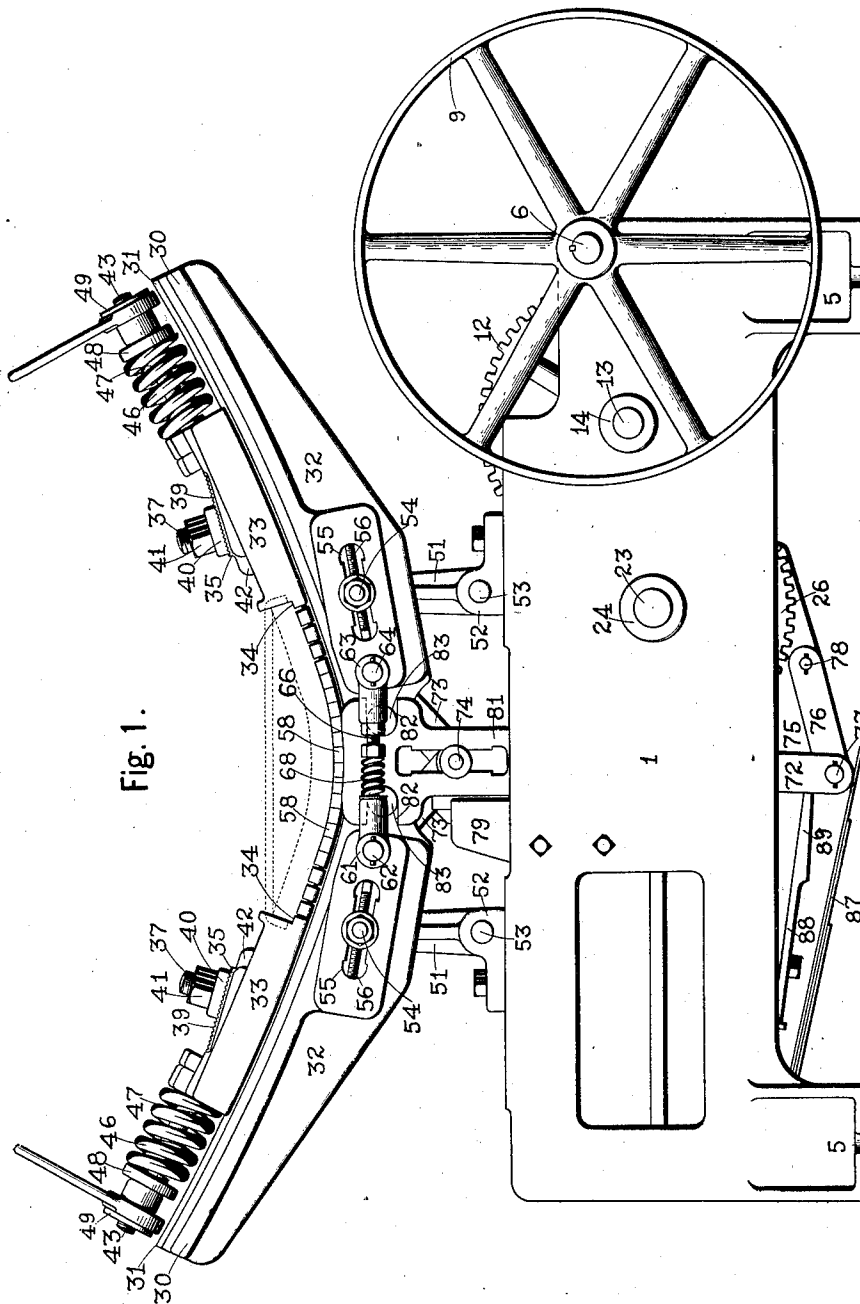


E. F. BEUGLER.
STAVE BENDING MACHINE.
APPLICATION FILED APR. 24, 1912.

1,063,498.

Patented June 3, 1913.

