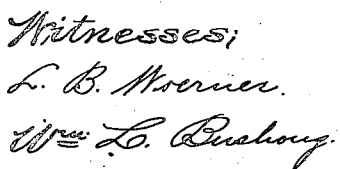


1,052,919.

4 SHEETS—SHEET 1.



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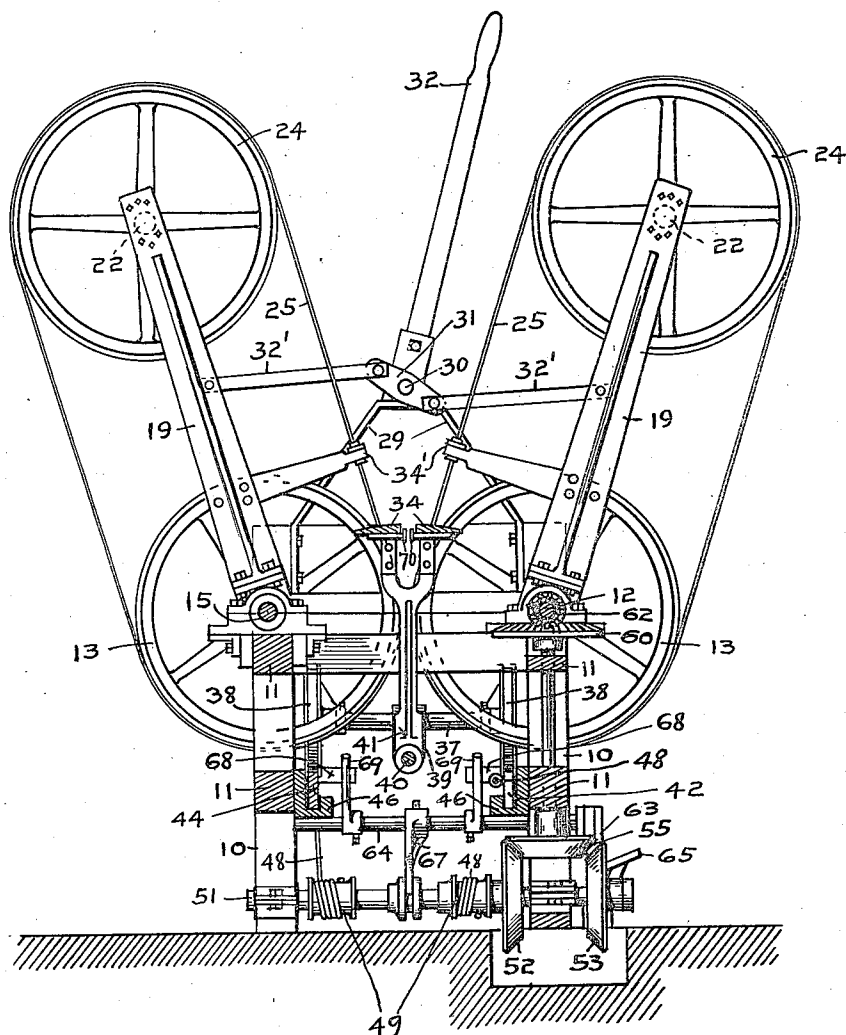
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F. HILL.
STAVE FORMING MACHINE.
APPLICATION FILED AUG. 29, 1911.

Patented Feb. 11, 1913.

4 SHEETS-SHEET 2.

Fig. 2.



