No. 753,522. PATENTED MAR. 1, 1904.

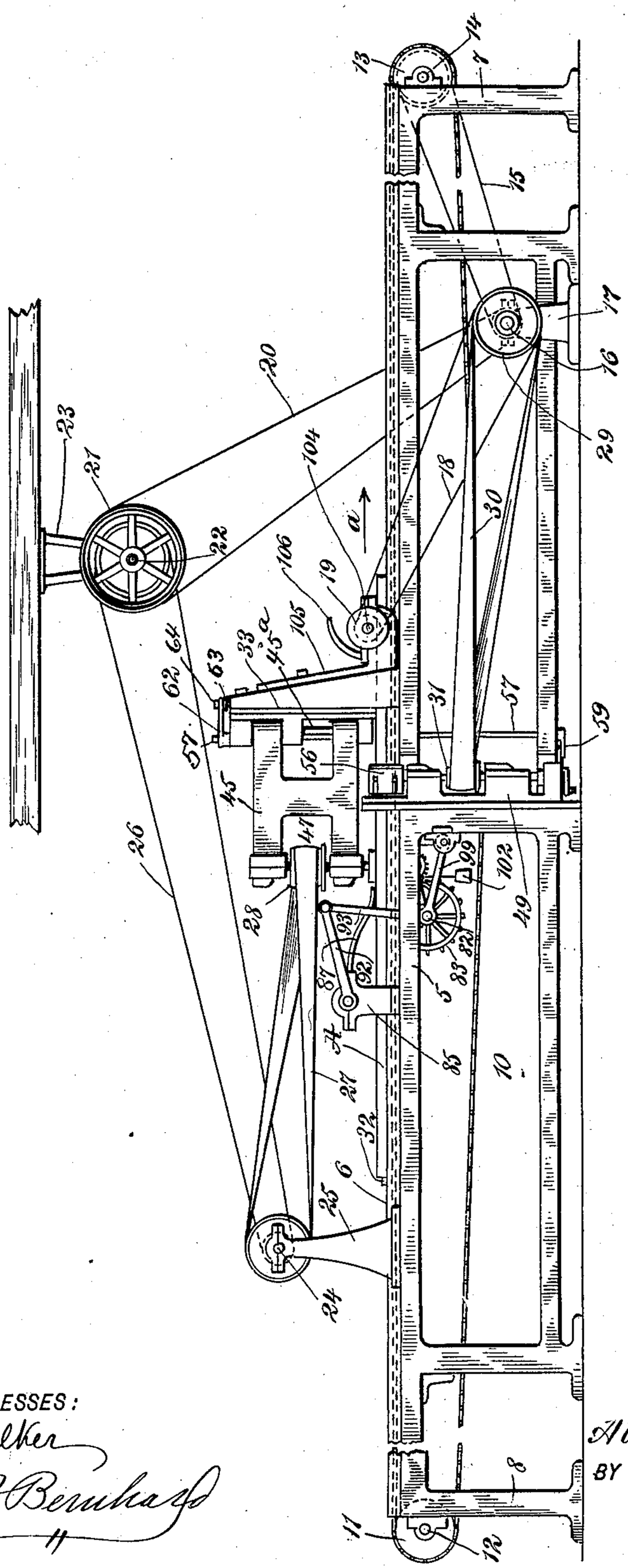
A. L. SHAW.

STAVE SHAPING MACHINE.

APPLICATION FILED MAR. 29, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

FIG 1



WITNESSES:

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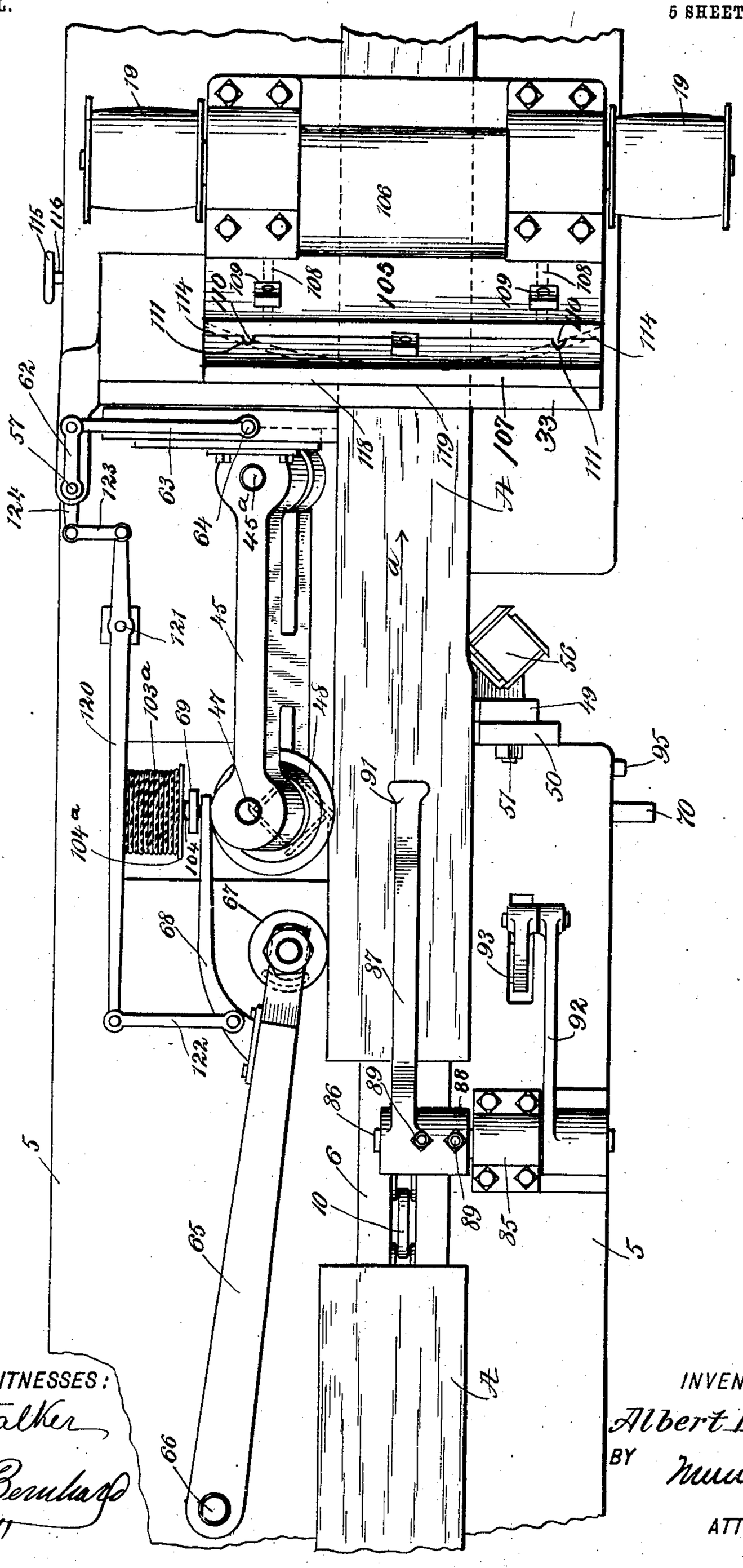
NO MODEL. 5 SHEETS—SHEET 2.



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NO MODEL. 5 SHEETS—SHEET 3.

