No. 650,820. Patented June 5, 1900.

G. W. BUGBEE & F. DANNER.

TENONING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.)

5 Sheets—Sheet 1.

FIG. 8.

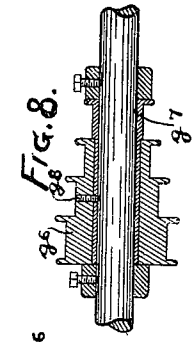
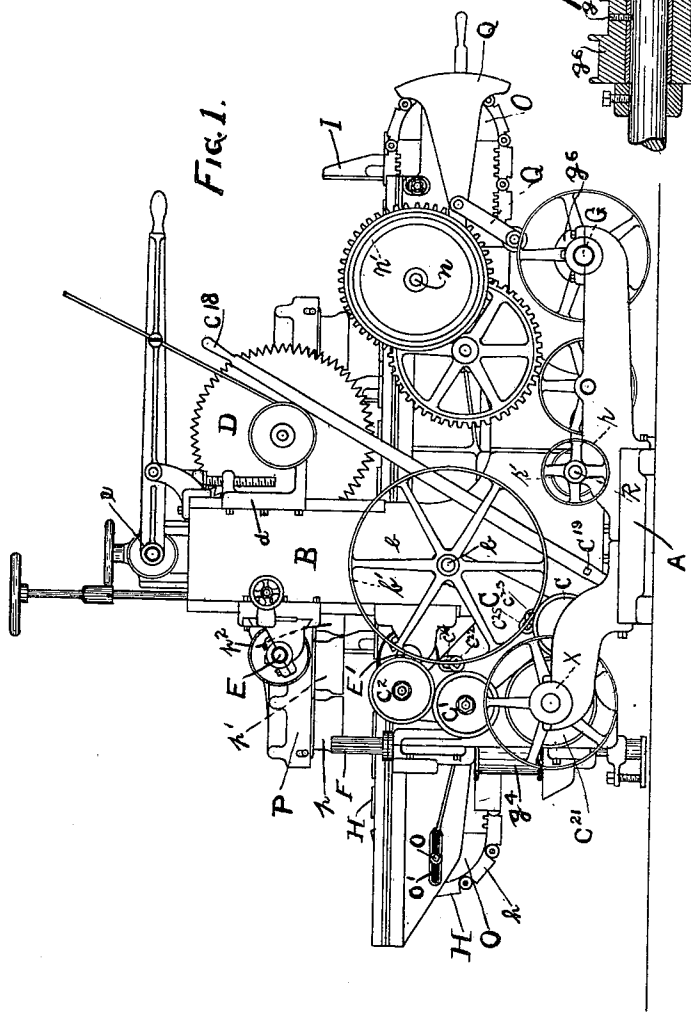


FIG. 1.



WITNESSES.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 650,820. Patented June 5, 1900.

