

L. M. REED.

MACHINE FOR MAKING KEGS, BARRELS, OR CASKS.

(Application filed Jan. 28, 1901.)

(No Model.)

3 Sheets—Sheet 1.

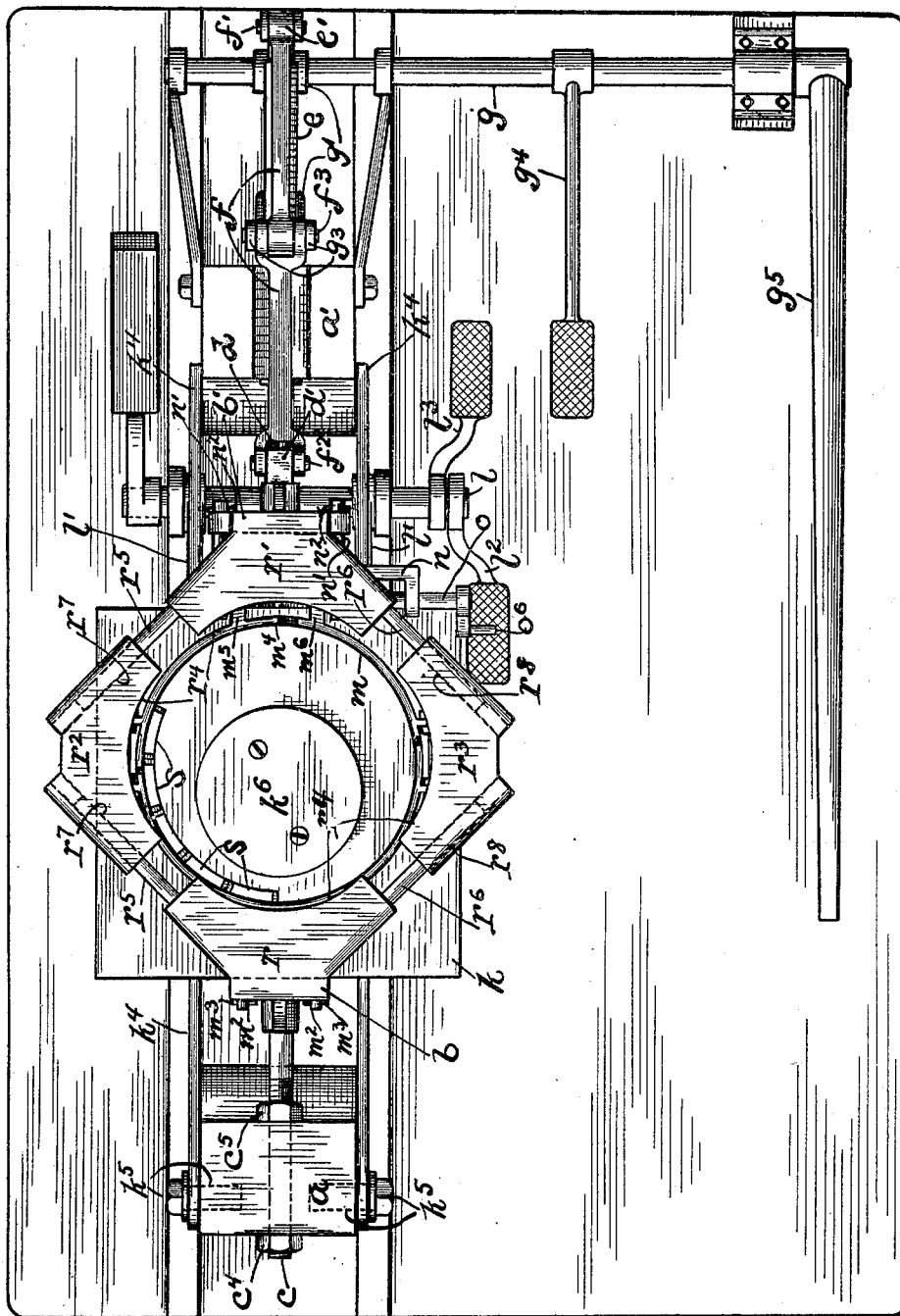


FIG. 1

WITNESSES:
Daniel E. Daly.
Victor C. Lynch.

INVENTOR
Simon M. Reed,
BY
Fyfe & Dorer
ATTORNEYS

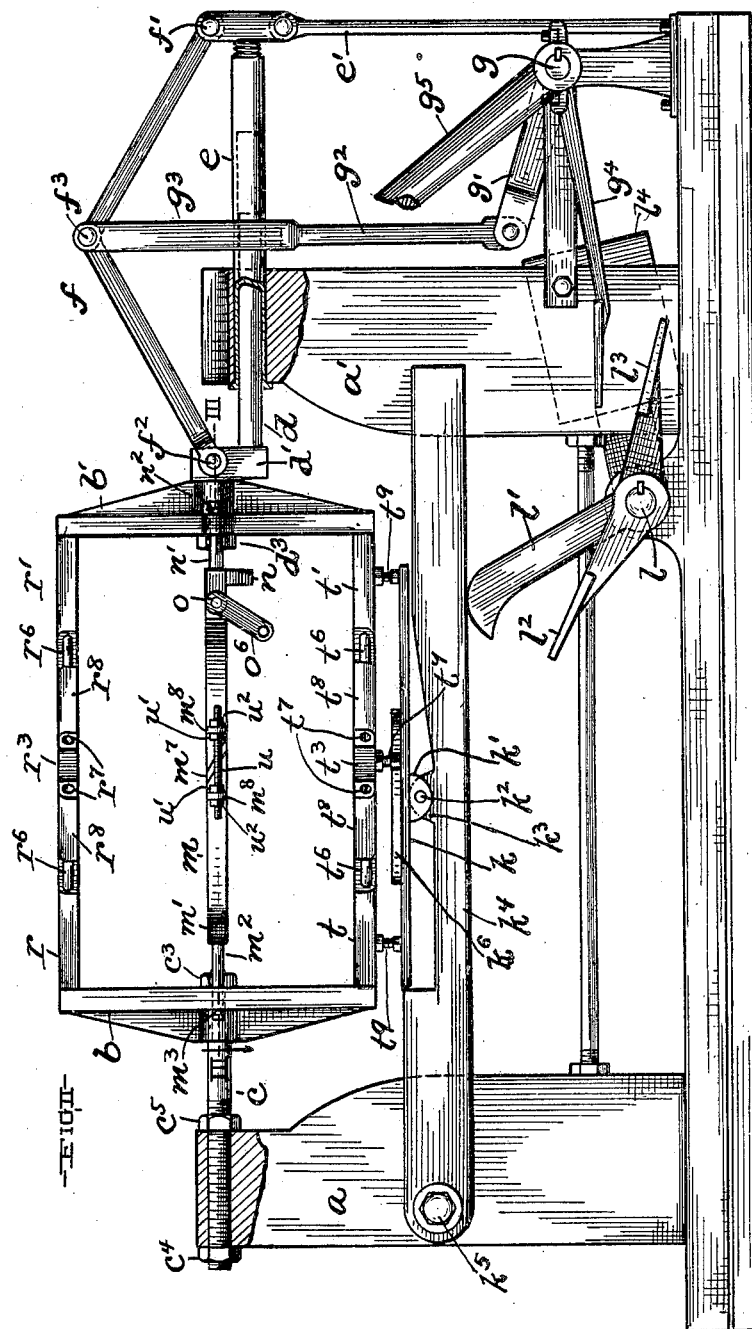
L. M. REED.