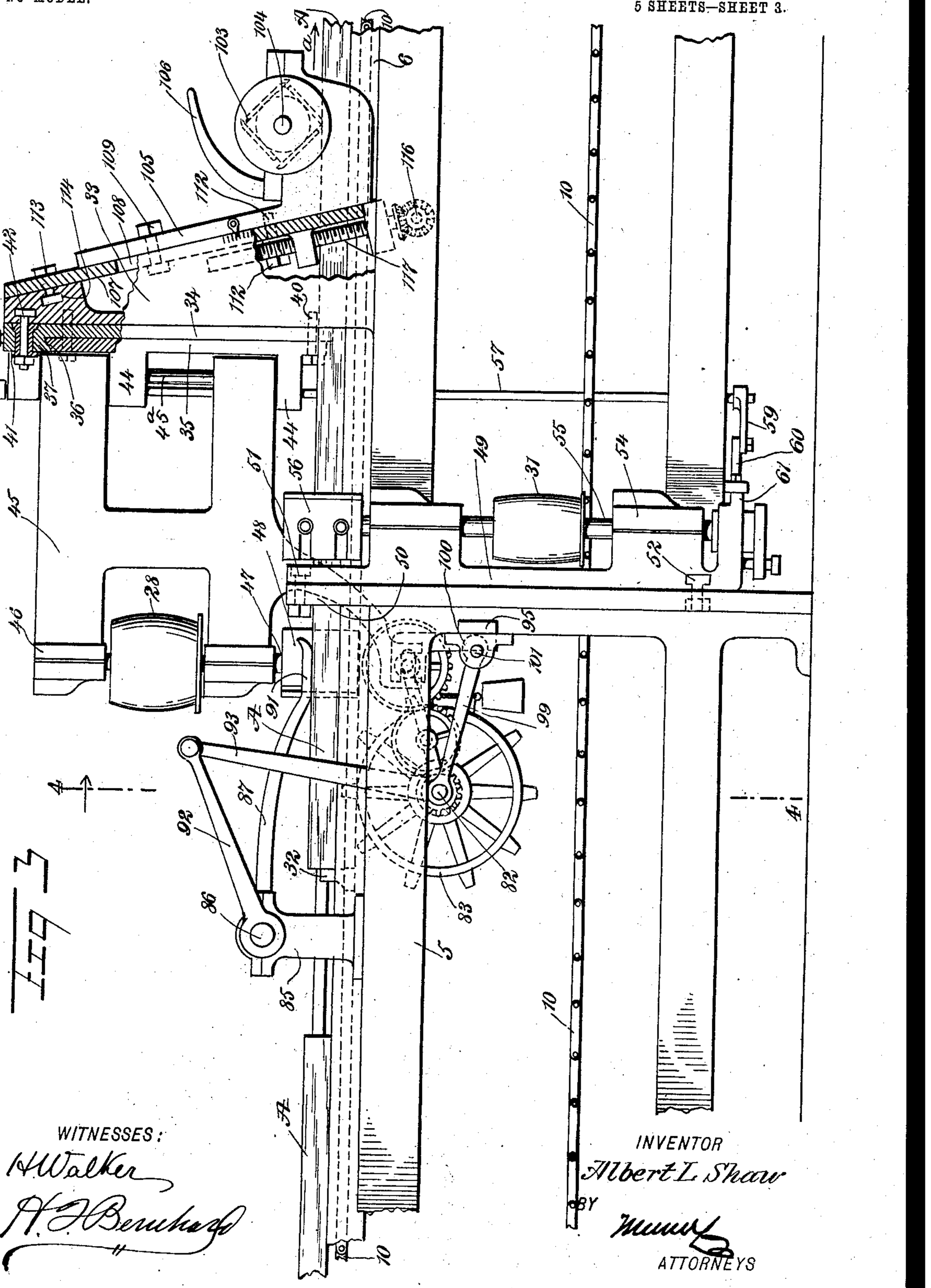

FIG 3

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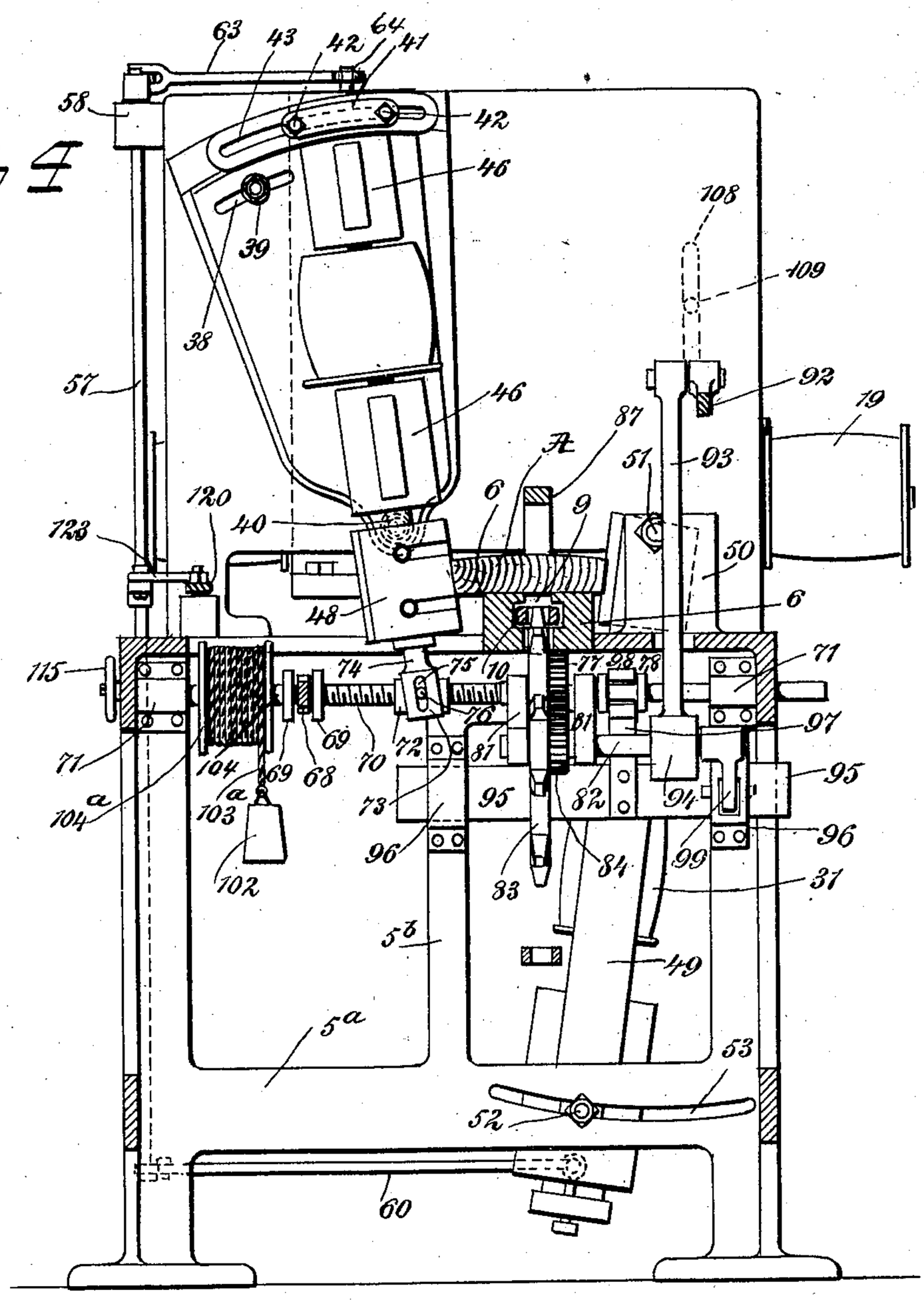
NO MODEL. 5 SHEETS—SHEET 4.