4 SHEETS—SHEET 1.



Witnesses.
K. A. Landis.
Carl Schramm

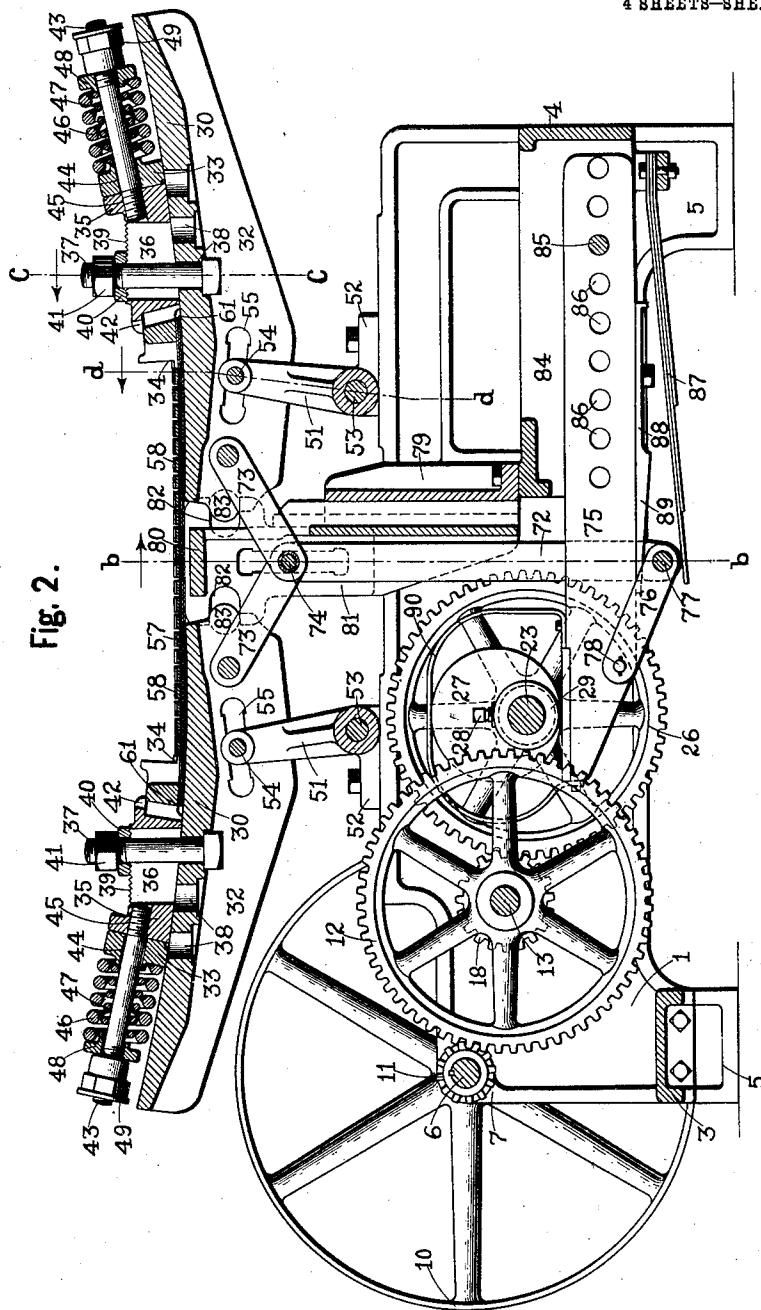
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By *A. Langston* Attorney.

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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