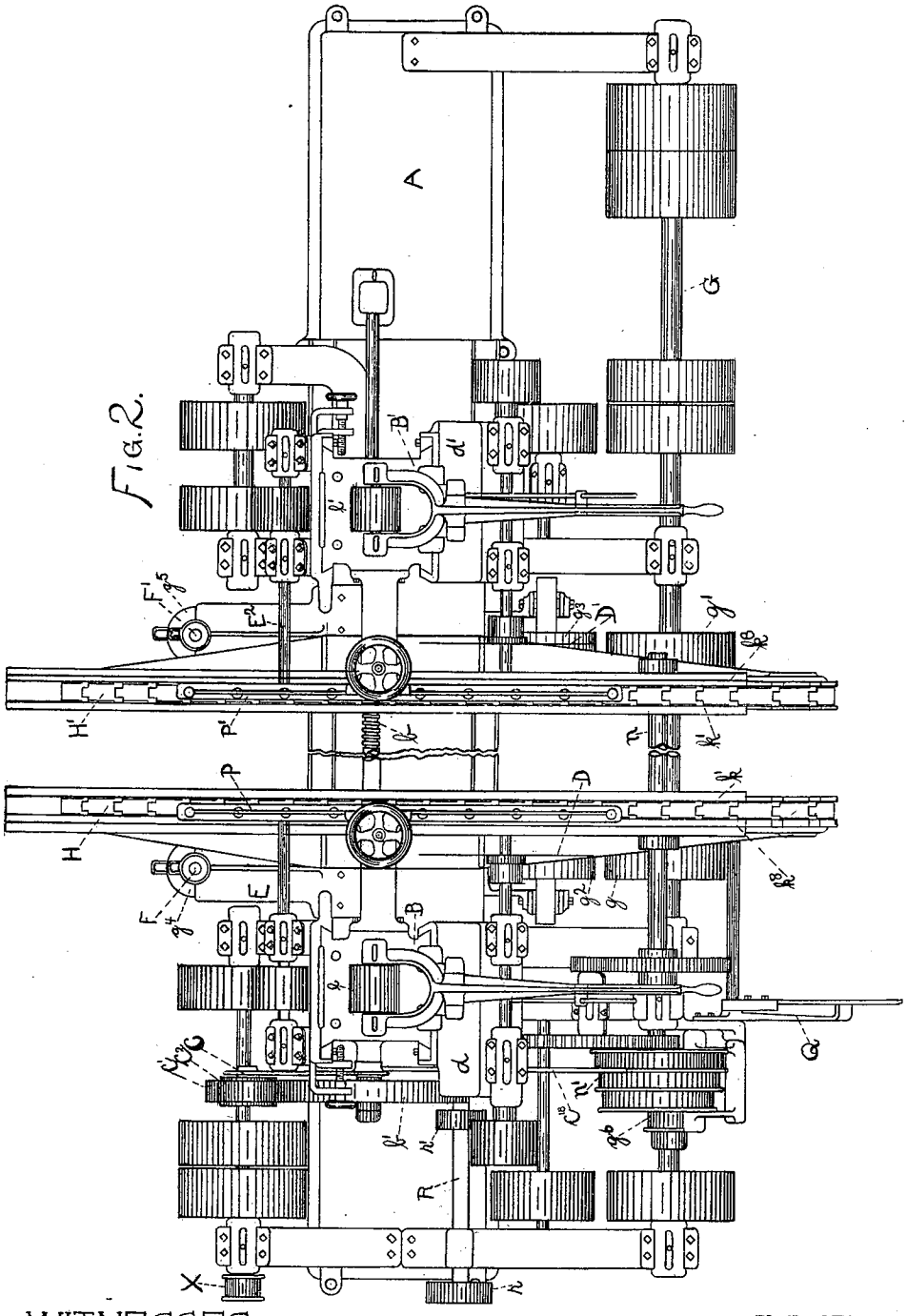
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TENONING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.) 5 Sheets—Sheet 2.

FIG. 2.



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No. 650,820. Patented June 5, 1900.

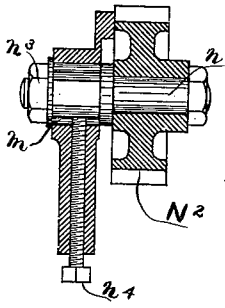
G. W. BUGBEE & F. DANNER.

TENONING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.) 5 Sheets—Sheet 3.

FIG. 5.



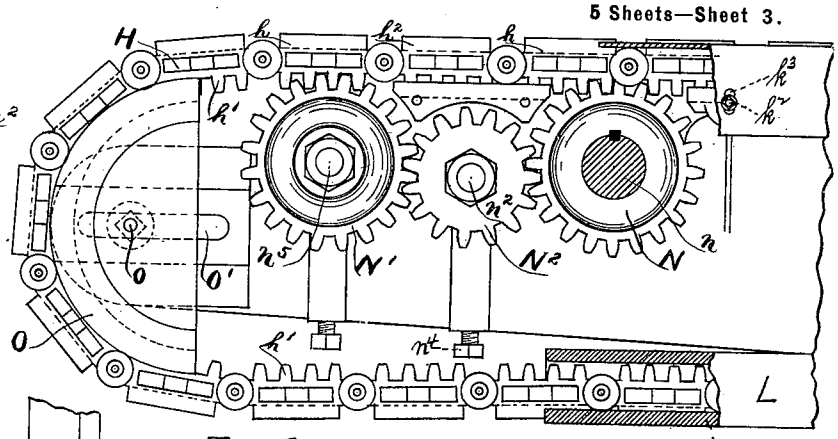


FIG. 3.