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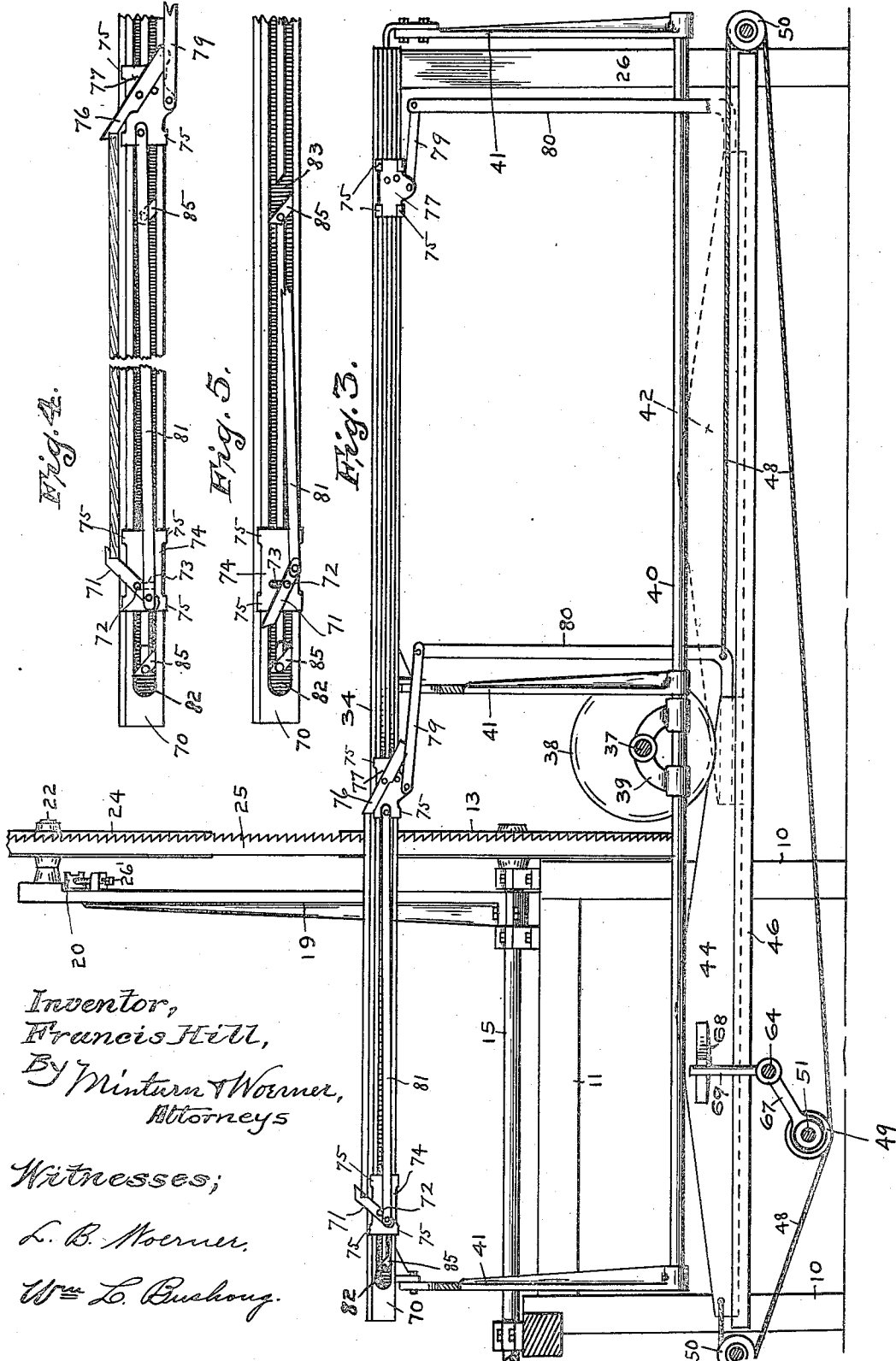
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4 SHEETS-SHEET 3.

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4 SHEETS—SHEET 4.

Fig. 8.