MACHINE FOR MAKING KEGS, BARRELS, OR CASKS.

(Application filed Jan. 26, 1901.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:
Daniel E. Daly.
Victor C. Lynch.

INVENTOR
Simon M. Reed
BY
Squire & Worey
ATTORNEYS

UNITED STATES PATENT OFFICE.

LEMON M. REED, OF CLEVELAND, OHIO.

MACHINE FOR MAKING KEGS, BARRELS, OR CASKS.

SPECIFICATION forming part of Letters Patent No. 676,914, dated June 25, 1901.

Application filed January 26, 1901. Serial No. 44,803. (No model.)

To all whom it may concern:

Be it known that I, LEMON M. REED, a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines or Apparatus for Making Kegs, Barrels, or Casks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in machines for making barrels, kegs, or casks comprising staves in the construction; and the invention pertains more especially to the type of machine disclosed in United States Letters Patent No. 411,300, granted to me September 17, 1889.

The object of this invention is to greatly simplify the construction of the machine, to produce a machine of the character indicated that requires less room, to render the machine more convenient in operating the same, to reduce the power required to operate the machine, to improve the work done by the machine, and to facilitate the discharge from the machine of the machine's product.

With this object in view and to the end of realizing other advantages hereinafter appearing the invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a top plan of a machine embodying my invention. Fig. II is a side elevation of the machine, and portions are broken away and in section in this figure to more clearly show the construction. Fig. III is a top plan in section on line III III, Fig. II. Fig. IV is an outer side elevation, partly in section, of one of the screw-rods u , the nuts u' and u'' , engaging the said rods, and the adjacent nut-bearing split portion of the ring or band m . Fig. V is an inner side elevation of that split portion of the ring or band m which is operatively connected with the double screw o and illustrates also the adjacent portion of the slide-forming frame n . Fig. VI is a top plan, partly in section, of a portion of the machine and shows in the main the position of the stave-clamping and stave-bending apparatus upon the

completion of the formation of the circumferential shell of a keg, barrel, or cask. Fig. VII is a vertical section on line VII VII, Fig. VI. Figs. IV and V are drawn on a larger scale than the remaining figures.

Referring to the drawings, a and a' designate two upright standards arranged a suitable distance apart laterally of the machine and connected together and rendered stationary in any approved manner. Between the upper ends of the standards a and a' are two vertically-arranged and parallel clamp-bearing heads b and b' , arranged a suitable distance apart laterally of the machine, between the standards a and a' , and capable of being oscillated or rotated together in a vertical plane. The left-hand head b is journaled or rotatably mounted (see Figs. I, II, and III) centrally between the upper and lower ends of the head upon the inner and diametrically-reduced end c' of a rod or bar c , which is arranged horizontally and extends easily through a correspondingly-arranged hole formed in and extending laterally through the upper portion of the left-hand standard a . The reduced end c' of the rod or bar c is screw-threaded externally, and the head b is loosely and rotatably mounted upon the said end c' , (see Fig. III,) between the annular shoulder c^2 , formed at the inner extremity of the said end c' , at the outer side of the head, and a correspondingly-threaded nut c^3 , mounted upon the said end c' , at the inner side of the head. Obviously the nut c^3 and the shoulder c^2 prevent displacement of the head b laterally of the machine, or, in other words, endwise of the rod or bar c , independently of the said rod or bar. That portion of the rod or bar c which extends through the standard a is screw-threaded externally, and two nuts c^4 and c^5 are mounted upon the said last-mentioned portion of the rod or bar c , at the outer side and inner side, respectively, of the said standard. Obviously upon turning the nuts c^4 and c^5 in the direction required to bring them into tight engagement with the standard a the rod or bar c is rendered stationary, and upon turning the said nuts in the opposite direction the said rod or bar is rendered free to be adjusted endwise to accommodate the adjustment of the head b inwardly or outwardly, as may be required.

The head b' is journaled or turnably mounted centrally between its upper and lower ends and in line with the axis of the head b upon a horizontally-arranged stud d^2 , which extends laterally of the machine through the head b' and is formed upon and projects inwardly from the inner side of a short upright arm d' , formed upon and projecting upwardly from the inner end of a slide-forming endwise-shiftable rod or bar d , which extends laterally of the machine from the outer side of the head b' toward the right-hand end of the machine at an elevation somewhat below the rod c into and has bearing in a slideway-forming stationary hollow bar e , which is supported at its inner end from the right-hand standard a' . The bar e is arranged in the main at the outer side of the said standard and is supported in any approved manner at its outer end from the upper end of an upright stationary rod or bar e' .