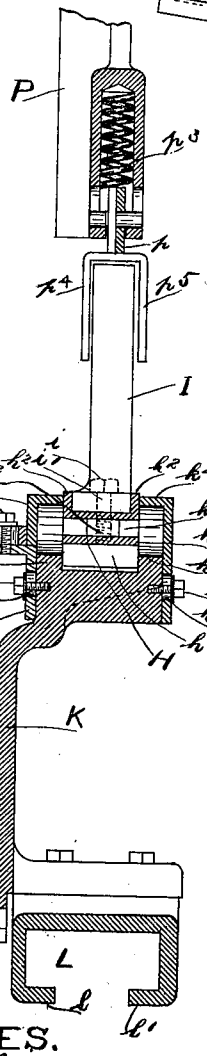
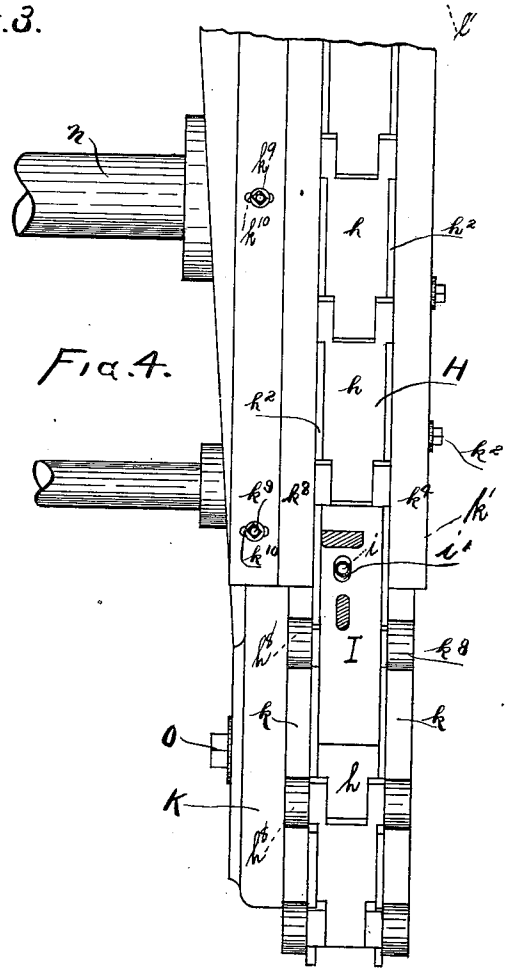


FIG. 6.

FIG. 4.



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No. 650,820.

Patented June 5, 1900.

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TENONING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.)