Fig 4



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NO MODEL. 5 SHEETS—SHEET 5.

Fig 5

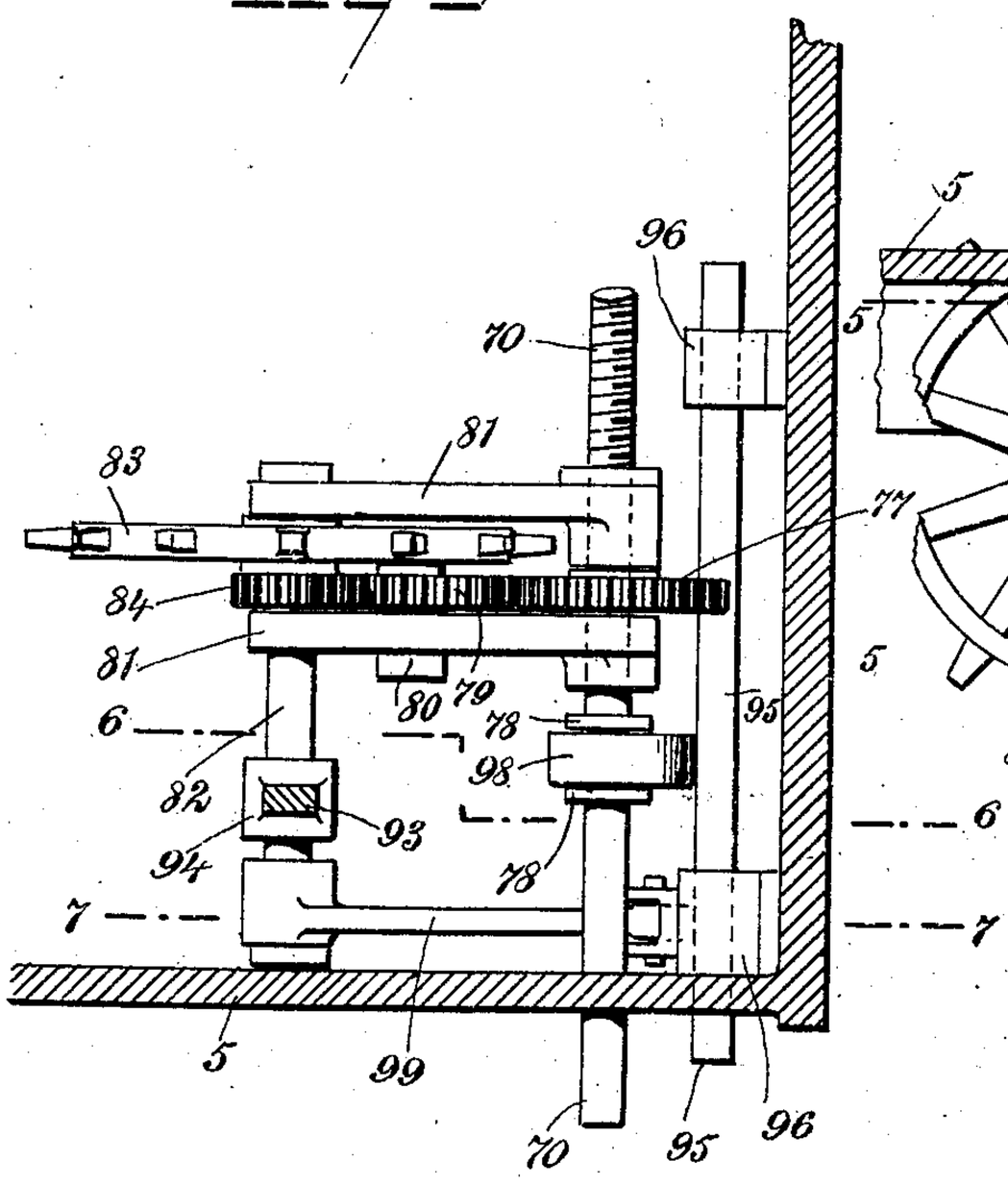


Fig 6

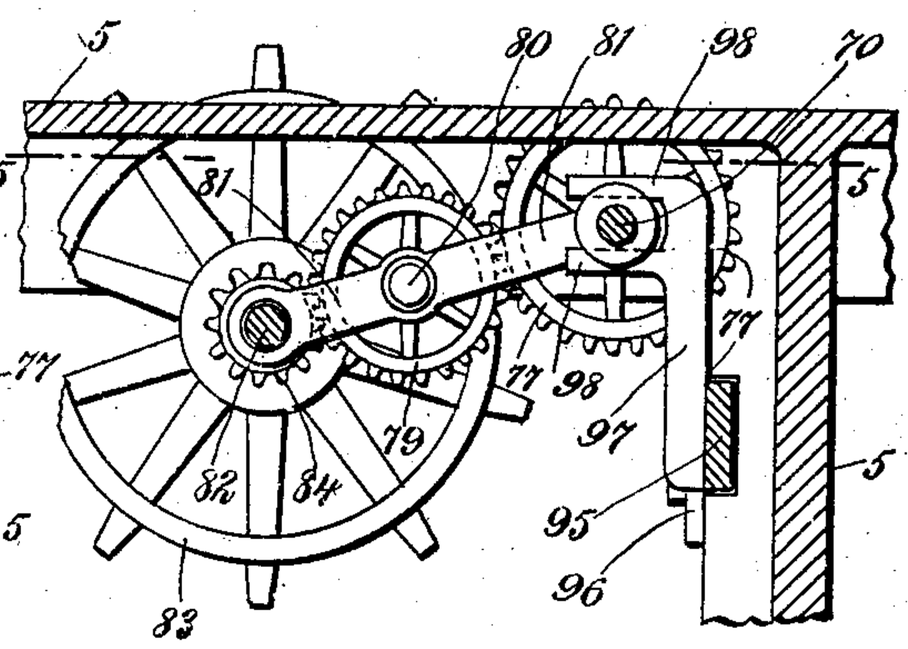
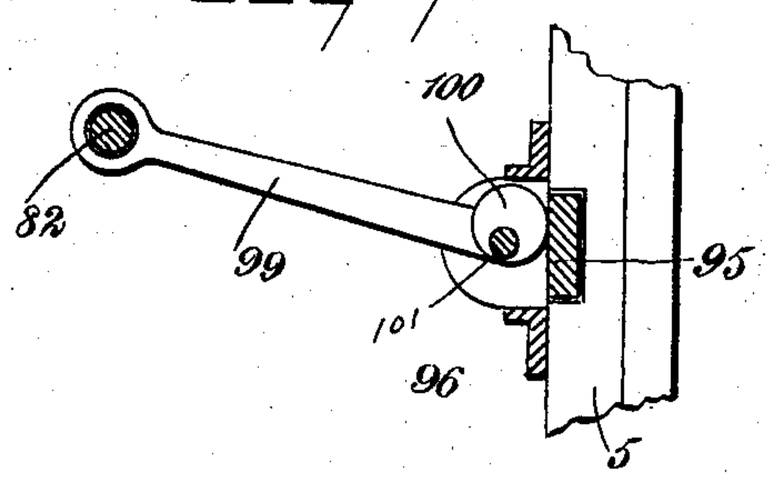


Fig 7



WITNESSES:

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No. 753,522. Patented March 1, 1904.