A toggle-joint f is arranged above and longitudinally of the rod or bar e and the slide d and is arranged with its axial line centrally between the upright e' and the inner end of the said slide and extending horizontally forwardly and rearwardly of the machine. The outer arm of the toggle-joint has its outer end pivoted horizontally by a pin f' , extending forwardly and rearwardly of the machine, to the upper end or head of the upright e' . The inner arm of the toggle-joint is pivoted horizontally by means of a pin f^2 , extending rearwardly and forwardly of the machine, to the arm d' of the slide d , and is consequently operatively connected with the head b' . The axial pin f^3 of the joint formed between the said toggle-arms extends forwardly and rearwardly through the upper end of a fork g^3 of a bifurcated upright rod or link g^2 , which establishes operative connection between the toggle-joint and an arm or lever g' , which is operatively mounted or formed upon a suitably-supported oscillating shaft g , which extends forwardly and rearwardly of the machine and is provided with a foot-lever g^4 and with a hand-lever g^5 for turning the shaft. Obviously when the rod or link g^2 is elevated by turning the shaft to the right the head-connecting end of the inner arm of the toggle-joint is moved nearer the outer end of the outer arm of the said joint, so as to move the connected head b' outwardly and farther from the head b , as shown in Fig. II, and the oscillation of the shaft g to the left shifts the head b' in the direction of the head b and reduces the room or space between the said heads.

The staves s employed in making the keg, barrel, or cask formed by my improved machine are placed in an upright position and assembled in the form of a circle upon a horizontally-arranged table k , provided at the bottom of and between the heads b and b' . Two vertically-tiltable and parallel bars k^4 and k^4 , extending laterally of the machine at the forward side and rear side, respectively, of the standards a and a' , are pivoted hori-

zontally and coincidently at their left-hand ends forwardly and rearwardly of the machine, as at k^3 , (see Figs. I and II,) to the standard a . Each bar k^4 (see Figs. II and VII) is provided centrally between the right-hand and left-hand edge of the table with an upwardly-projecting lug k^3 , to which is pivoted horizontally and forwardly and rearwardly of the machine, as at k^2 , a lug or lugs k' integral with and depending from the table k , and the axes of the pivots k^2 are of course coincident. A suitably-supported horizontally-arranged shaft l , which extends forwardly and rearwardly of the machine at the left-hand side of the standard a' , is operatively provided with two arms l' and l' , engaging the under side of the different table-bearing bars k^4 and k^4 , respectively. The shaft l is provided also with two oppositely-extending foot-levers l^2 and l^3 for oscillating or turning the shaft. Obviously the table k is lowered or elevated according as the shaft l is turned in the one or the other direction. The shaft l is provided also with a poise l^4 for counterbalancing the table-bearing bars k^4 and the latter's load, and thereby facilitating the operation of the shaft. It will be observed that the means shown and described for supporting and elevating and lowering the table k is exceedingly simple in construction.

The heads b and b' are provided at their upper and lower ends with devices for embracing the ends of the assembled staves externally and bending the said staves to form the circumferential shell of the resulting keg, barrel, or cask, and the said heads are provided centrally between the upper and lower ends with means for affording an external bearing for and externally clamping the bilge to be formed by the staves.

The means for affording bearing for the assembled staves externally between the lower and upper ends of the staves comprises, preferably, an annular metallic band or ring m , suitably supported from the heads b and b' and extending centrally around the space wherein the staves are arranged vertically and in a circular row.

The band m at the inner side of the head b (see Figs. III and VI) is suitably secured to or rigid with a slide comprising a laterally-shiftable block m' , which is arranged externally of the said band and has two outwardly-extending arms m^2 and m^2 arranged in a horizontal plane at opposite sides, respectively, of the axial line of the head b and extending through correspondingly-arranged slideway-forming holes b^2 , which are formed in and extend laterally through the said head. Each arm m^2 has its outer end provided with a pin or member m^3 , arranged to abut against the outer side of the said head b in the extreme inner position of the said slide m' and m^2 and limit the inward movement of the said slide.

The band m at the inner side of the head b' (see Figs. III, V, and VI) is supported by

a slide-forming frame n , which comprises two arms n' and n'' , arranged in one and the same horizontal plane at opposite sides, respectively, of the axial line of the said head b' , and each arm n' has its outer end provided with a pin or member n^2 , engaged by the outer side of the head b' , in the outer position of the said head, and constituting a stop for limiting the movement of the said head b' away from the head b . The band m , at the inner side of the head b' and preferably directly opposite and in line with the axial line of the said head, is split, as at m^4 , to render the said band expansible and contractible. The number of staves required to build the keg, barrel, or cask that is to be formed by the machine are placed vertically and side by side along the inner side of the band m . Several staves are shown assembled in Figs. II and III. The band m is of course expanded preparatory to the assembling of the staves, as shown in Figs. I, II, III, and V, so as to make ample room within the said band for easily receiving the required number of staves and affording an adequate external and lateral bearing for the staves. The split m^4 of the band m to permit the stave placed opposite thereof to have an adequate bearing against the said band extends circumferentially as well as transversely of the band—that is, diagonally of the band, as shown in Figs. III and V.