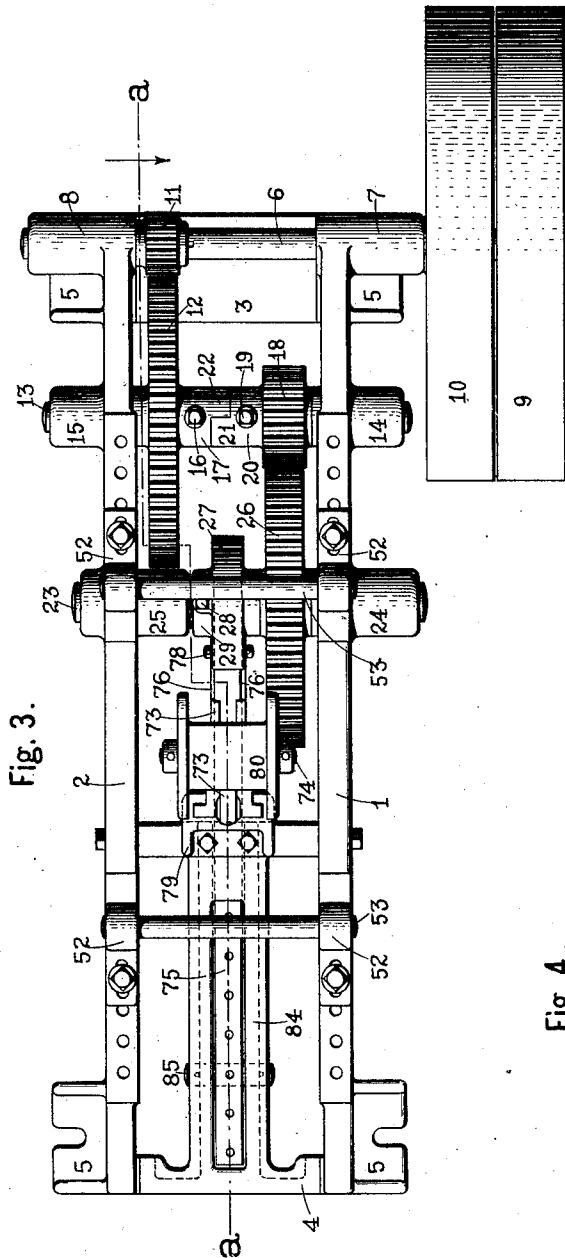


Fig. 3.

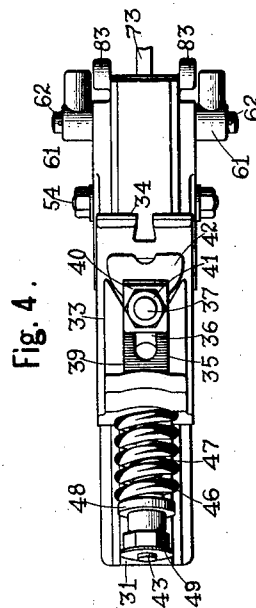


Fig. 4.

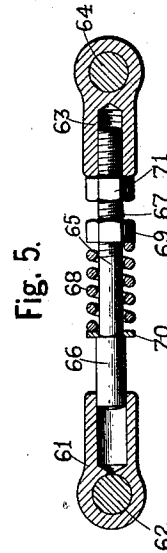


Fig. 5.

Witnesses.
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4 SHEETS—SHEET 4.

1,063,498.

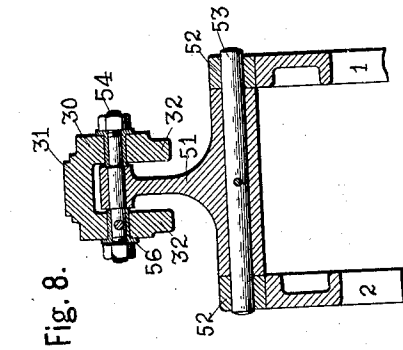


Fig. 8.

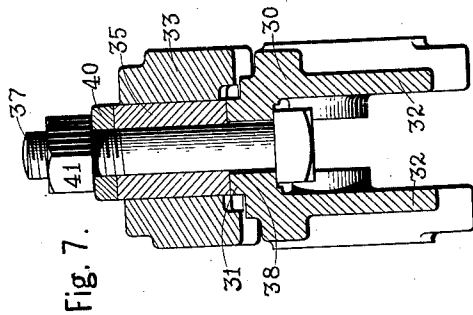
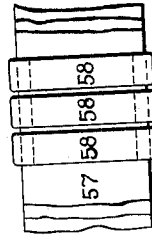


Fig. 7.

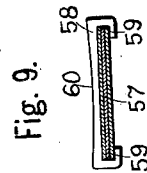


Fig. 9.

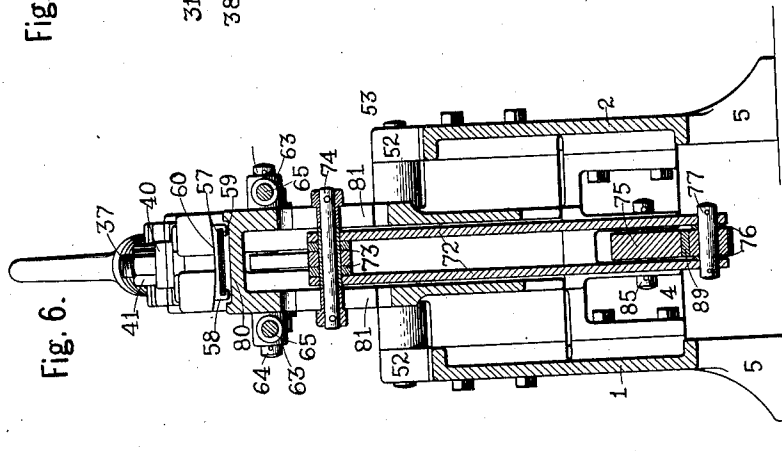


Fig. 6.