UNITED STATES PATENT OFFICE.

ALBERT LAWRENCE SHAW, OF WHITECASTLE, LOUISIANA, ASSIGNOR OF THREE-FIFTHS TO ROBERT H. DOWNMAN, OF NEW ORLEANS, LOUISIANA.

STAVE-SHAPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 753,522, dated March 1, 1904.

Application filed March 29, 1902. Serial No. 100,552. (No model.).

To all whom it may concern:

Be it known that I, ALBERT LAWRENCE SHAW, a citizen of the United States, residing at Whitecastle, in the parish of Iberville and State of Louisiana, have invented certain new and useful Improvements in Stave-Shaping Machines, of which the following is a full, clear, and exact description.

My invention relates to improvements in machines for shaping staves, by which I am able to prepare staves for tanks, vats, stills, and other regularly-tapered receptacles in a manner to give the desired longitudinal taper and the necessary bevel to the edges of the staves, both these operations being performed on the stave simultaneously and during its passage through the machine.

The improved machine of my invention is characterized by its adaptability to properly bevel and taper staves which may vary in size within wide limits, the said capability being a very great advantage in making the staves for receptacles of commercial sizes. It will be understood that long narrow staves for large vessels do not, as a rule, require much taper or bevel to be given thereto, whereas shorter and wider staves require more taper and an increased bevel. As a general although not an invariable rule the taper in staves for tubs and the like average one-sixteenth of an inch to the foot.

The improved machine contemplates the employment of side cutters and automatic setting and compensating devices having operative connection with said cutters to give the desired angular adjustment to the side cutters, according to the width of the stave, whereby the proper bevel and taper will be given by the side cutters to the side edges in order to joint the stave.

Normally the several mechanisms are adjusted to operate on staves of a certain width, say staves which are six inches wide; but, as will be understood from the foregoing introductory, the devices will on the introduction of staves which may be narrower or wider than six inches—as, for instance, as narrow as four inches or as wide as eight inches—be automatically adjusted to give the side cutters the proper angular positions.

Further objects and advantages of the invention will appear from the subjoined description, and the novelty in the combinations of devices and in the construction and arrangement of parts will be hereinafter more fully described.

The actual scope of the invention will be defined by the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a stave-shaping machine embodying the features of my invention. Fig. 2 is a plan view on a somewhat enlarged scale and with the end portions of the machine broken away. Fig. 3 is a side elevation of the parts shown by Fig. 2 and on substantially the same scale. Fig. 4 is a vertical transverse section taken in the plane of the dotted line 4 4 of Fig. 3, looking in the direction of the arrow. Figs. 5 and 6 are detail views in plan and side elevation, respectively, of a train of gearing and associated parts whereby a shiftable threaded shaft may be locked against endwise movement and be driven automatically immediately following the introduction of a stave into working position relative to the cutter mechanisms; and Fig. 7 is a detail sectional elevation on the line 7 7 of Fig. 6.

The framework 5 of the machine is constructed, preferably, of metal and in any suitable style. The metallic portion of the framework is of a length necessary to accommodate the various working parts, shafting, &c., and this metallic section is provided with a metallic bed-plate 6, the same being shown more clearly by Figs. 2 and 4. At its end portions the framework 5 is provided with extensions 7 8, the same being arranged in alinement with the table and made of wood or any material other than metal, because these extensions are somewhat of a temporary character.

The bed-plate 6 is comparatively narrow and is situated a little to one side of the mid-

dle portion of the framework, and it extends longitudinally of the metallic portion 5 of said framework. This bed-plate is provided with a longitudinal slot 9, (see Fig. 4,) said slot extending the full length of the bed-plate and opening through the top and bottom faces thereof. Said slot of the bed-plate accommodates the upper active lead of an endless feed-chain 10, which is made, preferably, of slotted links joined pivotally together, so that it resembles a sprocket-chain. This feed-chain extends the full length of the bed-plate and of the machine-framework, and one portion of the chain passes around an idle sprocket-roller 11, the shaft 12 of which is journaled in suitable bearings on the frame extension 8. The other portion of the endless feed-chain passes around and is engaged with a driving-sprocket 13, the shaft 14 of which is journaled in proper bearings on the frame extension 7, and this shaft 14 is driven by a belt 15 from a counter-shaft 16, the latter being mounted in pillow-blocks 17, as shown by Fig. 1. This counter-shaft 16 is provided with a series of pulleys, (not shown,) and one of said pulleys serves to guide the belt 15 just described, while a second pulley is connected by a belt 18 to a pulley 19 on a top-dressing cutter, and, finally, the last pulley of the counter-shaft 16 is engaged and driven by a belt 20, which leads to the pulley 21 on the overhead main or driving shaft 22, the latter being supported in the proper bearings or hangers, one of which is indicated at 23 in Fig. 1. This overhead main shaft 22 also drives, by a belt 26, another counter-shaft 24, supported in elevated pillow-blocks 25 on the framework 5, and said last mentioned counter-shaft propels a belt 27, that drives the pulley 28 on one of the side cutters. The counter-shaft 16, in addition to driving the belts 15 and 18, is equipped with another pulley, 29, which propels the belt 30, that has engagement with a pulley 31 on the shaft of a companion side cutter.

The endless feed-chain 10 is arranged and supported in the machine for its active upper lead to extend through the longitudinal slot 9 of the bed-plate, and this chain is equipped at suitable intervals with dogs 32, one of which is shown by Figs. 1 and 3. These dogs may be of any suitable character and fastened to the chain by any approved means. The intervals between the dogs will depend upon the length of the staves which are to be shaped by the machine; but the dogs and the staves should be so arrangsd on the feed-chain that an interval of fifteen inches will be allowed between the successive presentation of staves to the cutter mechanisms, thus allowing a measurable lapse of time to intervene between the action of the cutter devices on different staves, and this interval of time is utilized for the operation of the setting devices in order to return the cutter mechanisms to their initial positions before the presentation of another stave thereto.

In order that the invention may be more readily understood, I have shown the work at A in the several figures of the drawings, the dog 32 being engaged with the rear end of the work and adapted to shove or push it through the machine in the direction of the arrow *a*.