Means or mechanism for expanding the band m preparatory to the assembling of the staves and for contracting the said band after the assemblage of the staves and before the formation of the circumferential shell of the keg, barrel, or cask being formed comprises, preferably, a right-handed and left-handed or double screw o , arranged horizontally and extending forwardly and rearwardly of the machine at the inner side of the head b' and supported from the slide-forming frame n and being the medium through which the band m is supported from the said frame n . (See Figs. III, V, and VI.) The right-hand-threaded portion o' of the screw o is engaged by a correspondingly-threaded nut m^5 , formed upon the band m , at one side of the split m^4 in the said band, and the left-hand-threaded portion o^2 of the screw o is engaged by a correspondingly-threaded nut m^6 , formed upon the band m at the opposite side of the said split. The screw o , forward of its threaded portion, has bearing in two boxes n^3 and n^4 , which are arranged a suitable distance apart forwardly and rearwardly of the machine and formed upon the slide-forming frame n . The screw o is rendered stationary so far as endwise movement is concerned, and the means preferably employed for preventing endwise displacement of the said screw comprises a diametrical reduction, as at o^3 , of the rear end of the screw, the extension of the said end o^3 of the screw through an arm n^5 , which is formed upon the frame n and affords bearing for the said end of the screw and has a

snug interposition between the annular shoulder o^4 , formed at the inner extremity of the said reduced end of the screw at the inner side of the arm n^5 and the nut o^5 , mounted upon the screw at the opposite side of the said arm. The screw o is provided at its forward end with a crank o^6 for turning the same, and obviously the band m is expanded or contracted according as the said screw is turned in the one direction or the other.

As already indicated, Figs. II, III, and V of the drawings show the band m expanded, with the split m^4 of the band wide open, and consequently the band is there shown ready to receive the number of staves required to form the keg, barrel, or cask that is to be built, and when the required number of staves have been assembled in the manner hereinbefore described the screw o is turned in the direction required to close the said split m^4 or more nearly close the same, and thereby result in the contraction of the band m and in firmly binding the staves together circumferentially of the said band centrally between the lower and upper ends of the staves, as shown in Figs. VI and VII.

The table k is elevated preparatory to the assemblage of the staves, as already indicated, and has its upper side provided centrally with a plate or flat piece k^6 , which affords bearing for the head s' , (see Figs. II, III, and VII,) which is introduced from above into the shell, already partially formed by the assembled and clamped-together staves, next after the completion of the operation of the screw o , whereupon the clamping apparatus with which the upper and lower ends of the heads b and b' is provided is operated to draw and clamp the staves together at the upper and lower ends of the shell already partially formed by the staves.

The clamping apparatus with which the upper ends of the heads b and b' is provided comprises, preferably, a series of four clamping-jaws r , r' , r^2 , and r^3 , arranged in one and the same horizontal plane and approximately corresponding in their external contour, being provided each with an inwardly-facing edge r^4 , which has the curvature required to render it capable of reaching one-quarter or approximately one-quarter of the distance around the engaging portion of the keg, barrel, or cask being built upon the completion of the operation of the said jaws. The said jaws are arranged, therefore, equidistant or approximately equidistant apart around the space wherein the staves are placed vertically in a circular row. The jaws r and r' are formed upon and project inwardly from the upper end of the different heads b and b' , respectively, and are each provided with two inwardly extending and diverging slideway-forming arms r^5 and r^6 , with the arms of each of the said jaws arranged at right angles to the arms of the other of the said jaws and with the diagonally opposite arms of the said jaws parallel. The rearwardly-converging

rear arms r^5 and r^5 of the jaws r and r' engage correspondingly-arranged holes r^7 , formed in the slide-forming portions r^3 of the rear jaw r^2 , which is arranged at and between the rear
 5 ends of the side jaws r and r' . The forwardly-converging forward arms r^6 and r^6 of the jaws r and r' engage correspondingly-arranged holes r^7 , formed in the slide-forming portions r^3 of the forward jaw r^3 , which is arranged at
 10 and between the forward ends of the side jaws r and r' . The left-hand jaw r , being rigid with the head b , is of course stationary, and by the peculiar construction and arrangement of the remaining jaws and the peculiar arrange-
 15 ment of the slides and slideways connecting the rear and forward jaws with the right-hand and left-hand jaws a simultaneous and uniform inward movement of the rear and forward jaws is effected during the in-
 20 ward actuation of the head b' .

The construction, arrangement, and operation of the clamping apparatus with which the lower ends of the heads b and b' is provided is substantially the same as the con-
 25 struction, arrangement, and operation of the already-described clamping apparatus with which the upper ends of the said heads are provided, and, briefly described, is as follows: Two jaws t and t' are formed upon and pro-
 30 ject inwardly from the lower end of the different heads b and b' , respectively. Each of the said jaws t and t' is provided with two inwardly-extending and diverging slideway-forming arms t^5 and t^6 , with the arms of each
 35 of the said jaws arranged at right angles to the arms of the other jaw and with the diagonally-opposite arms of the said jaws parallel. The rearwardly-converging rear arms t^5 and t^5 of the side jaws t and t' engage cor-
 40 respondingly-arranged holes t^7 , formed in the slide-forming portions t^3 of the rear jaw t^2 , which therefore constitutes a sliding jaw mounted upon the said arms t^5 at and between the rear ends of the side jaws t and t' . The
 45 forwardly-converging forward arms t^6 and t^6 of the jaws t and t' engage correspondingly-arranged holes t^7 , formed in the slide-forming portions t^3 of the forward jaw t^3 , and correspond in relative arrangement to the rela-
 50 tive arrangement of the arms t^5 and t^5 . The jaw t^3 constitutes, therefore, a sliding jaw mounted upon the arms t^5 at and between the forward ends of the side jaws t and t' . The
 55 jaws t , t' , t^2 , and t^3 are arranged, therefore, in one and the same horizontal plane and approximately correspond in their external contour, being each provided with an inwardly-facing edge t^4 , which has the curvature required to render it capable upon the comple-
 60 tion of the operation of the said jaws of reaching one-quarter or approximately one-quarter of the distance around the engaging portion of the keg, barrel, or cask being built. The left-hand side jaw t , being rigid with the head b , is of course stationary, and by the
 65 peculiar construction and arrangement of the remaining jaws and the peculiar arrangement

of the slides and slideways connecting the rear and forward jaws t^2 and t^3 with the side jaws t and t' the said rear and forward jaws
 70 are simultaneously and uniformly moved toward and from each other, according as the right-hand side jaw t' is moved toward and from the left-hand jaw t ; but it is obvious that as the left-hand jaw is stationary the
 75 right-hand jaw must have a greater travel than the rear and forward jaws.