Witnesses.

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UNITED STATES PATENT OFFICE.

EDWIN F. BEUGLER, OF BUFFALO, NEW YORK, ASSIGNOR TO E. & B. HOLMES MACHINERY COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

STAVE-BENDING MACHINE.

1,063,498.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed April 24, 1912. Serial No. 692,889.

To all whom it may concern:

Be it known that I, EDWIN F. BEUGLER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Stave-Bending Machines, of which the following is a specification.

This invention relates to improvements in machines for bending staves for barrels, kegs, casks and other articles.

The principal objects of the invention are to provide means for unyieldingly supporting the stave across its width during the bending operation and thereby prevent the stave flattening transversely or splitting, to support the stave during the bending operation between spring mounted blocks, to provide suitable simple and correct adjustments and to generally simplify and strengthen the construction.

The invention also relates to certain details of construction which will be hereinafter described and claimed, reference being had to the accompanying drawings in which a preferred adaptation of the improved machine is illustrated.

In the drawings,—Figure 1 is a side elevation of the improved machine, a stave being shown therein in bent position in dotted lines. Fig. 2 is a vertical longitudinal section through the machine frame on line *a—**a* Fig. 3, and also a central vertical section through the stave gripping members located above the machine frame. Fig. 3 is a top plan view of the machine frame, the stave gripping members and their connecting and supporting pivotal links being omitted. Fig. 4 is a detached top plan view of one of the stave gripping members. Fig. 5 is a detached enlarged view partially in longitudinal section and partially in side elevation of the central spring cushion device connecting the stave gripping members. Fig. 6 is a transverse vertical section through the complete machine on line *b—b* Fig. 2. Fig. 7 is an enlarged detached transverse section through one of the stave gripping members on line *c—c* Fig. 2. Fig. 8 is an enlarged detached fragmentary transverse section through one of the stave gripping members and also through one of the connecting and supporting pivotal links for the stave gripping members on line *d d* Fig. 2. Fig. 9 is an enlarged detached transverse section through

the elastic stave supporting member. Fig. 10 is an enlarged detached top plan view of a fragment of the elastic stave supporting member.

In referring to the drawings in detail, 60 like numerals designate like parts.

The machine frame is composed of two parallel side frame members 1 and 2 which are comparatively long and two comparatively short end frame members 3 and 4 that extend between and connect to the ends of the side frame members 1 and 2. Four supporting legs depend respectively from the corners of the machine frame and as they are approximately similar in form they are all indicated by the same numeral 5. The side members 1 and 2, end members 3 and 4, and depending legs 5 of the frame are preferably in one integral structure of iron or other suitable or desirable metal or material.

A driving shaft 6 is journaled in bearing boxes 7 and 8 formed at one end of the side frame members 1 and 2 and one end of said shaft projects beyond the frame upon which two pulleys 9 and 10 are mounted side by side, the pulley 9 being rigidly and unrotatably fastened to the shaft and the pulley 10 being loose thereon and arranged to revolve freely and independently of the shaft. A pinion 11 is rigidly mounted on the driving shaft between the side frame members and meshes with a spur gear wheel 12 on a second shaft 13. The second or driven shaft 13 is journaled in bearings 14 and 15 found respectively in the side frame members, and the gear wheel 12 is unrotatably fastened to said shaft by a set screw 16 which is fitted through a screw threaded opening in a lateral tubular extension or hub 17 of the gear wheel as shown in Fig. 3. A pinion 18 is also mounted on the second or driven shaft and is unrotatably fastened to said shaft by a set screw 19 which likewise is fitted through a screw threaded opening in a lateral tubular extension or hub 20 of the pinion. The hubs 17 and 20 of the gear wheel 12 and pinion 18 are respectively cut away at their adjacent ends to provide half portions 21 and 22 which lap lock with each other and thereby securely fasten the gear wheel and pinion together against independent rotation, see Fig. 3. A third shaft 23 is journaled in bearings 24 and 25 in the side frame members of the machine

and a gear wheel 26 is mounted on said shaft which meshes with the pinion of the second shaft as shown in Fig. 3. An eccentric wheel 27 is also mounted on the third shaft 23 as shown, more particularly in Fig. 2. This wheel 27, as shown in Fig. 2, is circular in form but is mounted off center and it is fastened to the third shaft 23 by a set screw 28 which fits through an opening in the hub 29 of the eccentric wheel substantially as shown in Fig. 3.