The carrying-head for the elevated side cutter is mounted on the vertical knees 33 on the metallic section 5 of the framework, and said head consists of the plates 34 35, the latter having a beveled top edge, as indicated at 36 in Fig. 3, and adapted to be received snugly within an overhanging flange 37 at the top portion of the companion plate 34. The top edges of the two plates 34 35 and the flange 37 on the plate 34 are curved, as more clearly shown by Fig. 4, thus permitting the plate 35 to be adjusted at an angle with respect to the plate 34. The plates are connected adjustably together by the formation of a curved slot 38 in the plate 35, through which slot passes a bolt 39, that is fastened to the plate 34. The two plates are pivotally supported on the elevated framework formed by the knees 33 by means of the fulcrum-bolt 40, (see Figs. 3 and 4,) said plates being capable of angular adjustment with respect to the bed-plate 6 and the work A, which is advanced thereon by the action of the feed-chain. These plates 34 35 of the carrying-head for the side cutter are movable freely on the axis afforded by the bolt 40, and the angular adjustment of the plates, which are connected firmly together by the bolt 39, is limited by an arc-shaped guide 41. This guide 41 is cast of a single piece in the segmental form shown more clearly by Fig. 4, and it is secured firmly to the elevated framework formed by the knees 33 by means of the bolts 42, said bolts being countersunk in the elevated framework and passing through the guide. (See Figs. 3 and 4.) This guide is recessed or flanged in order to snugly fit within an arcuate slot 43, which is provided in the upper portion of the plate 34, whereby the guide serves to steadily maintain said plates of the carrying-head in their operative positions, and the head is free to shift on the axis afforded by the bolt 40. The plate 35 is provided with lugs 44, to which is pivotally secured the forwardly-extending arm 45 by the pivot 45ª. The arm 45 has the journal-bearings 46, which accommodate the shaft 47, said shaft being equipped with the pulley 28 and with one of the side cutters 48, the latter being disposed adjacent to the bed-plate 6. (See Fig. 4.)

The carrying-head for the other side cutter is indicated at 49 in Figs. 3 and 4, and it is disposed on the opposite side of the bed-plate 6 from the side cutter 48, said carrying-head lying below the horizontal plane of the bed-plate. The upper portion of this carrying-head 49 is pivotally supported on a short up-

standing post 50, provided on the framework 5 at one side of the bed-plate 6. This pivotal support for the carrying-head 49 is afforded by the bolt 51, and this carrying-head is capable of an angular adjustment and in a lateral direction relative to the bed-plate. This angular adjustment of the carrying-head 49 is restricted within certain limits by means of the bolt 52, arranged to play in the arcuate slot 53, which is provided in the lower cross-bar 5^a of the metallic frame.

The carrying-head 49 is equipped with suitable journal-bearings 54, which accommodate the shaft 55 of the side cutter 56, (see Fig. 3,) and this shaft 55 is also provided with the pulley 31, that is driven by the belt 30 from the counter-shaft 16.

From this description it will be seen that I have provided two shiftable carrying-heads which are disposed on opposite sides of the bed-plate 6 and are pivotally supported at points adjacent thereto. These shiftable carrying-heads serve to individually support the shafts of companion side cutters, the latter being disposed on opposite sides of the bed-plate and in operative relation to work which may be advanced thereon by the action of the feed-chain. As these side cutters are mounted in the shiftable carrying-heads, they are adapted to partake of the angular adjustment thereof, whereby the side cutters are made to assume inclined or angular positions relative to the work on the bed-plate, and, furthermore, these side cutters will partake of the diverging positions relative to each other indicated more clearly by Fig. 4 of the drawings.

57 designates a vertical rock-shaft which is disposed on one side of the machine, preferably the left-hand side, as indicated in Figs. 2 and 4, said shaft being supported in suitable bearings, one of which is indicated at 58 and extending from the lower part to the upper part of the machine. This rock-shaft 57 has operative connection with the two shiftable carrying-heads for the companion side cutters. The connection between the lower pivoted head 49 and the rock-shaft 57 is obtained by means of the crank-arm 59, secured to the lower extremity of the rock-shaft, the arm 61 on the lower or unconfined portion of the pivoted carrying-head 49 and the link 60, having its respective end portions attached pivotally to the crank-arm 59 and the carrying-head arm 61. The connection between the upper portion of the vertical rock-shaft 57 and the shiftable carrying-head for the other side cutter is obtained by means of a crank-arm 62, secured to the upper extremity of the rock-shaft 57, and the link 63, having one end pivoted to the crank-arm 62 and its other end to an upstanding lug 64, which is provided on the plate 34, forming one member of the carrying-head for the side cutter 48.

The shaft 57 is adapted to be rocked in its bearings when a stave-blank approaches the cutter mechanisms by the operation of automatic setting devices, which I will now proceed to describe.

The setting-arm 65 is disposed on the metallic frame-work 5 in a position alongside of the bed-plate 6, one end of said arm being pivotally connected, as at 66, to the frame-work, and the free end of the arm being disposed adjacent to the side cutter 48. On this free end of the setting-arm 65 is mounted a roll 67, and this roll and the arm normally occupy such positions relative to the work-bed 6 that the roll lies in the path of the end of a stave-blank resting on the bed-plate 6 and advanced by the action of the feed-chain, whereby the engagement of the stave-blank with the roll 67 will deflect the arm 65 more or less, according to the width of the stave-blank. This setting-arm 65 is provided with a forwardly-extending finger 68, the free extremity of which is adapted to loosely engage with a shiftable and revoluble shaft 70. This shaft 70 is provided with the collars 69, (shown more clearly by Fig. 4,) and the finger 68 engages with the shaft 70 between said pair of collars, whereby the finger will communicate the shifting motion of the setting-arm to the shaft when said setting-arm is actuated by the stave-blank.

The setting-arm 65 is connected with the shaft 57 by means of the lever 120, pivoted intermediate of its length to the section 5 of the framework, as indicated at 121, and having its long arm connected by the link 122 with the setting-arm or the finger thereof, the short arm of said lever being connected by the link 123 with the crank-arm 124 on the shaft 57, whereby the swinging movement of the setting-arm will rock the said shaft.

The shaft 70 is disposed in a horizontal position across the framework and below the bed-plate 6, (see Fig. 4,) and said shaft is mounted loosely in suitable bearings 71, which are provided within the side portions of the framework 5, so as to rotate freely on its axis and to be capable of endwise movement. This shaft 70 is threaded for a considerable portion of its length, as shown by Fig. 4, and said shaft is operatively connected with the carrying-head for the side cutter 48. This operative connection is obtained by the provision of a female threaded sleeve or nut 72, which is screwed on the threaded portion of the shaft 70, and with this nut or sleeve engages a slotted foot-piece 73, the latter being integral with a downwardly-extending arm 74 on the free end of the arm 45, carrying the side cutter 48. The foot-piece 73 is provided with slots (indicated at 75) and adapted to receive a pin 76, attached to the sleeve or nut 72, thus loosely connecting the foot-block of the arm 45 with the threaded sleeve, whereby, owing to the connection between the setting-arm 65 and the rock-shaft 57 and the said shaft and the plate 34 of the carrying-head of the cutter

48, the said head will swing on its fulcrum 40 simultaneously with an endwise movement of the shaft 70 when said shaft is shifted by the action of the setting-arm 65, and at the same time, owing to the connection between the rock-shaft 57 and the other carrying-head 49 for the cutter 56, the said head will be swung on its pivot. Simultaneously with the swinging movement of the carrying-head of the cutter 48 on its pivot 40 by the endwise movement of the shaft 70, as above described, the arm 45, carrying the cutter-shaft, will be swung on its pivot 45^a in the same direction; but since the said arm is connected directly with the shaft 70, so as to partake of the movement thereof, while the plate 34 is connected with the setting-arm 65, which engages the said shaft, the movement of arm 45 will be greater than that of the plate 34. It will thus be seen that the movement of the setting-arm 65 moves the shaft endwise, and thereby swings the arm 45 on its pivot for the necessary width of the stave, and at the same time the setting-arm through its connection with the plate 34 of the carrying-head swings the said plate on its pivot, and thereby the cutter carried by the arm 45 proportionate to the distance which the cutter has been moved laterally by the swinging of the said arm 45 on its pivot. The two carrying-heads for the side cutters will thus be simultaneously adjusted to the required position for operation on the side edges of the stave-blank to give the bevel to the blank acccording to the width thereof.