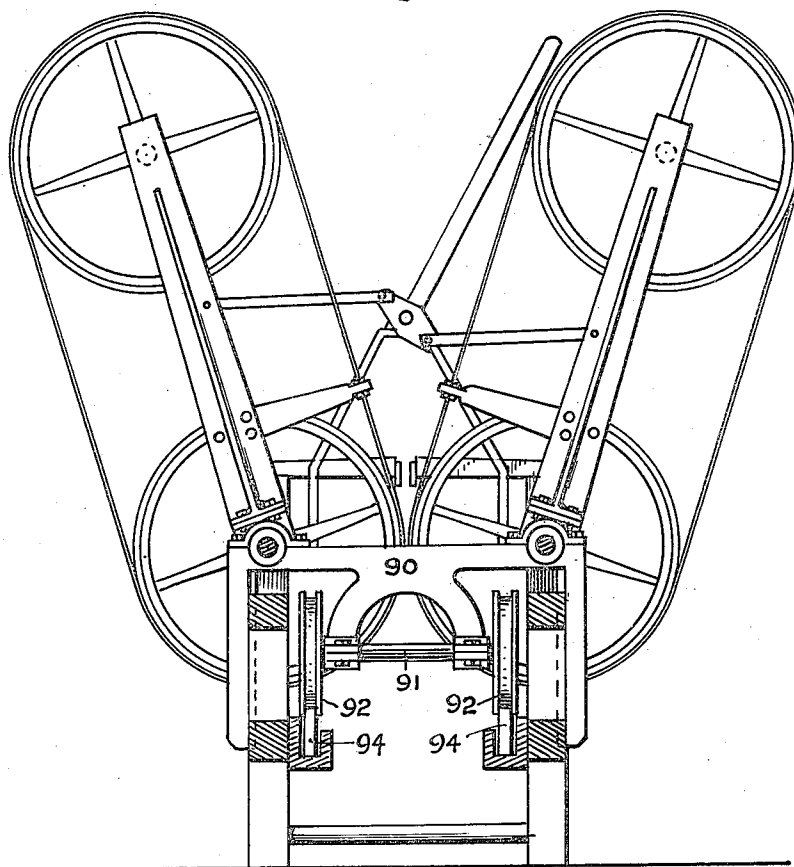
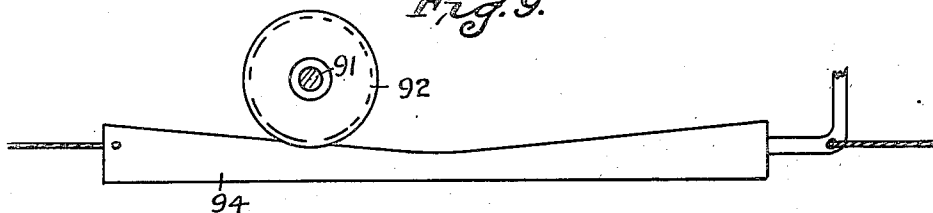


Fig. 9.



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UNITED STATES PATENT OFFICE.

FRANCIS HILL, OF INDIANAPOLIS, INDIANA.

STAVE-FORMING MACHINE.

1,052,919.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed August 29, 1911. Serial No. 646,714.

To all whom it may concern:

Be it known that I, FRANCIS HILL, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Stave-Forming Machines, of which the following is a specification.

The object of this invention is to provide a machine which will simultaneously and automatically saw both of the curved longitudinal edges of a barrel stave, properly proportioning the curves of the edges to the width of the stave to secure the proper bilge to the barrel, and beveling the edges to make proper radial joints between the assembled staves.

I accomplish the objects of the invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a view in side elevation of a stave-forming machine embodying my invention; Fig. 2 a vertical section on the line 2—2 of Fig. 1; Fig. 3 a longitudinal central section on a larger scale; Fig. 4 a detail in elevation of one member of the longitudinally divided table showing the stave-clamping mechanism in operative position; Fig. 5 a like view showing the retracted position of one of the clamps; Fig. 6 a top plan view and Fig. 7 a cross section on the line 7—7 of Fig. 6, of a stave blank in which the saw-courses are indicated by dotted lines; Fig. 8 a cross section similar to Fig. 2 of a modified form in which the stave-supporting table is stationary while the saws are vertically adjustable to form the bilge in the stave, and Fig. 9 a detail in side elevation of the cam and wheel for adjusting the saws in the modified construction.

Like characters of reference indicate like parts throughout the several views of the drawings.