The stave bending mechanism in brief comprises two opposed spring mounted stave gripping members between which the stave is supported and yieldingly gripped at its ends, and an intermediate stave supporting member which extends between the two stave gripping members.

As the two end stave gripping members are substantially similar in construction, it is thought that a detail description of one will suffice for both and that the same numerals may be employed to indicate corresponding parts.

Reference is to be had to Figs. 1, 2, 3, 4, 6, 7 and 8 for an understanding of the stave gripping members. Each of the stave gripping members is composed of a main comparatively large block and a smaller slide block mounted on the main block. The main block is of an elongated form having an upper bed portion 30 provided with a top longitudinal slideway 31 which is slightly concaved or curved and two depending side flanges 32. The slide block 33 is formed substantially as shown in Figs. 1, 2 and 7 being recessed out on the bottom so as to slidably seat on the slideway 31 and is also provided with a notch or cut out portion 34 at its inner end in which one of the ends of a stave is adapted to be fitted and gripped as shown in dotted lines in Fig. 1. The slide block 33 is provided with a rectangular vertical opening in which a small anchor block 35 is fitted, as shown in Figs. 2 and 7. A longitudinally elongated vertical opening or slot 36 is formed in the anchor block 35 as shown more particularly in Fig. 2 and a bolt 37 is fitted through said slot 36 and one of several openings 38 in the bed of the main block to adjustably fasten both the anchor block and the slide block to the main block.

The object in providing several openings 38 in the bed of the main block located at intervals therein is to secure a fairly wide range of adjustment for the slide block so that staves of various lengths may be bent on the same machine.

As shown in Figs. 1 and 2 the top surface 39 of the anchor block is transversely serrated or roughened and a washer 40 fitted on the screw threaded upper end of the bolt 37 is correspondingly serrated or roughened on its under surface, the two contacting ser-

rated or roughened surfaces serving to securely and unslidably fasten the washer to the anchor block. A lock nut 41 is screwed on the upper end of the bolt 37 against the washer 40, see Figs. 1 and 2. The anchor block 35 is provided with a laterally projecting lip or flange 42 which laps on the top surface of the inner portion of the slide block as shown in Figs. 1, 2 and 4 and locks it against independent upward movement.

The slide block is yieldingly supported from the anchor block and has a limited range of sliding movement on the slideway of the main block under spring tension when gripping against a stave end. Referring to Fig. 2, a screw bar 43 which is loosely fitted through an opening 44 in the outer portion of the slide block has its inner end screwed into a screw threaded opening 45 in the anchor block. Two springs 46 and 47 are arranged on the projecting end of the screw bar, being longitudinally compressed between the outer end of the slide block and a washer 48 loosely fitted on the screw bar. The washer 48 is held in place against outward movement and is adjusted longitudinally on the screw bar by an adjusting nut 49. For convenience in adjusting, a handle 50 may be arranged on each adjusting nut 49 as shown in Fig. 1.

Each of the stave gripping members is supported above the machine bed so that it can be rocked or tilted. This is preferably accomplished by connecting the gripping member to the machine frame by a pivotal link 51 which is of an inverted T-shaped form as shown in Fig. 8, the inverted head of the link being pivoted between brackets 52 bolted to the top of the side frame members 1 and 2 by a long pivot pin 53 and the upper end of the link being slightly widened and pivoted between the depending side flanges 32 of the main block by a pivot bolt 54.

It will be noted by referring to Figs. 1 and 2 that the openings 55 in the flanges 32 through which the pivot bolt 54 passes are longitudinally elongated forming adjusting slots, and an adjusting screw 56 which is fitted transversely through the pivot bolt as shown in Figs. 1 and 8 bears with its opposite ends against the opposite end walls of one of the slots. By turning the adjusting screw 56 the pivot bolt can be adjusted longitudinally in the slot thereby varying the longitudinal position of the pivot bolt in the main block of the stave gripping members.