5 Sheets—Sheet 4.

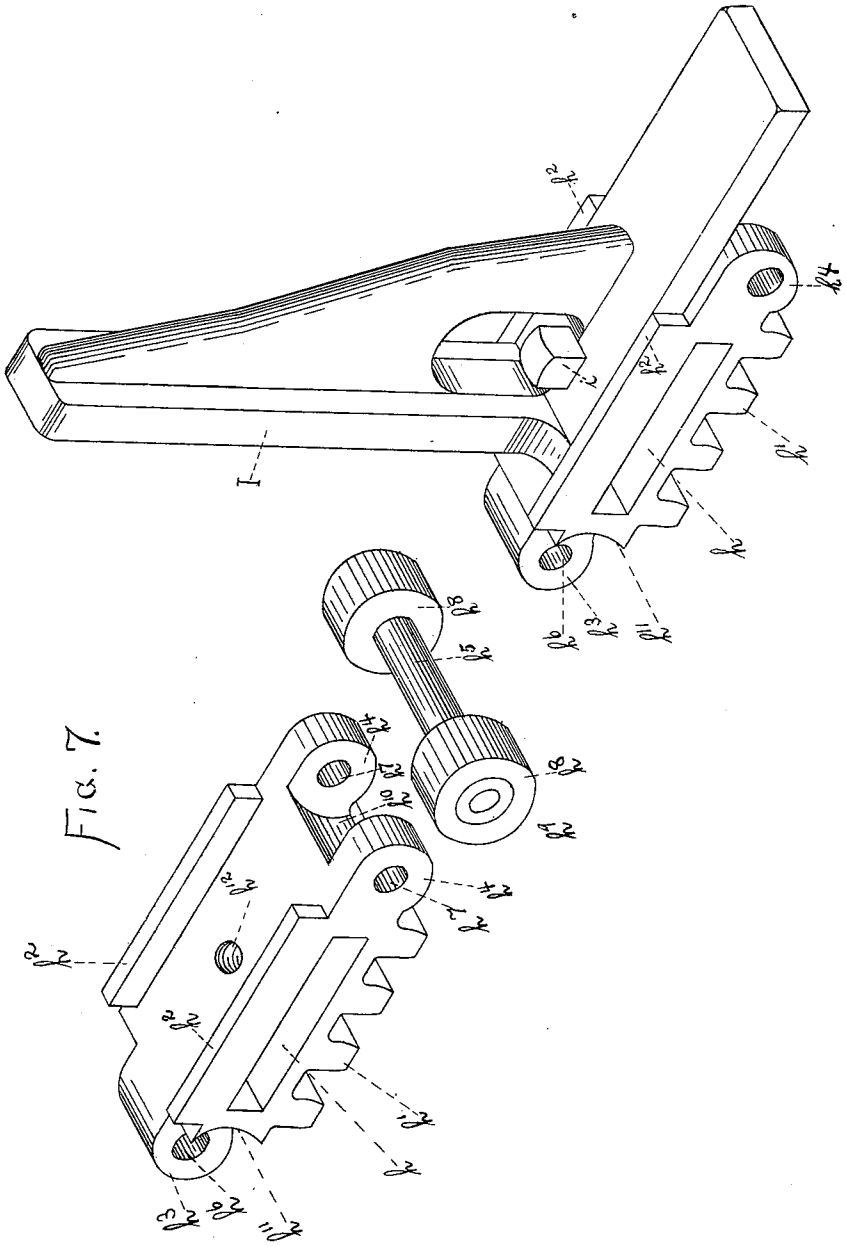


FIG. 7.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 650,820. Patented June 5, 1900.

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TENONING MACHINE.

(Application filed Dec. 20, 1897.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 9.

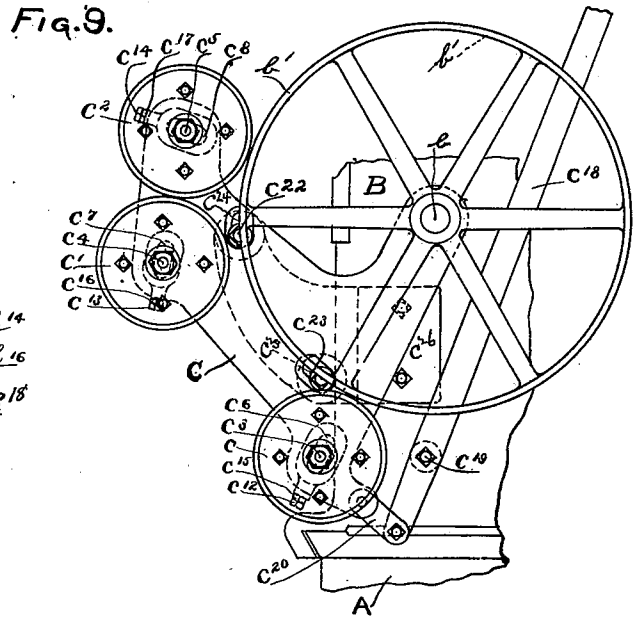


Fig. 11.

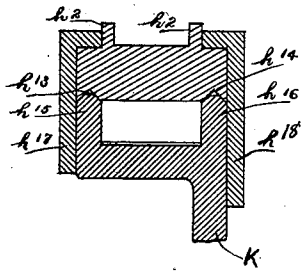
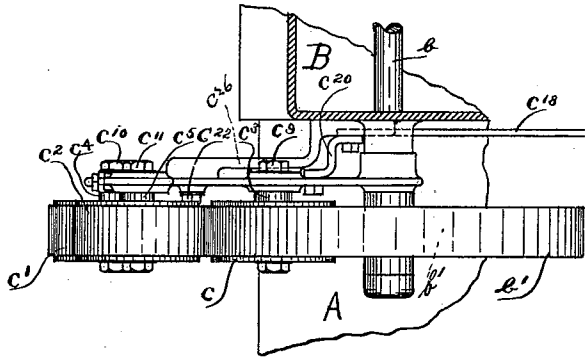


Fig. 10.