I will now proceed to describe the mechanism by which the shaft 70 is automatically rotated when the stave passes between the side cutters and this rotation of the shaft 70 operates the carrying-head of the side cutter 48 in a manner to automatically draw the latter inwardly toward the blank with a slow progressive movement to give the taper to the blank.

The shaft 70 is provided at a point intermediate of its length with a gear-pinion 77, the latter being made fast with the shaft and adapted to rotate therewith, and said shaft is furthermore provided at a point to one side of the gear-pinion with the spaced collars 78, the latter being made fast with the shaft and adapted to accommodate an arm of a clutch or locking mechanism to be hereinafter described. With the gear 77 of the shiftable and revoluble shaft 70 is adapted to mesh an intermediate gear 79, the shaft 80 of which is suitably journaled in one or more swinging arms 81, two of which are preferably employed. (See Figs. 5 and 6.) These arms 81 are loosely connected with the shaft 70, so that the latter may slide through the arms and said arms may themselves turn freely on the shaft, the arms being disposed on opposite sides of the train of gearing, as shown by Fig. 5. The free ends of the swinging arms 81 are loosely mounted on a shaft 82, the latter being equipped with a sprocket-gear 83, the same being made fast with said shaft 82 and adapted to turn therewith in order to rotate said shaft 82 at the proper period in the operation of the machine. This shaft 82 is furthermore equipped with a gear-pinion 84, which is secured fast to the shaft at a point quite close to the sprocket gear 83 and which lies in the same vertical plane as the gears 79 77. The gear 84 on the sprocket-gear shaft 82 has intermeshing engagement with the intermediate gear 79, so that the latter will mesh with the gears 84 77, and thereby form the train of gears which operatively connect the shaft 70 with the sprocket-gear shaft 82. This sprocket-gear shaft 82 is disposed below the bed-plate 6 and in a horizontal position on one side of and parallel to the shaft 70, and this shaft 82 occupies such a relation to the bed-plate that the sprocket-gear 83 will lie in the vertical plane of the slot 9 in the bed-plate, thus disposing the upper portion of the sprocket-wheel in a manner for its teeth to project into the lower part of the slot 9 and to have engagement with the links of the endless feed-chain 10. It will be evident that the engagement of the sprocket-gear 83 with the feed-chain will serve to rotate this gear, the shaft 82, and the train of gears from said shaft 82 to the shaft 70; but normally the shaft 82 and the gear 83 are dropped to position wherein the sprocket-gear 83 is free from engagement with the feed-chain 10, said sprocket-gear and its associated parts being only brought into operative positions when the stave-blank is advanced to the cutter mechanism. The means for adjusting the shaft 82 and the sprocket-gear 83 will now be described.

A short post 85 is firmly secured to the upper part of the framework 5, and this post is provided with a short horizontal rock-shaft 86, the end portions of said rock-shaft being extended beyond the bearings of the post 85. A trip-arm 87 is provided at one end with a collar 88, which is fitted on one projecting end portion of the short rock-shaft 86, said collar 88 being provided with one or more set-screws 89, adapted to impinge on the shaft 86, thus making the trip-arm fast with the rock-shaft. The trip-arm 87 is made of elastic or springy material, and it is curved or bent so as to extend in a downward or rearward direction from the shaft 86. Said arm 87 practically forms a stiff spring which has its lower rear portion widened and expanded to form a presser-foot 91, the width of said presser-foot exceeding the width of the slot 9 in the bed-plate 6. This yieldable trip-arm is thus arranged for its foot to lie over the slot in the bed-plate and in the path of a stave-blank, which is adapted to be advanced by the feed-chain, and when the stave-blank engages with the foot 91 said trip-arm is raised to the position shown in Fig. 3, thereby turning the shaft 86 in its bearings. The shaft 86 is pro-

vided at its opposite protruding end with a crank-arm 92, the same extending at a different angle to the rock-shaft from the trip-arm 87, and to the free end of the crank-arm 92 is pivoted the upper portion of a link 93, the lower end of said link 93 being formed with a bearing 94, which loosely receives the shaft 82 of the sprocket-gear 83, whereby said shaft 82 is journaled in said bearing of the link 93, so as to be shiftable relatively to the bed-plate 6. The link 93 is practically suspended from the crank-arm 92 of the rock-shaft 86, so as to support the shaft 82 and the gear 83 in shiftable relation to the under side of the bed-plate.

With the threaded shaft 70 is combined an automatic clutch or locking mechanism adapted to restrain the said shaft from endwise movement during the period that it is adapted to be rotated. This automatic locking mechanism includes a shiftable locking-bar 95, which is disposed in a horizontal position below and parallel to the shaft 70. Said locking-bar is slidable endwise in the frame under normal conditions in suitable guides 96, which are provided on the framework 5 and an upstanding bar 5^b thereof. (See Fig. 4.) This slidable locking-bar 95 is provided with an upstanding arm 97, which is made fast with the locking-bar and is provided with the forwardly-extending jaws 98, said jaws loosely embracing the shaft 70 between the collars 78 thereon. A locking-lever 99 is provided with an enlarged cam-shaped head 100, (see Figs. 5 and 6,) and this headed end of the lever is fulcrumed to one of the guides 96 by means of the pin or bolt 101, thus disposing the eccentric or cam head of the lever in a position to bind against the shiftable locking-bar 95. The lever 99 extends upwardly from the guide 96 for a suitable distance, and the free end of said lever is loosely fitted to the shiftable suspended shaft 82. It is evident that the arm 97 will serve to operatively connect the locking-bar 95 to the spindle of the shaft 70, so that the locking-bar will partake of the endwise adjustment of said shaft. The locking-bar and the shaft are free to have the endwise play or adjustment when a stave-blank is not presented to the cutter mechanism and while the sprocket-gear 83 is in its dropped-down or lowered position; but after the adjustment of the carrying-heads and the side cutters by the action of the setting devices heretofore described and on the engagement of the trip-arm 87 with the stave-blank the shaft 86 will be rocked in its bearings, so as to lift the link 93 through the arm 92, and thereby raise the shaft 82, so that the sprocket-gear 83 will be lifted into the lower part of the slot 9 in the bed-plate and into engagement with the feed-chain. This elevation of the shaft 82 and the gear 83 makes the feed-chain rotate the gear, and the motion of said gear is transmitted through the train of gears to the shaft 70. On the elevation of the shaft 82 in the manner just described the lever 99 will be raised so that its cam or eccentric head 100 will impinge forcibly against the locking-bar 95, thereby restraining said locking-bar against any continued movement in an endwise direction. As the locking-bar 95 is connected operatively with the shaft 70 by means of the upstanding arm 97, it is evident that this shaft 70 will not be capable of any endwise movement, because the collars 78 of said shaft lie on opposite sides of the arm 97. As the shaft is thus held against endwise movement and as it is rotated by the train of gearing from the sprocket-gear, Fig. 3, the threaded portion of the shaft will operate to impart a traveling movement to the nut or sleeve 72, which is communicated by the foot-block 73 and the arm 74 to swing the arm 45 of the carrying-head of the side cutter 48 on its pivot 45^a to automatically draw the said arm, and with it the cutter, inwardly toward the blank with a slow progressive movement, so as to give the taper to the stave-blank.