The lower series of jaws t , t' , t^2 , and t^3 and the slideways t^5 and t^6 of the lower stave-bending apparatus have the same relative
 80 arrangement as the corresponding parts r , r' , r^2 , r^3 , r^5 , and r^6 of the upper stave bending and clamping apparatus, so that the operations upon both ends of the keg, barrel, or
 85 cask which is building shall be uniform and simultaneous, and the arrangement of parts is such, therefore, that when the head b' is actuated outwardly both right-hand jaws r'
 90 and t' shall move uniformly and simultaneously toward the opposing stationary and co-operating jaws r and t , and the rear and forward jaws r^2 and t^2 and r^3 and t^3 shall uniformly and simultaneously operate during
 95 the operation of the jaws r' and t' .

Each of the lower jaws t , t' , t^2 , and t^3 is provided with a depending set-screw t^8 , engaged
 95 by the table k in the elevated position of the table, which screws are arranged to level the table and in conjunction with the table constitute stops for preventing the oscillation of
 100 the heads b and b' and connected clamping apparatus during the assemblage of the staves upon the said table.

The adjustability of the stationary head b accommodates the formation of various sizes
 105 of kegs, barrels, or casks by my improved machine, and the band m to adapt it to different sizes of work is split also at the rear and at the front, as at m^7 , to accommodate a diametrical enlargement or reduction of the
 110 said band. The said band m has the splits m^7 extending circumferentially as well as transversely of the band—that is, diagonally of the band, as shown in Figs. II, III, and IV—to enable the band to afford an adequate
 115 external and lateral bearing at the said splits for any staves placed opposite the splits during the assemblage of the staves along the inner circumferential surface of the band. Means for diametrically enlarging and reduc-
 120 ing the band m at the splits m^7 comprises, preferably, two ears m^8 and m^8 , formed upon the said band at opposite sides, respectively, of each split m^7 and loosely embracing and adjustable endwise of a screw-rod u . Each
 125 ear m^8 upon each rod u is secured in the desired adjustment by two nuts u^1 and u^2 , mounted upon the rod at opposite sides, respectively, of the said ear, and obviously the band m by a proper manipulation of the nuts
 130 u^1 and u^2 upon both screw-rods u can be adjusted diametrically not only to accommodate the formation of different sizes of kegs, barrels, or casks, but to accommodate the

placing along the inner side of the band of only the right number of staves required to form the predetermined size of keg, barrel, or cask for which the machine has been set.

5 Obviously the supporting of the clamping-band m from the heads b and b' through the medium of slides and slideways arranged parallel with the travel of the movable head b' accommodates the shifting of the said band
10 m and the work within it laterally to the left or toward the stationary head b during the inward actuation of the shiftable jaws of the clamping apparatus, and the arrangement of parts is such that the work-engaging edges
15 r^4 and t^4 of the jaws of the clamping apparatus and the band m shall be arranged concentrically upon the completion of the operation of the said apparatus upon the keg, barrel, or cask being built, as shown in Figs. VI and
20 VII. The band m being carried by slides supported from and movable laterally of the heads b and b' is, obviously, shiftable laterally. The band m is shifted to the right through the medium of the engagement of the
25 pins or projecting members n^2 of the sliding frame n by the outer side of the head b' during the movement of the said head from its inner extreme position into its outer extreme position. The band m is shifted to the left
30 through the medium of the assembled staves being operated upon by the rear, forward, and right-hand side jaws of the upper and lower series of clamps—that is, the circular shell of staves is shifted to the left during the
35 operation of the said jaws, and of course the band m is shifted correspondingly. The arrangement of the parts is such that the jaws of the upper and lower series of clamping-jaws shall, when the movable jaws are in their
40 outer position, as shown in Figs. I and III, be outside of the circular stove-receiving space bounded by the inner side of the band m .

To accommodate the location of the stud d^2 , on which the head b' is mounted, and the
45 nut d^3 upon the said stud at the inner side of the head in the inwardly-actuated position of the said head, the frame n extends below the path of the said nut-bearing stud, as shown at n^7 , Fig. V.

50 The operation of the machine is briefly described as follows: The head b , and consequently the left-hand side jaws r and t , is properly adjusted, if not already so, and secured in the desired adjustment, and thereby rendered stationary, and the band m is properly
55 adjusted as to size diametrically by a proper manipulation of the nuts u^1 and u^2 , and then the machine is ready for operation. The head b' is actuated into its outer position, and the
60 band m and the aforesaid jaws are in the position required to accommodate the placing of the staves vertically along the inner side of the band. The table k is then elevated, as shown in Figs. II and VII, whereupon the placing
65 of the staves in position takes place, as shown in Figs. II and III, and when a circular row of staves has been formed the band m is

tightened and caused to clamp the staves together, and then the head s' is introduced into the shell formed by the staves and
70 dropped upon the member k^6 of the table k , whereupon the head b' is actuated inwardly, so as to result in the operation of the upper and lower series of stove-bending jaws and in bringing the head s' in engagement with
75 the croze in the lower end of the staves, as shown in Figs. VI and VII. Next a chime-hoop (not shown) is placed around the upper and open end of the keg, barrel, or cask being formed, and then the table k is lowered,
80 so as to render the heads b and b' and connected clamping apparatus free to be turned in the one direction or the other far enough to afford access to the other or head-containing end of the said keg, barrel, or cask, when
85 a chime-hoop is placed around the last-mentioned end, and then the head b' is actuated outwardly to effect the release of the keg, barrel, or cask.