The stave bending member is constructed substantially as particularly shown in Figs. 9 and 10 being composed of a plurality of superimposed thin strips 57 of elastic material such as spring steel and a series of presser blocks 58 recessed on their under surface so as to fit loosely and slidably on

the superimposed strips. Referring to Fig. 9 it will be noted that the presser blocks are each provided with lower inwardly extending opposed flanges 59 which secure the presser blocks on the spring strips 57 against removal therefrom or appreciable movement thereon except in a longitudinal direction. The top surfaces of the presser blocks are slightly concaved as indicated at 60 in Fig. 9 so as to conform to and fit against the slightly curved outer surface of the stave. The presser blocks are preferably constructed of brass or other non-rusting or non-corrosive metal to prevent any discoloring of the exterior surface of the stave. The superimposed strips 57 have their opposite ends fitted beneath the inner ends of the slide blocks of the end stave gripping members; each strip end being clamped between the under surface of the inner end of one of the slide blocks and the top surface of the main block on which said slide block is mounted. By referring to Fig. 2 it will be noted that the under portion of the inner end of each slide block is cut out slightly to provide a space 61 in which the ends of the strips are fitted.

The two opposed stave end gripping members are connected together by a cushion member, the tendency of which is to form an elastic cushion at or near the limit of the upward tilting or stave bending movement of the two stave end gripping members. The cushion member is shown in detail in Fig. 5 and is composed of a slide socket 61 pivoted to one of the depending flanges of the main block of one of the end gripping members by a pivot pin 62 which passes through a transverse opening in the outer portion of the slide socket, a screw socket 63 pivoted to one of the depending flanges of the main block of the other end gripping member by a pivot pin 64 which likewise passes through a transverse opening in the outer portion of the screw socket, a bar 65 having an enlarged portion 66 at one end which slidably fits in the slide socket 61 and a screw threaded portion 67 at the opposite end which screws into the screw socket 63 and a spring 68 loosely encircling the bar intermediate its ends; said spring being longitudinally compressed between an adjusting nut 69 on the screw threaded portion 67 and a washer 70 loose on the intermediate portion of the bar and bearing against the shoulder at the inner extremity of the enlarged portion 66. The tension of the spring is regulated by the adjusting nut 69 and the screw threaded portion 67 is locked in the screw socket by a lock nut 71.

The mechanism for tilting or rocking the outer ends of the stave gripping members upward to bend a stave consists of a vertical slide member, an approximately hori-

zontal lever pivotally linked to the lower end of the vertical slide member, and arranged to be rocked by the eccentric wheel, and a pair of toggle levers connected at their outer ends to the stave gripping members and at their inner ends to the vertical slide member. The vertical slide member is composed of two parallel vertical bars 72 between the upper ends of which a pair of toggle levers 73 are pivoted by a single pivot pin 74 as shown in Fig. 6. The lower ends of the bars 72 depend on opposite sides of a horizontal lever 75 and the lower end of a connecting link 76 to which they are pivoted by a pin 77. The link 76 extends diagonally upward and is pivoted at its upper end to the horizontal lever 75 by a pin 78, see Fig. 2 thereby providing a positive pivotal connection between the lever 75 and vertical slide member. The vertical slide block which in turn is slidably mounted in a bracket 79 bolted to a suitable portion of the machine frame.

The upright block is composed of an upper portion 80 which is recessed on its top surface and serves as a base support for the middle portion of the stave supporting and bending member substantially as shown in Fig. 1 and two depending vertical portions 81 in parallel separated arrangement between which the vertical slide member is slidably mounted as shown in Fig. 6. The upper ends of the depending portions 81 are laterally enlarged and provided with side recesses 82 in which laterally projecting rounded portions 83 at the inner ends of the main blocks of the stave gripping members loosely fit as shown in Figs. 1 and 2.

The horizontal lever 75 is pivoted between the two parallel parts of a horizontal longitudinal frame member 84 shown in Figs. 2 and 3, by a pivot pin 85 and said lever is provided with a series of holes 86 in any one of which the pin 85 can be inserted, thereby providing means for varying the length of the leverage.

A series of flat leaf springs 87 of different lengths are superimposed upon each other and have their outer ends bolted to the frame and the inner end of the longest spring extended beneath the vertical slide member, as shown in Fig. 2.