It is evident that the rate of inward movement of the side cutter 48 will depend upon the pitch of the threads of the shaft 70 and the speed of the shaft, which is communicated by the train of gearing from the sprocket-gear 83, adapted to be propelled by the feed-chain.

When the inner or rear end of the stave is carried by the dog to the feed-chain beyond the cutter devices, the trip-arm 87 is disengaged from the blank or the completed stave, and as soon as this takes place the swinging frame carrying the sprocket-gear 83 swings down by its own weight, thus stopping the rotation of the shaft 70 and at the same time releasing the said shaft, so that it will be free to move endwise. The nut or sleeve 72 on the shaft 70 is returned to its normal position on said shaft by means of the drop-weight 102, the same being attached to a cable 103^a, which is coiled around a spool 104^a, the same being made fast to an end portion of the shaft 70. When the shaft is rotated by the action of the train of gearing and the sprocket-gear, the cable is coiled on the spool and the weight is elevated; but the return of the parts to their normal positions allows the sprocket-gear 83 to become disengaged from the feed-chain, and therefore the weight 102 becomes active in order to unwind the cable and to rotate the drum and the shaft, the latter serving to impart endwise traveling movement to the sleeve or nut 72. This movement of the nut 72 swings the arm 45 on its pivot 45^a to return said arm, and with it the cutter-head 48, to its normal position.

I preferably employ a top dressing-cutter in connection with the side cutters. This cutter, however, forms no part of the present invention. As shown in the drawings, the cutter is shown at 101 and is made fast to a shaft 104, which is journaled in bearings carried by

a plate or member 105 of a horizontal carrying-head. The shaft 104 of the cutter is provided with pulleys 19, adapted to be driven by belt 18 from the shaft 16, and said cutter is disposed below an arched chip-breaker or shield 106. The plate 105 is adjustably secured to the plate or member 107 of the carrying-head by means of bolts 109, carried by plate 105 and working in slots 108 in plate 107. The plate 105 is provided with ribs 110, working in grooves 111 in plate 107. The carrying-head is pivoted to the knees 33 of the framework by a bolt 112, and the angular adjustment of said head is limited by a bolt 113, working in an arcuate slot 114 in the framework. The carrying-head is raised and lowered by the hand-wheel 115 on the shaft 116, which is geared with the screw-shaft 117, mounted in the framework and connected with the member 107 of the carrying-head.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a stave-dressing machine, the combination with a pair of connected side cutters, of a work-feed mechanism movable between said cutters, a revoluble and shiftable shaft, a traveler actuated by the shaft and connected with one of said cutters, work-actuated setting devices operatively connected with said cutters and with the shaft to shift the latter and thereby space the cutter-heads and adjust them to predetermined angular position according to the width of the blank, and means for rotating said shaft during the movement of the blank between the cutters to operate the traveler and thereby draw the cutter connected therewith toward the blank with a progressive movement.

2. In a stave-dressing machine, the combination with companion side cutters, and a work-feeding mechanism, of a shiftable and revoluble shaft having connection with said cutters, work-actuated setting devices connected to the shaft and the cutters and operable to give the shiftable movement to the shaft to space the cutters and quickly bring them to the desired angular positions on the introduction of a work-blank, and mechanism actuated by the work-feed mechanism for rotating said shaft to draw one of the side cutters toward the blank with a progressive movement.

3. In a stave-dressing machine, the combination with a pair of companion side cutters, and work-feed mechanism, of a shiftable and revoluble shaft having operative connection with said side cutters, work-actuated setting devices connected with said shaft to adjust the latter endwise and to space the cutters and move them to predetermined angular positions on the introduction of a work-blank, means for rotating the shaft, shaft-locking devices operable subsequently to the endwise movement of the shaft to lock said shaft against further endwise movement during the period of its rotation by the shaft-driving mechanism, and means for moving one of the cutters with a progressive movement from the rotating shaft.

4. In a stave-dressing machine, the combination with side cutters, and work-feed mechanism, of a threaded shaft having operative connection with one of said side cutters, work-actuated means connected with said threaded shaft to impart endwise adjustment thereto to move one of the cutters laterally and also connected with the side cutters for quickly adjusting the same to predetermined positions, means for locking said threaded shaft against endwise movement during the period of its rotation, and means actuated by the work-feed mechanism to rotate said shaft and cause the latter to draw one of the side cutters inward toward the blank with a progressive movement.

5. In a stave-dressing machine, the combination with side cutters, and work-feed mechanism one of the cutters being movably mounted on a movable support, of a threaded shaft mounted for revoluble and endwise movement, means connecting said shaft with said cutters, means connected with the shaft to give endwise adjustment thereto to move one of the cutters laterally and also connected with the cutters for adjusting them in angular positions on the introduction of work thereto, an automatic locking mechanism for restraining the shaft against movement during the advancement of work between the cutters, driving mechanism for rotating the shaft simultaneously with the advancement of work between the cutters, means for moving one of the cutters toward the blank from the rotating shaft, and means for returning the parts to normal positions subsequent to the passage of the work beyond the range of the cutters.

6. In a stave-dressing machine, the combination with companion cutters, and a work-feed mechanism, of a vertical rock-shaft linked to both of said cutters to insure simultaneous adjustment thereof, a setting-arm connected with the rock-shaft, a shaft shiftable by the setting-arm, a connection between the shaft and one cutter for moving said cutter laterally, means for rotating the shaft subsequent to its adjustment by the setting-arm, and means for moving one of the cutters when the shaft is rotated.

7. In a stave-dressing machine, the combination with a pair of companion side cutters, one of the cutters being pivotally mounted on a swinging support, and a work-feed mechanism, of means connecting the cutters to simultaneously adjust them to different angular positions relative to the path of feed of the work, a setting device disposed in the path of the work and connected with said means for operating the same, a threaded shaft with which the setting device is connected, a connection between the shaft and the cutter mounted on the swinging support for moving

said cutter when the shaft is rotated, and means for operating the shaft from the work-feed mechanism.

8. In a stave-dressing machine, the combination with work-feed mechanism, of pivoted carrying-heads disposed on opposite sides of the path of feed and having means to restrict the angular adjustment thereof, side cutters mounted individually in said heads and adjustable therewith, a vertical rock-shaft, an operative connection between the shaft and the said heads, a setting-arm, and a connection between the said rock-shaft and the setting-arm for operating the former from the latter.

9. In a stave-dressing machine, the combination with companion side cutters, one of the cutters being movably mounted in a movable support, a work-feed mechanism, and work-actuated setting devices connected with said side cutters, of a shiftable and revoluble shaft, means connecting the shaft with the cutters for adjusting them in angular positions, a connection between said shaft and one of the cutters for moving it laterally, a locking-bar connected with said shaft and shiftable therewith, means for rotating said shaft subsequent to adjustment by the setting devices, and means for locking the bar and the shaft against endwise movement during the rotation of the shaft.