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UNITED STATES PATENT OFFICE.

GEORGE W. BUGBEE, OF DELHI, AND FREDERICK DANNER, OF HYDE PARK, OHIO, ASSIGNORS TO THE J. A. FAY & EGAN COMPANY, OF CINCINNATI, OHIO.

TENONING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 650,820, dated June 5, 1900.

Application filed December 20, 1897. Serial No. 662,578. (No model.)

To all whom it may concern:

Be it known that we, GEORGE W. BUGBEE, residing at Delhi, and FREDERICK DANNER, residing at Hyde Park, in the county of Hamilton and State of Ohio, citizens of the United States, have invented a certain new and useful Improvement in Tenoning-Machines, of which the following is a specification.

Our invention relates more particularly to double end-tenoning machines; and it consists in the novel means for adjusting the traveling standard of the machine, in the peculiar means for supporting the stock as it is fed through the machine, in the novel construction of the traveling chain whereby accuracy in results is obtained and wear prevented, and in the parts and the construction, arrangements and combination, of parts hereinafter more fully described and claimed.

In the drawings, Figure 1 is an end elevation of our improved device; Fig. 2, a plan view of the same; Fig. 3, a side elevation, partly in section, showing the traveling chain and means for propelling the same; Fig. 4, a plan view of the same; Fig. 5, a sectional view of the idler-gear for the chain; Fig. 6, a cross-section of the runner for the chain, showing the chain and pressure device; Fig. 7, a detail in perspective of the chain-links, connecting-pin, and idler for supporting the same; Fig. 8, a sectional view of the lower feed-cone; Fig. 9, a side elevation of the standard-adjusting mechanism; Fig. 10, a plan view of the same, and Fig. 11 a modification of the chain and track.

A represents the base of the machine, on which standards B B′ are supported. The standard B is intended to remain stationary, while the standard B′ is adjustably supported on the base, traveling to and from the standard B on suitable planed and gibbed ways. The standards B B′ are provided with suitable cutting agencies.

D D′ are saws mounted in housings d d', preferably in advance of the standards, so that the material may be cut to size before passing to the tenoning-heads.

E E′ E^2 are tenoning-shafts for carrying suitable tenoning-heads. Belt-tighteners e e' are provided for the belts operating these heads.

F F′ are vertical spindles for cope or other suitable cutters for undercutting the respective ends of material. These vertical spindles are driven from pulleys g g' on the main shaft G, the belt passing from these pulleys over idlers g^2 g^3 and thence through an opening in the standard to pulleys g^4 g^5 on the vertical shaft.

H H′ are traveling chains, which from their peculiar construction serve the purpose of a table for the material and at the same time pass the material through the machine past the cutting agencies, preserving the strict position of the material with relation to the table and the cut which is so necessary in doing accurate work. In machines of this character as heretofore constructed it has been the practice to force the material through the machine while supported by a stationary table or ledges or by the action of feeding-chains serving to pull the material through the machine in such manner that the action of the force exerted on the feeding-chains tended to separate the component links of the chain, causing both the feeding action and the wear caused by the travel of the chain to be exerted in the same direction. In these constructions there is friction between the table and the material, or the wear of the chain links and pins quickly produces a variance in the length of the respective chains which is communicated to the product, all of which we obviate in our improved device. In our improved construction frictional contact between the stock and the table is removed, as the chain-tables directly support the stock and carry it with them in their movement, and the chain-tables are pushed through the machine in a manner to cause their component links to approach, meet, and be supported by each other through the entire distance from the point where the feeding force is first exerted past the point of action of the last cutting agency, giving to the stock a continuous feed in perfectly-parallel lines against a series of cutting agencies acting to retard that feed, pushing both ends of the material simultaneously in parallel lines, and capable of being moved to and from each other for different lengths of stock. To accomplish these objects, the chains are each composed