10 are the vertical posts of that part of the machine frame which supports the saws and 11 are longitudinal timbers supporting the posts.

12 is the main driving shaft which is mounted horizontally above the upper timber 11. Mounted on the inner end of shaft 12 is a wheel 13 which constitutes the lower one of a pair of band-saw wheels. Mounted on the outer end of shaft 12 is a pulley 14 to which power is applied from any suitable source by means of a belt. (Not shown.) Mounted above the timber 11 on the oppo-

site side of the machine is a shaft 15, on the inner end of which is a band-saw wheel 13 similar to the one on shaft 12. Each shaft 12 and 15 has a pulley 16 and the two pulleys are belted together so as to be driven in opposite directions, in the usual manner. (Not shown.) The shafts 12 and 15 have upwardly extended arms 19 mounted on them near their inner ends, and the upper ends of each arm 19 is provided with a slide-way to receive an adjustable plate 20 having a stud-shaft 22 upon which an upper band-wheel 24 is mounted. Each pair of wheels 13 and 24 is connected by a band-saw 25, and the saws are tightened on their wheels by moving plates 20 by means of set-screws 26.

Located on the opposite sides of wheels 13 from posts 10 are the vertical posts 26 which are connected in side pairs by a continuation of the lower horizontal timbers 11. The tops of each side pair of posts 26 are connected by horizontal timbers 27. Supported from posts 26 and timbers 27 are standards 29 which support a horizontal rock-shaft 30. On the end of shaft 30, next to the band-saws, is a cross head 31, each arm of which is connected by link-bar 32' with the nearest one of the band-wheel arms 19. On the other end of the shaft 30 is a hand lever 32 by which the shaft is rocked to thereby vary the distance apart of the arms 19. Saw-guides 34' are supported from the arms 19.

The blanks from which the staves are to be sawed are fed endwise against both saws and the beveled edges are cut on the staves by reason of the oblique positions of the saws, as clearly shown in Fig. 2. When a narrow stave is to be sawed the saws are brought closer together by manipulating the hand-lever 32, which correspondingly reduces the bevel as it should be, and for wider staves the saws are separated, thereby correspondingly increasing the bevel. The gradually increasing width of the finished stave from each end to the middle, to give the bilge to the barrel, is secured by suitably raising and lowering a table along which the blank is moved into contact with the saws, and I will now describe this construction.

The table 34 has vertical and not longitudinal or lateral movement. It is divided transversely at the saws to allow for the unobstructed adjustment and operation of the

latter, and it is also divided longitudinally midway of the saws for the free travel between the two parts thus formed, of a double set of clamping dogs which grasp the stave-blank and have a travel in alternate opposite directions between the two parts of the table longitudinally of the latter. Journalled in vertically adjustable blocks 36, is a transverse shaft 37, on which is mounted a pair of peripherally grooved or channeled wheels 38, and mounted on the shaft between the two wheels 38 is a yoke 39, the depending arms of which terminate with journal boxes in which a shaft 40, extending longitudinally of the machine, is mounted. This shaft has standards 41 at its ends, and between, which support the table 34, the upper ends of the standards being bifurcated to furnish a support for each side-division of the table and to allow the clamping dogs to pass.

By the above described construction, a vertical movement of the wheels 38 will correspondingly raise and lower the table as a whole. This raising and lowering of wheels 38 is accomplished by a pair of sliding cams 42 and 44, one on each side of the machine operating in runs 46 secured to the inner walls of the lower timbers 11. These cams are drawn back and forth in their runs by cables 48 which are wrapped with several turns around corresponding rotating drums 49 and have their ends secured to the opposite ends of their respective cams after passing around pulleys 50 at the ends of said runs 46.