What I claim is—

90 1. In a machine of the character indicated, two side jaws arranged at opposite sides, respectively, of the space wherein the staves are assembled in a circular row with one of the said jaws movable toward and from the
95 other; a rear clamping-jaw and a forward clamping-jaw arranged at and between the rear extremities and forward extremities, respectively, of the said side jaws; rearwardly-converging slideways and correspondingly-
100 arranged slideway-engaging slides establishing operative connection between the rear jaw and the side jaws, and forwardly-converging slideways and correspondingly-
105 arranged slideway-engaging slides establishing operative connection between the side jaws and the forward jaw, substantially as and for the purpose set forth.

2. In a machine of the character indicated, two side jaws arranged at opposite sides, re-
110 spectively, of the space wherein the staves are assembled in a circular row with one of the said jaws movable toward and from the other; a rear clamping-jaw and a forward clamping-jaw arranged at and between the
115 forward extremities and rear extremities, respectively, of the side jaws; two inwardly-extending and diverging slideways formed upon each of the side jaws with the slideways of each jaw arranged at right angles to the slide-
120 ways of the other jaw; slides formed upon the rear jaw and engaging the rear slideways of the side jaws, and slides formed upon the forward jaw and engaging the forward slide-
125 ways of the said jaws, substantially as and for the purpose set forth.

3. In a machine of the character indicated, two side jaws arranged at the right-hand side and left-hand side, respectively, of the space
130 wherein the staves are assembled in a circular row, with the jaw at the left-hand side stationary, and with the jaw at the right-hand side movable toward and from the stationary jaw; a rear clamping-jaw and a for-

ward clamping-jaw arranged at and between the rear extremities and forward extremities, respectively, of the said side jaws; two rearwardly-converging slideway-forming arms rigid with and extending rearwardly and inwardly from the different side jaws, respectively; correspondingly - arranged slides formed upon the rear jaw and engaging and slidable upon the said arms; two forwardly-converging slideway-forming arms rigid with and extending forwardly and inwardly from the different side jaws, respectively, and correspondingly-arranged slides formed upon the forward jaw and engaging and slidable upon the said last-mentioned arms, substantially as and for the purpose set forth.

4. A machine of the character indicated, comprising a series of four clamping-jaws arranged at the left-hand side, right-hand side, rear side and forward side, respectively, of the upper portion of the space wherein the staves are assembled in a circular row, with the jaw at the left-hand side stationary; another series of four clamping-jaws arranged at the left-hand side, right-hand side, rear side and forward side, respectively, of the lower portion of the said space, with the jaw at the left-hand side stationary; means for affording lateral and external bearing to the staves between the two series of jaws; means for effecting a simultaneous movement of the right-hand jaws of the two series of jaws toward or from the left-hand jaws; rearwardly-converging slideways and correspondingly-arranged slideway-engaging slides establishing operative connection between the rear jaws and the jaws at the left-hand and right-hand sides, and forwardly-converging slideways and correspondingly-arranged slideway-engaging slides establishing operative connection between the jaws at the left-hand and right-hand sides and the forward jaws, substantially as and for the purpose set forth.

5. A machine of the character indicated, comprising a series of four clamping-jaws arranged at the left-hand side, right-hand side, rear side and forward side, respectively, of the upper portion of the space wherein the staves are assembled in a circular row with the jaw at the left-hand side stationary; two inwardly-extending and diverging slideways formed upon each of the said right-hand and left-hand jaws, with the slideways of each jaw arranged at right angles to the slideways of the other jaw; slides formed upon the rear jaw and engaging the rear slideways of the right-hand and left-hand jaws; slides formed upon the forward jaw and engaging the forward slideways of the right-hand and left-hand jaws; another series of four clamping-jaws arranged at the left-hand side, right-hand side, rear side and forward side, respectively, of the lower portion of the said space, with the jaw at the left-hand side stationary; two inwardly-extending and diverging slideways formed upon each of the right-hand and left-hand jaws of the lower series

of jaws, with the slideways of each jaw arranged at right angles to the slideways of the other jaw; slides formed upon the rear jaw of the lower series of jaws and engaging the rear slideways of the right-hand and left-hand jaws of the said series of jaws; slides formed upon the forward jaw of the lower series of jaws and engaging the forward slideways of the right-hand and left-hand jaws of the said series of jaws; means for affording lateral and external bearing to the staves between the two series of jaws, and means for effecting the movement of the right-hand jaws of both series of jaws simultaneously toward or from the left-hand jaws, substantially as and for the purpose set forth.

6. A machine of the character indicated, comprising a series of four clamping-jaws r , r' , r^2 and r^3 , arranged in one and the same horizontal plane at the left-hand side, right-hand side, rear side and forward side, respectively, of the upper portion of the space wherein the staves are assembled in a circular row, with the jaw r stationary; another series of four clamping-jaws t , t' , t^2 and t^3 arranged in one and the same horizontal plane at the left-hand side, right-hand side, rear side, and forward side, respectively, of the lower portion of the said space, with the jaw t stationary; the rearwardly-converging slideway-forming arms r^4 and r^5 arranged at right angles to each other and formed upon and extending rearwardly and inwardly from the jaws r and r' , respectively, and correspondingly-arranged slides formed upon the jaw r^2 and engaging and slidable upon the said arms; two forwardly-converging slideway-forming arms r^6 and r^7 arranged at right angles to each other and formed upon and extending forwardly and inwardly from the jaws r and r' , respectively, and correspondingly-arranged slides formed upon the jaw r^3 and engaging and slidable upon the said arms; the rearwardly-converging slideway-forming arms t^4 and t^5 arranged at right angles to each other and formed upon and extending rearwardly and inwardly from the jaws t and t' , respectively, and correspondingly-arranged slides formed upon the jaw t^2 and engaging and slidable upon the said arms; two forwardly-converging slideway-forming arms t^6 and t^7 arranged at right angles to each other and formed upon and extending forwardly and inwardly from the jaws t and t' , respectively, and correspondingly-arranged slides formed upon the jaw t^3 and engaging and slidable upon the said arms; means for affording lateral and external bearing to the staves between the two series of jaws, and means for effecting a movement of the jaws r' and t' simultaneously toward or from the jaws r and t , substantially as and for the purpose set forth.

