To all whom it may concern:

Be it known that I, Axel M. Walstrom, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Feeding Mechanism for Stave-Jointing Machines, of which the following is a specification.

The invention relates to machinery for the processing of staves used in the manufacture of tubs and like containers of stave construction, and more particularly to the work feeding mechanism in a machine for shaping or jointing the staves, such as that described and illustrated in my copending application Serial No. 690,630, of which this application is a division.

In my copending application above referred to, I have described and illustrated my invention of improvements in a machine for finishing the lateral edges of staves for assembly in the construction of tubs and like containers of tapered form. The machine embodies improved automatic mechanisms for positioning the staves in relation to cutting devices, which operate successively to finish the lateral edges of staves of variable widths in correct angular relation, the structure and operation of which I have therein set forth.

The machine also embodies improved automatic mechanisms for successively conveying or feeding the staves from a magazine stack through the respective operating zones of the positioning and cutting devices, my invention of improvements in such feeding mechanism being the subject matter of this application.

It is the principal object of this invention to provide feeding mechanism in which a carrier operates automatically to withdraw successively a series of staves from a stacked supply and propel them through the machine, and in which the carrier is provided with automatic means for alternatively freeing and locking the staves thereto coincident with the respective operations of laterally positioning and cutting the staves.

Other objects and advantages will be apparent in the following detailed description of a preferred embodiment of my invention which I have selected for illustration in the accompanying drawings. It will be understood, however, that various changes in form, construction and arrangement may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims.

Referring to the drawings, Fig. 1 represents a sectional elevation of the machine. Fig. 2 is a fragmentary plan view of one of the carrier chains with its stave engaging devices. Fig. 3 is a vertical sectional view of the portion of the carrier shown in Fig. 2. Fig. 4 is a sectional end view of the machine taken on the plane of the line 4-4 in Fig. 1, illustrating the parts of the feeding mechanisms associated with the chains. Fig. 5 is a fragmentary sectional side view of those parts taken on the plane of the line 5-5 in Fig. 4.

I will first state generally the operative arrangement of the machine, herein illustrated as adapted to the jointing of staves for butter tubs. The rough cut approximately tapered staves are stacked at one end of the machine. An endless chain traveling beneath the stack carries devices adapted to engage the lowermost staves successively and move them forward through the machine, the withdrawal of the staves from the stacked supply being controlled by devices adapted to prevent the removal of more than one at a time.

As each stave is moved out from the stack it passes into the path of a lateral positioning device which engages the stave and adjusts the position of one of its lateral edges, whereupon the engaging devices on the carrier chain operate to lock the stave in adjusted position. The continuously forwardly moving stave is then carried into engagement with a revolving cutter which finishes the aligned lateral edge, the stave thereafter being released from the locking engagement of the carrier devices.

The stave is carried further into the path of a second positioning device which engages and adjusts the position of the stave for operation upon the opposite lateral edge by a second cutter, whereupon the engaging devices on the carrier again operate to lock the stave thereto, the latter being then moved through the zone of the second cutter, the locking devices thereafter releasing the stave for discharge from the machine. The structure and operation of the position-
ing and cutting devices being fully set forth in my copending application Serial No. 699,620, they are not further described herein.

More specifically described, with reference to the drawings, the operating mechanisms may be supported upon a frame of any suitable construction, that herein illustrated comprising pairs of spaced upright members 1, supported upon bottom rails 2, and carrying top rails 3. Top cross members 4 and intermediate cross members 5 complete the frame structure.

Mounted on the cross members 4, are two pairs of longitudinally extending spaced guide rails 6, each pair supporting one of two endless carriers 7. The carriers preferably are of link-belt or chain type, and are operatively supported at the ends of the guide rails by sprockets 8 and 9, the upper runs of the carrier chains passing between the guide rails 6. The two front or receiving end sprockets 8 are mounted on a shaft 10 having suitable bearing supports mounted on the frame members 2. The two rear or delivery end sprockets 9 are mounted on a shaft 12 having bearing supports mounted on the other ends of the frame members 3. The shaft 12 carries a drive pulley 14 by which power is received for the operation of the chain carriers.

The guide rails 6 are adapted to give lateral and under support between the sprockets 8 and 9 to the upper runs respectively of the carrier chains 7 in such position that the upper surfaces of the chains are substantially flush with the upper surfaces of the guide rails. Each of the guide rails 6 is provided with a lateral channel in its upper inner surface forming a shoulder, as indicated at the line 15 in Fig. 1, for the under support of the side members of the chains in parallel relation to the upper surfaces of the rails.

The carriers 7 are preferably of link-belt construction comprising outer side links 16 (see Figs. 2 and 3) with their ends overlapping inner side links 17 and carrying cross pins 18 on which the links are pivoted. Spacer sleeves 19 are positioned between the pairs of inner links, the sleeves preferably being provided with bushings 20 as bearings for the pivot pins.