10. In a stave-dressing machine, the combination with a work-feed mechanism, companion side cutters, one of the cutters being movably mounted on a movable support and setting devices connected with said side cutters, of a threaded shaft connected with said setting devices to be shiftable therewith and also connected to one of said side cutters, a train of gearing propelled from said work-feed mechanism and to rotate said threaded shaft subsequent to the adjustment thereof by the setting devices and during the period of advancement of the work between the side cutters, and work-actuated means to throw the gear-train into service.

11. In a stave-dressing machine, the combination with companion side cutters, a feed-chain, and a setting mechanism having operative connection with said side cutters, of a screw-threaded shaft, a connection between the shaft and one of the said side cutters to draw it toward the line of feed of the work with a progressive movement, a swinging frame moving on an axis concentric with the said shaft, a sprocket-wheel in the free end of the frame, a train of gearing mounted in said frame and geared with the screw-threaded shaft, and the sprocket-wheel and work-holding means connected to the swinging frame and operating to hold the sprocket-wheel into engagement with the feed-chain.

12. In a stave-dressing machine, the combination of a pivoted trip-arm disposed in the path of feed of the work, adjustable side cutters, a shaft, a connection between the said shaft and one of the cutters to draw said cutter toward the line of feed of the work, a frame hung on said shaft and supported at its free end by said trip, a sprocket-wheel in the free end of the frame, a feed-chain, and a gear-train mounted in the frame and gearing with the shaft and sprocket-wheel, said sprocket when the frame is raised meshing with the feed-chain.

13. In a stave-dressing machine, the combination with side cutters, and a feed-chain, of a rock-shaft having a trip-arm which is disposed in the path of feed, a revoluble shaft connected with one of the side cutters to draw it toward the line of feed of the work, a shiftable frame hung on said shaft, a link connection between the frame and the rock-shaft, a train of gearing mounted in the frame, and a sprocket-wheel mounted in the free end of the frame and geared with the gearing thereof, said sprocket-wheel when the frame is raised having intermeshing engagement with the feed-chain.

14. In a stave-dressing machine, the combination with cutters, and a feed mechanism, of a revoluble and endwise-movable shaft, a connection between one of the cutters and said shaft to draw the said cutter toward the line of feed with a progressive movement, a swinging frame, a train of gearing in the frame and geared with the said shaft, a trip-arm in the path of feed, means for operating the swinging frame the trip-arm to move the gearing of said frame in engagement with the feed mechanism, and means for locking said shaft against endwise movement when revolved.

15. In a stave-dressing machine, the combition with cutters, and a feed-chain, of a revoluble and endwise-movable shaft, a connection between the shaft and one of the cutters to draw said cutter toward the line of feed with a progessive movement, a swinging frame mounted on said shaft, a train of gearing in the frame and geared with the shaft, a sprocket-wheel in the free end of the frame and driven by said gearing, a trip-arm in the path of feed, means for operating the said frame from the trip-arm to bring the sprocket-wheel into mesh with the feed-chain, and means for locking the said shaft against endwise movement when revolved.

16. In a stave-dressing machine, the combination with side cutters, of a threaded shaft operatively connected with one of said cutters, setting devices for preliminarily adjusting the threaded shaft and through the shifting of the said shaft the side cutters to variable positions according to the width of the blank, shaft-locking devices for restraining the shaft against shifting adjustment subsequent to the operation of the setting devices, means for driving said threaded shaft while under the restraint of said locking devices, and means for restoring the threaded shaft and the cut-

ters to normal positions after the passage of a stave-blank.

17. In a stave-dressing machine, the combination with side cutters, of a threaded shaft connected with one of said cutters, setting devices for shifting the shaft and adjusting the side cutters through the shifting of the said shaft, a shiftable bar movable endwise with said shaft, means for rotating the shaft, and means for automatically locking said bar and the shaft when the shaft-driving devices are in service.

18. In a stave-dressing machine, the combination with side cutters, of a threaded shaft having collars, setting devices for shifting the shaft and adjusting the cutters through the shifting of the said shaft, a locking-bar provided with an arm which engages with said collars, a cam-formed lever arranged to impinge said locking-bar, a work-feed mechanism, and means for rotating the said threaded shaft and for actuating said cam-formed lever.

19. In a stave-dressing machine, the combination of a cutter-carrying head comprising a member mounted to swing on a horizontal pivot, and a second member hinged to first member to swing on a vertical pivot and carrying the cutter, a shaft mounted to rotate, and connection between the said shaft and the member of the head carrying the cutter, for swinging said member on its pivot.

20. In a stave-dressing machine, the combination of a cutter-carrying head comprising a member mounted to swing on a horizontal pivot, and a second member hinged to the first member to swing on a vertical pivot and carrying the cutter, a threaded shaft mounted to rotate, a nut on the shaft, and a connection between the nut and the free end of the said second member of the carrying-head.

21. In a stave-dressing machine, the combination of a cutter-carrying head comprising a member mounted to swing on a horizontal pivot, and a second member hinged to the first member to swing on a vertical pivot, said second member carrying the cutter, a shaft mounted to rotate, means for rotating said shaft, a connection between the shaft and the second member of the carrying-head for operating the latter from the former, a setting-arm, and a connection between the setting-arm and the first member of the carrying-head to swing it on its pivot.

22. In a stave-dressing machine, the combination of a cutter-carrying head comprising a member mounted to swing on a horizontal pivot, and a second member hinged to the first member to swing on a vertical pivot, said second member carrying the cutter, a threaded shaft mounted to rotate, means for rotating said shaft, a nut on the shaft, a connection between the nut and the free end of the second member of the carrying-head, a setting-arm, and a connection between the arm and the first member of the carrying-head.

23. In a stave-dressing machine, the combination with a cutter-head support comprising a member mounted to swing on a horizontal pivot, and a second member pivoted to the first member to swing on a vertical pivot, of a shaft mounted to slide endwise and with which the second member of the cutter-head support is connected, a setting-arm, and a connection between said arm and the first member of the cutter-head.

24. In a stave-dressing machine, the combination with a cutter-head support having a member pivoted to swing on a horizontal pivot, and a second member pivoted to the first member to swing on a vertical pivot, of a sliding shaft with which the second member of the cutter-head support is connected to move therewith, a setting-arm, a vertical rock-shaft, a connection between the setting-arm and rock-shaft, and a connection between the said rock-shaft and the first member of the cutter-head support.

25. In a stave-dressing machine, the combination with pivotally-mounted cutter-heads, of a vertical rock-shaft, a link connection between the rock-shaft and each cutter-head, a setting-arm, and means for operating the rock-shaft from the setting-arm.

26. In a stave-dressing machine, the combination with pivotally-mounted cutter-head, and a second cutter-head support comprising a member mounted to swing on a horizontal pivot and a second member pivoted on the first member on a vertical pivot, of a revoluble and sliding threaded shaft, a traveler on the said shaft and connected with the second member of the said cutter-head support, a setting-arm engaging said shaft to move the same, a vertical rock-shaft, a connection between one end of the rock-shaft and one of the cutter-heads, a connection between the other end of the shaft and the first member of the other cutter-head support, means for operating the rock-shaft from the setting-arm, and means for revolving the screw-shaft.

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

ALBERT LAWRENCE SHAW.

Witnesses:
R. B. SPOFFORD,
F. S. BROWN.