7. In a machine of the character indicated, an upright stationary head b ; another upright head b' arranged a suitable distance from and movable toward and from the stationary

head; mechanism for operating the movable head; two upper side clamping-jaws r and r' formed upon and projecting inwardly from the upper end of the different heads, respectively; an upper rear clamping-jaw r^2 and an upper forward clamping-jaw r^3 arranged at and between the rear extremities and forward extremities, respectively, of the said side jaws; two lower side clamping-jaws t and t' formed upon and projecting inwardly from the lower end of the different heads, respectively; a rear clamping-jaw t^2 and a forward clamping-jaw t^3 arranged at and between the rear extremities and forward extremities, respectively, of the lower side jaws; means for affording lateral bearing, between the upper and lower clamping-jaws, to and externally of the staves, and means whereby both upper and lower rear and forward jaws are shifted simultaneously and uniformly inwardly or outwardly according as the movable head is moved toward or from the stationary head, substantially as and for the purpose set forth.

8. In a machine of the character indicated, an upright laterally-adjustable stationary head b ; another upright head b' arranged a suitable distance from and movable toward and from the stationary head; mechanism for operating the movable head; two upper side clamping-jaws formed upon and projecting inwardly from the upper end of the different heads, respectively; an upper rear clamping-jaw and an upper forward clamping-jaw arranged at and between the rear extremities and forward extremities, respectively, of the said side jaws; two lower side clamping-jaws formed upon and projecting inwardly from the lower end of the different heads, respectively; a rear clamping-jaw and a forward clamping-jaw arranged at and between the rear extremities and forward extremities, respectively, of the lower side jaws; means whereby both upper and lower rear and forward jaws are shifted simultaneously and uniformly inwardly or outwardly according as the movable head is moved toward or from the stationary head; a standard at the outer side of and a suitable distance from the stationary head; a rod or bar extending through the said standard, attached to the stationary head and adjustable endwise, and screw-threaded externally, and two nuts mounted upon the said bar or rod at opposite sides, respectively, of the standard, substantially as and for the purpose set forth.

9. In a machine of the character indicated, the combination with the stave-clamping and stave-bending apparatus and a table arranged below the said apparatus, of two suitably-supported vertically-tiltable parallel bars k^1 and k^2 extending laterally of the machine and having their axes coincident, which bars are arranged a suitable distance apart and carry the table, a pivotal connection between the table and the said bars, and means for tilting the said bars simultaneously, substantially as shown and described.

10. In a machine of the character indicated, the combination with the stave-clamping and stave-bending apparatus, and a table arranged below the said apparatus and having two depending lugs, of two suitably-supported vertically-tiltable parallel bars k^1 and k^2 extending laterally of the machine and having their axes coincident, and having upwardly-projecting lugs pivoted, forwardly and rearwardly and in line, to the aforesaid lugs of the table, and means for leveling the table when the table-bearing bars are actuated into their upwardly-tilted position.

11. A machine of the character indicated comprising a series of clamping-jaws arranged around the upper portion of the space wherein the staves are assembled in a circular row, another series of several clamping-jaws arranged around the lower portion of the said space, means whereby the simultaneous operation of all of the aforesaid jaws is effected, and a suitably-supported clamping ring or band extending around the said space centrally between the upper and lower jaws, which band is split to accommodate an expansion or contraction of the same, and means for effecting the expansion or contraction of the band, substantially as and for the purpose set forth.

12. A machine of the character indicated, comprising a table upon which the staves, required to form a keg, barrel or cask, are placed vertically in a circular row, clamping-jaws for operating upon and inwardly bending the upper portions of the staves, clamping-jaws for operating upon and inwardly bending the lower portions of the staves, a split clamping-band arranged around the space wherein the staves are assembled centrally between the upper and lower jaws, and having its split extending circumferentially as well as transversely of the band, and means for drawing the ends of the band at the said split toward or from each other and thereby contracting or expanding the band, substantially as and for the purpose set forth.

13. A machine of the character indicated, comprising a table upon which the staves, required to form a keg, barrel or cask, are arranged vertically in a circular row, clamping-jaws for operating upon and inwardly bending the upper portions of the staves, clamping-jaws for operating upon and inwardly bending the lower portions of the staves, a split clamping-band arranged around the space wherein the staves are assembled between the upper and lower jaws, a right-handed and left-handed screw arranged horizontally or approximately horizontally externally of the band adjacent to the split in the band, two correspondingly-threaded nuts engaging the right-handed threaded portion and left-handed threaded portion, respectively, of the screw and formed upon the band at opposite sides, respectively, of the aforesaid split, means for turning the screw, and means for preventing endwise displacement of the

screw, substantially as and for the purpose set forth.

14. A machine of the character indicated, comprising a table upon which the staves, required to form a keg, barrel or cask, are placed vertically in a circular row; clamping-jaws for operating upon and bending inwardly the upper portions of the staves; clamping-jaws for operating upon and bending inwardly the lower portions of the staves; a clamping-band extending around the space wherein the staves are assembled centrally between the upper and lower jaws; a support for the said band at the left-hand side of the aforesaid space; a split formed in the band at the right-hand side and extending circumferentially as well as transversely of the band; a suitably-supported horizontally or approximately horizontally arranged right-handed and left-handed screw; two correspondingly-threaded nuts engaging the right-handed threaded portion and left-handed threaded portion, respectively, of the screw, and formed upon the band at opposite sides, respectively, of the split; means for preventing an endwise shifting of the screw, and means for turning the screw, substantially as set forth.