At regular intervals in the carrier chains 7 there are located stave engaging dogs preferably comprising specially formed pairs of links 21 having extended portions projecting above the normal surface of the chain. A block 22 is rigidly secured between the extended portions of the special links, and is provided with a curved knife edge 23 projecting forwardly over the carrier chain.

Located between each successive pair of stave engaging dogs are preferably two stave securing devices comprising a link-shaped member 24 of enlarged dimensions positioned between the side links of the chain. The member 24 is supported at its two ends upon the bushings 20 of two adjoining link connections, the spacer sleeves 19 being shortened to accommodate the member 24. End openings 25 in the member 24 receive the bushings 20, and are of substantially larger diameter than the bushings, permitting the member to be moved vertically between the laterally supporting short spacer sleeve and the adjacent side link. The lower edge of the member extends substantially below the normal under surface of the carrier chain. The upper edge of the member 24 is provided with a pair of knife-like upward projections 26 which are substantially flush with the upper surface of the carrier chain when the member is in lowered position, but which rise above the chain when the member is lifted.

The stave securing members 24 are staggered in their positions in the carrier chain at alternately opposite sides of the chain. As herein illustrated, those on each side are located between every tenth pair of links, and the ten tooth sprockets 8 and 9 are of mutilated construction to accommodate the passage of the members, two teeth of each of the sprockets having oppositely lateral portions removed to receive the members.

As each stave securing member leaves the sprocket 8 at the beginning of the upper run of each carrier, the member drops by gravity into lowered positions, effecting the withdrawal of the engaging projections 26 flush with the upper surface of the chain. Positioned beneath the upper run of each carrier and between the spaced guide rails 6 are two pairs of successively arranged bars 27 and 28, and 29 and 30, which respectively engage and lift the members 24 and simultaneously thrust upward the engaging projections, holding them in raised position while travelling the length of the respective bars. (See Fig. 1.) The carrier bars are resiliently mounted, being similarly supported on cross bars 31, carried on compression springs 32, which latter are carried by bolts 33 suspended from the flanges of the guide rails 6.

Positioned above the upper run of each carrier is a longitudinally extending stave retaining bar 34, secured in spaced relation to the carrier chain by cross bars 35, adjustably supported on posts or bolts 36 mounted on the top rails 3.

A stave hopper or magazine is arranged over the front portion of each of the carriers. In the present illustration a forward wall or stop 37 is mounted on the front supporting cross bar 33 over the forward end of each of the retaining bars 34. (See Figs. 4 and 5.) Each of the latter is received in a block 38 secured to the bar 39.
and wall 37, and extending laterally over the upper flanges of the rails 6. The lower surface of the block 38 and upper surfaces of the rails 6 are preferably curved to the contour of a tub stave. The front face of the block 38 may be under cut, as at 39, to assist in driving the staves between the retaining bar and the guide rails.

The upper flanges of the rails 6 form the under support for the staves in the hopper sections, and an end stop is provided in the cross bar 40 and spacer blocks 41, secured to the guide rails 6 and supported on the front ends of the top rails 3. The upper flanges of the rails 6 are removed for a short section beneath the forward wall 37 to receive in each hopper a pair of vertically movable plates 42 pivotally supported on the sides of the rails 6, as at 43. The plates 42 are shaped in conformity to the upper surfaces of the rail flanges, and are normally swung upward at their forward ends against the block 38, being resiliently supported in that position by compression springs 44 bearing on the lower flanges of the guide rails.

Positioned on each side of the pairs of guide rails 6 within the hopper sections, are a pair of upright laterally swinging stave aligning rods 45, preferably interconnected to form a yoke shaped member pivotally supported, as at 46, upon a pair of cross members 47 attached to the guide rails and top rails of the frame. The interconnected portions 48 of the yokes are preferably crank shaped, each pair being operatively connected by a pair of rods 49 with one of the vertically swinging levers 50 pivoted on the lower frame of the machine and interconnected by a trolley bar 51, the levers 50 being normally maintained in a raised position by means of springs 52 suspended from brackets secured to the machine frame. Lateral pockets 53 may be formed in the upper flanges of the rails 6 to permit entry of the inward swinging rods 45.

Oiling devices may be provided for the lubrication of the chains and stave securing devices comprising as herein illustrated (see Fig. 4) a roller 54 of oil carrying material resiliently bearing upon the under side of the chain, the adjacent inner faces of the rails 6 being cut away to permit full contact with the chain. The roller 54 is pivoted in the side walls of an oil pan 55 resiliently supported beneath the rails 6, as by spring bolts 56 securing the upper flanges of the pan to the lower flanges of the rails at 57.

