 9,404, dated June 17, 1890, and in Germany, No. 61,967, dated April 24, 1891,) of which the following is a specification.

My invention relates to improvements in machinery for jointing the staves of casks or barrels whereby staves of various sizes may be made by the same machine.

In the accompanying drawings Figure 1 is a sectional side elevation and Fig. 2 an end view of the jointing machine and Figs. 3 and 4 are a plan and a side view respectively of a cutter block for use in the jointer. Fig. 5 is a side elevation of part of the machine showing more clearly the mechanism for adjusting the position of the staves and cutters.

The blanks for the staves are first cut to the required length and are next "jointed," that is they have their edges beveled or shaped as required according to the size of the cask to be made. Each blank or rough stave is placed on a reciprocating table or support F, Fig. 1, and is held in position thereon by clamps G centered at H to the table F. These clamps carry at their upper ends swiveling nuts I in which work right and left handed screws formed on a spindle K provided at its opposite ends with hand wheels L L^2, by which the spindle may be rotated from either end. The ends of the stave bear against stops or abutment pieces *t* which are adjustable in position to suit staves of different lengths, the clamps G being also adjustable in position on the table F for the like purpose. The stave is correctly centered or adjusted in position on the table or support in the direction of its width by means of levers M carried on spindles N, Figs. 1, 2 and 5, arranged on opposite sides of the table and mounted in bearings *u* on the frame of the machine, the levers being fixed on the spindles in a position to bear on the opposite sides of the stave midway between its opposite ends when the table is in position to receive a stave.

The machine illustrated is designed to act on a fresh rough blank or stave at each reciprocation of the table and consequently a set of centering levers and spindles are provided at each end of the machine. The spindles of each pair are geared together by segments *v* and are turned in their bearings by means of a treadle O connected by a rod *w* to an arm *x* fast on one of the said spindles so that when this treadle is depressed a simultaneous partial rotation will be imparted to both spindles causing the upper ends of the levers M on each side of the machine to move equally toward each other and by pressing against the opposite sides of the blank at the center of its length force it into its correct central position on the table, in which position it is retained by turning the spindle K so as to cause the nuts I thereon to approach each other and thereby force the clamps G onto the ends of the blank.

The table F is connected at or near its opposite ends by rods or radius bars P to blocks Q which are capable of being raised and lowered as required in guides R by means of screws S according to the length of the staves to be jointed, the rods P being also if desired adjustable in length (as shown) for the same purpose.

The table F is moved to and fro between spindles T slightly inclined from an upright position and carrying the cutters T^2 which are driven at a high speed by bands passing around the pulleys T^3. The cutters T^2 act simultaneously on the opposite edges of blank secured on the table.

For jointing staves that are of uniform thickness throughout their length the cutting edges of the cutters T^2 are parallel to the spindle T but staves that are thicker at their ends than in the middle require the angle of the edges at the ends to be different to the angle on the thinner portions as these thicker ends cannot be so much pressed or rounded, when trussing, as the parts at the center where the wood is thinner, so that when trussed the joints throughout the whole length of the staves will be close. To produce this

difference in the angle on the edges of the staves the edges of the cutting blades are parallel to the spindle for a portion of their length to operate on the thinner portions of the staves, the other part of the cutting edges being at an angle to the spindle to operate on the thicker parts of the staves. Each cutter blade may be made in two parts as shown in Fig. 4, the angled portion being made in one piece and the parallel part in another piece.

The motion is given to the table F by means of a screw U mounted in bearings *y* in the frame of the machine and working in an internally screwed block or nut V connected by a rod or link W to the table F. The screw U is rotated by means of a worm wheel X fast on the outer end thereof and gearing with a worm Y on shaft Z mounted in bearing *z* on the frame of the machine and carrying fast and loose pulleys 1 driven by a strap or band from any suitable prime mover. As the table is being moved longitudinally it also receives a rising and falling motion by reason of its connection with the radius bars or rods P and is guided in its up and down motions on brackets 2 which slide with the table in its longitudinal movements on the bars 3 of the frame of the machine. The radius bars or rods P are so situated with reference to the cutter spindles T that when the cutters T^2 commence to operate on the blank, the table F is about its highest position (as shown on the right hand side of Fig. 1), the cutters acting simultaneously on both edges of the blank 4 so as to reduce its width at the end to the required extent. As the table F moves forward it is gradually lowered by reason of the change in the angle of the radius bars P so that the amount of wood cut away from the edges of the blank is gradually reduced (in consequence of the angular position of the cutters) from the end to the center of the length of the blank, by which time the table F will have traversed one half of its full stroke and the radius bars P will be vertical, consequently the table will be in its lowest position. When the table is in this position the edges of the blank are acted upon by the lower portions of the cutters which lower parts, in consequence of the angular arrangement of the cutter spindles, are farther apart than are the upper parts whereby only sufficient wood is removed from the center part of the blank to give the required bevel or angle. By the continued movement of the table the angle of the radius bars is again altered in the reverse direction, thereby causing the table F to be gradually raised so that the width of the blank is reduced from the center toward the end in the same proportion as it increases from the other end to the center, thus producing a stave of uniform shape from the center to the opposite ends and with edges having the required angle or bevel. The stave thus jointed is removed from the table and another blank placed in position, it being centered by means of the treadle O situated at the opposite end of the machine to that from which the table had moved.