15. A machine of the character indicated, comprising an upright stationary head *b*; another head *b'* arranged a suitable distance from and movable toward and from the stationary head; mechanism for operating the movable head; two upper clamping-jaws *r* and *r'* formed upon and projecting inwardly from the upper end of the different heads, respectively; a rear upper clamping-jaw *r²* and a forward upper clamping-jaw *r³* arranged at and between the rear ends and forward ends, respectively, of the side jaws *r* and *r'*; two lower side clamping-jaws *t* and *t'* formed upon and projecting inwardly from the lower end of the different heads, respectively; a rear clamping-jaw *t²* and a forward clamping-jaw *t³* arranged at and between the rear ends and forward ends, respectively, of the lower side jaws; means whereby both upper and lower rear and forward jaws are shifted simultaneously inwardly or outwardly according as the movable head is moved toward or from the stationary head; a clamping-band arranged between the upper and lower jaws around the stave-receiving space, and suitably-supported slides bearing the clamping-band and movable laterally of the aforesaid heads, substantially as and for the purpose set forth.

16. A machine of the character indicated, comprising an upright stationary head *b* arranged at one side of the stave-receiving space; another upright head *b'* arranged at the opposite side of the said space and movable toward and from the stationary head; mechanism for operating the movable head; two upper side clamping-jaws *r* and *r'* formed upon and projecting inwardly from the upper end of the different heads, respectively; an upper rear clamping-jaw *r²* and an upper

forward clamping-jaw *r³*; two lower side clamping-jaws *t* and *t'* formed upon and projecting inwardly from the lower end of the different heads, respectively; a lower rear clamping-jaw *t²*; a lower forward clamping-jaw *t³*; means whereby the upper and lower forward and rear jaws are shifted simultaneously inwardly or outwardly according as the movable head is moved toward or from the stationary head; a clamping-band extending around the aforesaid space between the upper and lower jaws, and two slides bearing the said band and supported from and movable laterally of the different aforesaid heads, respectively, substantially as and for the purpose set forth.

17. A machine of the character indicated, comprising an upright stationary head *b* arranged at the left-hand side of the stave-receiving space; another upright head *b'* arranged at the right-hand side of the said space and movable laterally; mechanism for operating the movable head; two upper side clamping-jaws *r* and *r'* formed upon and projecting inwardly from the upper end of the different heads, respectively; an upper rear clamping-jaw *r²* arranged at and between the rear ends of the said side jaws; a forward clamping-jaw *r³* arranged at and between the forward ends of the said side jaws; two lower side clamping-jaws *t* and *t'* formed upon and projecting inwardly from the lower end of the different heads, respectively; a rear clamping-jaw *t²* arranged at and between the rear ends of the lower side jaws; a forward clamping-jaw arranged at and between the forward ends of the lower side jaws; means whereby the upper and lower rear and forward jaws are shifted simultaneously inwardly or outwardly according as the movable head is moved toward or from the stationary head; a clamping-band extending around the aforesaid space centrally between the upper and lower jaws and split at the right-hand side; a slide supporting the said band at the left-hand side of the said space and supported from and movable laterally of the stationary head; a slide-forming frame supported from and movable laterally of the movable head, and means for expanding and contracting the band, and the said means being carried by the aforesaid frame and constituting the medium by which the said band is supported at the right-hand side from the aforesaid frame, substantially as and for the purpose set forth.

18. A machine of the character indicated, comprising an upright stationary head *b* arranged at the left-hand side of the stave-receiving space; another upright head *b'* arranged at the right-hand side of the said space and movable laterally; mechanism for operating the movable head; two upper side clamping-jaws *r* and *r'* formed upon and projecting inwardly from the upper end of the different heads, respectively; an upper rear clamping-jaw *r²* arranged at and between the

rear ends of the said side jaws; a forward clamping-jaw r^3 arranged at and between the forward ends of the said side jaws; two lower side clamping-jaws t and t' formed upon and
 5 projecting inwardly from the lower end of the different heads, respectively; a rear clamping-jaw t^2 arranged at and between the rear ends of the lower side jaws; a forward clamping-jaw arranged at and between the forward
 10 ends of the lower side jaws; means whereby the upper and lower rear and forward jaws are shifted simultaneously inwardly or outwardly according as the movable head is moved toward or from the stationary head;
 15 a clamping-band extending around the aforesaid space centrally between the upper and lower jaws and split at the right-hand side, a slide supporting the said band at the left-hand side of the said space and supported
 20 from and movable laterally of the stationary head; a right-handed and left-handed screw arranged horizontally or approximately horizontally between the right-hand side of the band and the movable head; two correspond-
 25 ingly-threaded nuts engaging the right-handed threaded portion and left-handed threaded portion, respectively, of the screw and formed upon the band at opposite sides, respectively, of the split in the band; a slide-forming
 30 frame supported from and movable laterally of the movable head; bearings for the screw formed upon the said frame; means for turning the screw, and means for preventing end-wise shifting of the screw, substantially as
 35 and for the purpose set forth.

19. In a machine of the character indicated, a table upon which the staves, required to form a keg, barrel or cask, are placed vertically in a circular row; clamping apparatus

for inwardly bending the upper and lower 40 portions of the staves simultaneously; a suitably-supported clamping-band extending around the stave-receiving space centrally between the upper and lower ends of the said space, which band is split, as at m^7 , at diametrically opposite points and has the splits 45 thus formed extending circumferentially as well as transversely of the band, and means for operating upon the band's sections to increase or decrease the width of the splits and 50 thereby diametrically enlarge or reduce the band.

20. In a machine of the character indicated, a table upon which the staves, required to form a keg, barrel or cask, are placed vertically in a circular row; clamping apparatus 55 for inwardly bending the upper and lower portions of the staves simultaneously; a suitably-supported clamping-band extending around the stave-receiving space between the 60 upper and lower portions of the said space, which band is split at two oppositely-located points, as at m^7 ; two screw-rods u and u arranged at the outer side of the different splits, respectively; two ears m^8 and m^8 loosely em- 65 bracing each screw-rod and formed upon the band at opposite sides, respectively, of the adjacent split, and nuts upon each screw-rod at both sides of both ears embracing the said rod, substantially as shown, for the purpose 70 specified.

Signed by me at Cleveland, Ohio, this 24th day of January, 1901.

LEMON M. REED.

Witnesses:

C. H. DORER,
 A. H. PARRATT.