The mechanism hereinbefore described comprises the means for propelling the staves through the machine and for supporting them during the shaping of their lateral edges. In operation, an attendant, after stepping on the trolley 51 and opening the aligning bars 45, places a flatly stacked bunch of rough staves in each of the hopper sections, as illustrated at A in Fig. 1. Upon releasing the rods 45, the latter close upon the stacks of staves and approximately align them with the direction of travel of the carrier chains. The forward moving upper runs of the carriers, positioned between the spaced guide rails, operate in close proximity to the bottom staves of each stack, and as the projecting dogs 22 reach beneath the stack they successively engage the outer end of the bottom stave and push it from beneath the stack forwardly under the beveled block 38 into the space between the retaining bar 34 and the upper flanges of the guide rails 6.

The spring supported plates 42 operate to prevent any of the staves except the bottom one from passing out of the hopper section and jamming the machine, and also to prevent jamming the bottom stave when filling an empty hopper at the moment one of the dogs is well advanced in the hopper. The plates 42 are held against the block 38 with sufficient tension to prevent passage of the stave until the latter is properly engaged at its outer end and positively driven against the bevel 39, thereby depressing the plates 42 to the normal surface of the guide rails. The dogs 22 are separated in the carriers by a slightly greater distance than the length of a stave, and when first engaged each stave is thus loosely positioned between successive pairs of dogs, the curved knife like engaging edge of the latter facilitating the lateral shifting of the stave.

While thus loosely moved forward, each stave is laterally engaged by the first of the positioning devices (indicated generally at B) and one of its edges aligned for finish cutting at the correct angle. When so aligned, the two stave securing members 24 underlyng the stave are engaged simultaneously by the two cam bars 27 and 28, the members 24 being thereby lifted and their knife like projections 26 driven into the under side of the stave against the resistance of the retaining bar 34, their engagement being resiliently maintained by the spring mounting of the cam bars. The stave is thus locked against lateral displacement in correct position for the first shaping operation, which latter is accomplished by the cutter indicated at C while the members 24 travel the length of the respective cam bars 27 and 28.

Passing off the ends of the cam bars 27 and 28, the members 24 drop down and withdraw their engaging teeth from the stave, the latter being again loosely propelled by the dog 22. During the next stage of advancement the stave is laterally engaged by a second positioning means (indicated at D) which aligns the other edge of the stave.
for correct shaping. Thereupon, the stave securing members 24 are engaged by the second pair of cam bars 29 and 30, and are operated to again lock the stave in its new position for the second shaping cut by the cutter indicated at B while the securing members travel over the bars 29 and 30. As the members drop off the ends of the second pair of cam bars, the stave is finally released and loosely propelled out of the machine.

I claim as my invention:

1. In apparatus of the class described, having a carrier comprising pivotally connected pairs of spaced links, the combination of a stave abutting element secured to said links and projecting upwardly from the surface of said carrier, an oversize extra link positioned forwardly of said element and having oversize apertures receiving an adjacent pair of pivot connections in said carrier for the loose support of said extra link, said extra link normally extending below said carrier and having upper projections normally retracted below the upper surface of said carrier, and a cam adapted to engage the lower portion of said extra link and raise said upper projections above the surface of said carrier.

2. In apparatus of the class described, a carrier adapted to receive a succession of loose staves, said carrier having a plurality of spaced projecting elements respectively adapted to abut and propel the staves, a retaining bar positioned above the path of said staves adapted to prevent upward displacement of the staves, a plurality of elongated stave engaging members mounted longitudinally on said carrier beneath the respective positions of said staves having blade-like upper projections normally flush with said carrier and adapted to be raised by the upward movement of said members into engagement with said staves to prevent lateral displacement thereof, said members extending through said carrier and being loosely supported at their front and rear ends in the structure of said carrier, and cam means positioned below said carrier adapted to engage and raise said members.

3. In apparatus of the class described, in combination, a guide adapted to receive a stack of loose staves upon a portion thereof, means for successively moving the under stave of said stack along said guide, a stop wall positioned above said guide adjacent said stave receiving portion, said stop wall having an inclined lower portion terminating in spaced relation to said guide for the passage of said staves, and a resiliently depressable under support for the ends of said staves adjacent said stop wall, said under support normally closing the space between the lower end of said stop wall and said guide.

4. In apparatus of the class described, in combination, a stationary bottom support for a stack of loose staves, an upright end support for said staves having an outw ardly inclined lower portion terminating in spaced relation to said bottom support, a horizontally pivoted member positioned beneath said end support and normally closing the space between said end support and said bottom support, resilient means for maintaining said member in closing position, and means for forcing the lowermost one of said staves against the inclined portion of said end support thereby depressing said member and discharging said stave from said stack.

In witness whereof I have hereunto attached my signature.

AXEL M. WALSTROM.