An adjusting slide bar 88 is slidably bolted to the under surface of the horizontal lever 75 and has a tapering inner portion 89 which projects between the pivot pin 77 and the under surface of the lever 75, as shown in Fig. 2. By shifting the bar 88 longitudinally along the lever 75, the position of the vertical slide member relative to the lever is regulated. The horizontal lever 75 is rocked by means of a metal loop member 90 which is fastened at its ends to the horizontal lever 75 and loosely fits around the

eccentric wheel, as shown in Fig. 2. The rotation of the shaft on which the eccentric wheel is mounted alternately raises and lowers the inner end of the lever.

5 The operation of this improved machine is as follows: The end stave gripping members being properly adjusted and in the position shown in Fig. 2, a stave is placed in position between them, and the driving belt
10 (not shown) is shifted from the loose pulley to the fixed pulley, thereby starting the revolution of the driving shaft. This in turn through the intermeshing gear wheels and pinions rotates the driven shafts and rocks
15 the horizontal lever 75 downward from the position shown in Fig. 2 to the position shown in Fig. 1. The downward movement of the lever 75 slides the vertical slide member downward and pulls the inner ends of
20 the toggle links in a similar direction. The downward movement of the toggle links draws the stave end gripping members toward each other and tilts their outer ends upwardly. This causes the stave supporting
25 and bending member to bend or flex from the straight form shown in Fig. 2 to the curved form shown in Fig. 1 and imparts a longitudinal bend to the stave substantially as shown in dotted lines in Fig. 1. The
30 bent stave before it is removed from the machine is fastened in its curved condition by fitting thereon a holding bar substantially as shown in dotted lines in Fig. 1.

Perhaps the most important feature of
35 this improved machine resides in the presser blocks 58 which are loose on the flexible elastic strips 57 and are free to move or slide thereon in a lengthwise direction and owing to their slightly concaved top surface
40 form a support which is unyielding and rigid in a transverse direction and prevents the stave flattening or splitting during the bending operation. In other words the strips 57 in conjunction with the presser
45 blocks form a longitudinally flexing and transversely rigid support for the stave.

Another important feature resides in the spring mounting of one of the blocks of the stave end gripping members upon another
50 block so that the stave is resiliently gripped or clamped between the two end gripping members while it is being bent.

I claim,—

1. In a machine of the class described, a
55 machine frame, two opposed stave gripping members pivotally linked to the frame between which a stave is adapted to be clamped, each of said stave gripping members being composed of a main block, a slide
60 block slidably mounted on the main block

and provided with a rectangular opening, an anchor block fitted in the rectangular opening in the slide block and bolted to the main block; said anchor block being considerably shorter in length than the rec- 65 tangular opening, and a spring device fastened to the anchor block and connected to the slide block for cushioning said slide block.

2. In a machine of the class described, a 70 machine frame, two opposed stave gripping members between which a stave is adapted to be clamped, each of said stave gripping members consisting of a main block pivotally linked to the machine frame, and a 75 spring mounted slide block on said main block, a spring cushion connecting the stave gripping members, a middle stave gripping member extending between and connected to the stave gripping members, and means for 80 tilting the stave gripping members.

3. In a machine of the class described, a machine frame, two opposed stave gripping members between which a stave is adapted to be clamped, each of said stave gripping 85 members consisting of a main block pivotally linked to the machine frame, and a spring mounted slide block on said main block, a middle stave gripping member extending between and connected to the stave gripping 90 members, a spring cushion extending between and connected to the stave gripping members below the middle stave gripping member, and means for tilting the stave gripping members. 95

4. In a machine of the class described, two opposed stave gripping members each having a main block and a slide block mounted on the main block, means connected to the main blocks for tilting said members, and a 100 spring cushion device extending between and pivoted at its ends to the main blocks of said stave gripping members.

5. In a machine of the class described, two opposed stave gripping members each hav- 105 ing a main block and a slide block mounted on the main block, means connected to the main blocks for tilting said members and a spring cushion device consisting of a slide socket pivoted to the main block of one member, a screw socket pivoted to the main block, 110 a bar having one end slidably fitted in the slide socket and the opposite end screwed in the screw socket and a cushioning spring on said bar.

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Witnesses:

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