If the blank is the same width as that previously operated on the motion of the table is reversed and the jointing effected as hereinbefore described, but if the blank be of a different width and as the angle or bevel of the sides of the staves required to be varied according to the width it is necessary to alter the angle of the cutters accordingly. In order to correctly adjust the cutters to produce the required angle or bevel on the stave I provide in connection with the centering mechanism hereinbefore described means for indicating when the cutters are properly adjusted. On one of the spindles N which carry the centering levers M is an arm 5 carrying a pointer 6 which is moved more or less, when centering a blank, according to the width of the blank so that when a blank of a certain width is centered the pointer 6 will be moved into a certain position. Casks of large size require the angles on the edges of the staves to be less acute than on the staves of small casks and in order to vary the angle as required, each cutter spindle T is mounted at its upper end in a plummer block 7 carried on a disk 8 fitted to turn on a stud projecting from a block 9 so as to admit of the angle of the cutter spindle being varied as required.

The blocks 7 are adjusted in position crosswise of the machine for the purpose of regulating the distance between the two cutter spindles to suit staves for different sized casks and to facilitate the proper adjustment of these blocks a scale may be marked on the frame to indicate when the blocks are in the correct position. The lower ends of the cutter spindles are also mounted in plummer blocks 10 capable of being adjusted in position in a similar manner to the blocks 7 to vary the angle of the cutters to suit staves of different widths. The adjustment of the position of these spindles may be effected by means of right and left handed screw 11 as shown or otherwise.

In connection with the sliding block 12 which carries the plummer block 10 is a pointer 13 which moves with the block when the angle of the cutter spindles are being adjusted and is so arranged with reference to the pointer 6 connected with the centering mechanism that when the two pointers coincide or are opposite each other the cutters will be in position to produce the correct angle on the edges of the stave.

The blank which has been jointed is removed from the table F and another blank is centered and fixed on the table, after which the cutter spindles are adjusted in position (if not already in the proper position which will be indicated by the pointer in connection with the centering mechanism as hereinbefore described) and the motion of the table is reversed, when the apparatus is required to joint staves of a different length the length

of the radius rods P must be altered and the blocks to which their upper ends are attached be correspondingly raised or lowered as required by means of the hand wheel 15 and the gearing 16.

The blocks 9 carrying the upper bearings 7 of the cutter spindles are also adjusted to the required position by means of a handle $1^{\times}$ fitted to a shaft $2^{\times}$ carrying a worm $3^{\times}$ which gears with a worm wheel $4^{\times}$ keyed on the right and left hand screw spindle 11 so that by turning the handle $1^{\times}$ in the required direction the distance between the cutter spindles T may be adjusted as required according to the width of the staves to be operated on.

In order to prevent the blocks 9 being moved from the position to which they have been adjusted for staves of a certain length the spindle which rotates the worm $3^{\times}$ is connected thereto so that it may be readily removed to prevent the worm being rotated.

I claim as my invention—

In a machine for jointing and shaping the edges of staves for casks or barrels, the combination of a table, adjustable radius arms by which the table is suspended and means for imparting to the table a to-and-fro motion, with levers on opposite sides of the table, gearing whereby the said levers are simultaneously operated to center the staves on the table and a pointer carried by one of the levers, cutters on opposite sides of the table, movable bearings for the spindles of the cutters above and below the table, mechanism to regulate the distance between the bearings below the table to adjust the angle of the cutters, and a pointer connected with this mechanism adapted to register with the pointer carried by the centering mechanism when the correct angle of the cutters to suit the width of the stave is reached.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE MILLS.

Witnesses:

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