A shaft 51 on which the drums 49 are mounted, has a pair of spaced-apart, oppositely beveled friction wheels 52 and 53, between which, on the lower end of a vertical shaft 54, is a beveled friction wheel 55. The shaft 51 has a limited longitudinal adjustment whereby one or the other of the bevel friction wheels 52 or 53 is brought into driving contact with wheel 55, or placed in a position where both wheels 52 and 53 are out of contact with wheel 55. Mounted on the upper end of shaft 54 is a bevel gear 60 which meshes with a pinion 62 on shaft 12. Motion of rotation is thus transmitted from shaft 12 to shaft 54, and the shaft 51 may be driven in a forward or a reverse direction, depending upon which of the friction wheels 52 or 53 is in driving contact with the friction wheel 55.

A shaft 64 is mounted transversely of the machine and is adjustable longitudinally. One end projects on the side where the operator stands and terminates with a channeled disk which engages a yoke on an arm 63 mounted on a rock-shaft 64 having foot pedals 65 and 66, by which the shaft is rocked, thereby moving shaft 64 longitudinally. The shaft 64 has an arm 67 which terminates with a yoke that engages a chan-

nel in a disk on shaft 51, whereby, when the shaft 64 is moved longitudinally by the foot pedals the shaft 51 will be correspondingly moved. The shaft 64 also has a pair of arms 69 which are contacted by cams 68 on the inner sides of the cams 42 and 44, the cams 68 being so placed that they will strike their respective arms and move the shaft 64 to move shaft 51 to throw the friction wheels of the latter out of contact and stop the travel of cam 42 or 44, as the case may be, when the cam has reached the ends of its run. I prefer to adjust the above automatic stop so the friction wheels will be left out of contact, leaving the operation of throwing the machine into contact to the discretion of the operator.

I will now describe the construction and operation of the clamping-dogs which travel back and forth between the two parts of the longitudinally divided table to carry the stave material to the saws and then away therefrom. It is essential that the dogs for this purpose shall be in coöperative pairs to grasp the ends of a stave, and shall be adjustable in their distance apart to handle stave material of varying lengths. It is also important that the dogs shall automatically release the stave when it has reached the end of its travel after passing the saws, and shall disappear below the top of the table on their return travel so as not to interfere with the next stave. The sliding cams 42 and 44 will each control one pair of clamping-dogs which travel the full length of the table, along vertical guide-plates 70, 70, one of which plates is fastened to each longitudinal middle edge of the divided table. The pair of clamping dogs controlled by sliding cam 42 operates in connection with the guide-plate 70 on the near edge, and the pair operated by sliding cam 44 operates in connection with the plate 70 on the far edge, which, being more convenient to illustrate in Figs. 3 to 5, inclusive, will be described, it being understood that the clamping dogs for the near plate differ only in a reversed assembling to suit the oppositely placed plate 70. The front dog 71 has a pivot pin 72 which passes through a slot 73 in a plate 74. The plate 74 has edge hooks 75 which loosely engage the edges of plate 70 to retain plate 74 in position while allowing it to slide freely on plate 70. The rear dog 76 is pivoted to a plate 77 with edge hooks 75 by which it is slidably secured to plate 70 in the same manner as described for plate 71. The plate 77 is connected by bar 79 with a standard 80 carried by the sliding cam 44, and the dog 71 is connected with the rear plate 77 by a bar 81, the attachment to the dog being at its lower end below its pivot. The plate 70 has two longitudinal slots to receive the inner projecting end of pivot pin 72, and the slots

communicate with each other at 82 and 83 to allow pin 72 to pass from the upper to the lower slot at 82 and from the lower to the upper at 83. These communications 82 and 83 are guarded by gravity pawls 85 which keep the pin from traveling backward. The dog 76 is weighted below its pivot to cause its upper end to stand normally above the table within limits fixed by a pin 89 on plate 77.

The operation is as follows: A stave-blank is placed upon the table equally spaced with relation to the slot in the table top, and is pushed forward until its rear end clears dog 76 allowing the latter to rise above the table. The distance apart of the saws is adjusted by means of hand lever 32 to suit the width of the blank, and the machine is started. The plate 77 is moved toward the saws and toward plate 74 causing the front dog 71 to swing up into contact with the front end of the stave-blank, and the continued pressure causes the blank to be firmly grasped between the two dogs. When the ends of the slots in plate 70 are reached the pin 72 is forced down into the lower slot thus releasing the dog from the stave and the backward travel of plate 77 draws the dog 71, through connection with bar 81, into the position shown in Fig. 5 which is below the upper face of the table, and the stave is left to be pushed off of the table by the next stave, under which the two dogs 71 and 76 will pass without in any way obstructing it.

In the modification shown in Figs. 8 and 9, the two band saws and their supporting wheels and frames are mounted on a single frame 90 which is capable of vertical adjustment. It has a shaft 91 on which are two grooved wheels 92 which have their bearings upon longitudinally sliding cams 94, operated in the same manner as the cams 42 and 44, already described, for the purpose of raising and lowering the saws while the table remains in a fixed position, instead of raising and lowering the table while the saws remain fixed, as illustrated in the previously described figures of the drawings. In the modification shown in Fig. 8 the cams are required to be shaped in a reverse order from cams 42 and 44, or lowest at the middle and highest at each end in order to give the required middle expansion to the stave to make the bilge in the barrel. This shape is illustrated in Fig. 9.

Having thus fully described my invention, what I claim as new and wish to secure by Letters Patent of the United States, is—

1. In a stave-forming machine, a vertically adjustable saw-table to support the stave material, a pair of band saws having band wheels under the table with peripheral portions close together, shafts supporting said wheels, a band wheel for each saw lo-

cated above the table, arms supporting said upper wheels having swinging adjustment on the respective shafts of their lower band wheels, means to regulate the distance apart of said arms, a pair of sliding cams, means controlled by sliding cams to raise and lower the table as the material passes the saws to gradually increase the width of the stave from each end, winding drums, cables wound on said drums and connected with the sliding cams, means for independently rotating the drums, and means operated from the cams for alternately rotating the drums.

2. In a stave-forming machine, a vertically adjustable saw table to support the stave material, a pair of band saws having band wheels under the table with peripheral portions close together, shafts supporting said wheels, a band wheel for each saw located above the table, arms supporting said upper wheels having swinging adjustment on the respective shafts of their lower band wheels, means to regulate the distance apart of said arms, sliding cams, means controlled by the sliding cams to raise and lower the table as the material passes the saws to gradually increase the width of the stave from each end, a driving shaft, a driven shaft, a loose and a fixed drum on said shaft, cables wound on said drums and connected with and operating the sliding cams, and means for alternately driving the last drum and the loose driven drum from the driving shaft.

3. In a stave-forming machine, a pair of traveling cams, a table to support the stave-material capable of vertical movement and having means to contact with said cams to raise and lower the table, a pair of stave-cutting members oblique to the table, clamping-dogs to grasp and hold the stave-material, and means to impart a travel of the clamping-dogs longitudinally of the table.

4. In a stave-forming machine, a pair of traveling cams, a table to support the stave-material capable of vertical movement and having means to contact with said cams to raise and lower the table, a pair of stave-cutting members oblique to the table, a double pair of clamping-dogs each adapted to grasp and hold a stave-blank, means actuated by connection with said traveling cams for imparting a reciprocating travel in opposite directions longitudinally of the table to each pair of clamping dogs, and means to prevent the returning pair of dogs from interfering with the work of the other pair.

5. In a stave-forming machine, a pair of traveling cams, a table to support the stave-material capable of vertical movement and having means to contact with said cams to raise and lower the table, a pair of stave-cutting members oblique to the table, a pair of clamping dogs each adapted to hold and

grasp a stave blank, means actuated by connection with the traveling cams for imparting a reciprocating travel in opposite directions longitudinally of the table to each pair
5 of clamping dogs, means to cause the dogs to release the stave, and means to cause them to be lowered below the top of the table on their return travel.

In witness whereof, I, have hereunto set my hand and seal at Indianapolis, Indiana, 10 this 19th day of August, A. D. one thousand nine hundred and eleven.

FRANCIS HILL. [L. S.]

Witnesses:

F. W. WOERNER,
JOSEPH A. MINTURN.