of a series of links provided with teeth adapted to mesh with gears on a shaft mounted at the feeding-in end of the standards and adapted to push the chains from the feeding-in end rearwardly past the cutting agencies in the manner hereinafter described. The material is also cut off in perfectly-parallel lines by the saws cutting in advance of the tenon-cutting agencies. The cutting-off is done in perfectly-parallel lines by means of the parallel pushing-feed herein shown, described, and claimed. The tenon-cutters take off the "bur" left by the saws and leave the stock ready for joining without cleaning the edges and also avoid any preparatory cutting of the stock to lengths necessary in old constructions where the cutting-off saws cut after the tenoning-cutters perform their operation. The chains H H' consist of a series of links h, having teeth h' on their lower sides or inner faces, as formed by the chain-loop. Their upper faces are provided with extensions h^2, which project above the adjustable plates secured to the chain-housings and form a traveling table for the material, the material resting directly on these extensions and passing through the machine thereon. The links are provided at their ends with ears h^3 h^4 h^4, having a pin h^5 passing through openings h^6 h^7 h^7 in the ears. The pin is preferably fastened stationarily in the openings h^7 h^7 to prevent turning. The ends of the pin are provided with idlers h^8 h^8, held thereon by means of washers h^9, secured to the pin. In operation all the wear of the pin caused by its passing over the arched ways at the ends of the chain-loop and its return movement through the channel is confined to one side of the pin and its journal. As soon as the gears mesh into the teeth of the chain the other side of the pin and its journal come into contact and remain relatively stationary until the chain has passed beyond the cutting agencies. We have also shown the ears h^3 h^4 h^4 of the links rounded at their ends on the arc of a circle, being preferably milled, and presenting their faces against shoulders h^{10} h^{11} h^{11}, correspondingly but reversely shaped. A slight play is allowed between the links to permit the abutting surfaces to just clear while the chain is on its return movement and in slack condition, but are arranged to be in close contact, the ends of the ears hugging the shoulders and in such position that no wear will result as soon as the gears operate on these particular links in forcing the chain forward. The construction shown by us therefore allows no wear on the sides of the pins or ends of the links that come in contact when the chain is pushing stock through the machine, insuring accuracy of results at all times. In operation it is important that both chains shall operate uniformly, as any variation in their forward movement will cause a corresponding defect in the product. The cut produced in the machine must be at strictly right angles to the feeding edge of the material passing through the machine, and it will be readily seen that if there is any variance in either of the chains at any point the shoes of the chains will not operate in line with each other, which will result in the feeding edge of the material being out of a line at right angles to the line of cut and a corresponding deviation in the angle of the cut edges from a right angle with the feeding edge. In classes of work where comparatively-short pieces of stock of comparatively-great width were used and the tenons were cut on the wide edge of the stock—that is, where wide tenons had to be cut in parallel lines—the defect caused by the wear in the chain-links in the old constructions, in which pulling-chains were used, was especially noticeable and soon rendered the machine worthless. We obviate any deviation by means of our improved chain, its construction and operation insuring relatively-accurate travel of the chains. The independent chains are pushed simultaneously through the machine from the point where the feeding force is first exerted past the point where the last cutting agency operates in a manner to cause their component links to approach, meet, and be supported by each other without relative movement between the component links between those two points, thereby preventing friction and wear and allowing the component links to slightly recede from each other as soon as the cutting agencies have performed their function, so as to prevent wear between the abutting faces between the links while the latter are returned to position for contact with the moving agency, during which there is relative movement between the links. Means are also provided for adjusting a chain of the character described sidewise bodily to allow for different lengths of stock. The material rests on the extensions h^2 of the chain, which thereby serve the purpose of a table and directly supporting the material, preventing any friction or impingement with other parts of the machine and allowing it a free travel.

I is a shoe attached to and secured to a link by means of a bolt i, passing through the slot i' in the shoe and into an internally-threaded hole h^{12} in the link. The heel of the shoe is sufficiently long to pass beyond the link to which it is fastened above the next following link, so that it may impinge thereon when pressure is brought to bear on its toe and give it a wider bearing-surface.

The chains H H' travel on hangers K, the idlers h^8 traveling on the runners k on the hangers K. To secure accuracy in the work and a nicety in adjustment in the running of the chains, suitable angle-plates k' are fastened to one side of the hanger, bolts k^2 passing through slots k^3 in the plate and into the hanger. This plate has a lip k^4, which takes over the idlers on one side of the chain and, with the adjustment for the idlers of the other side of the machine hereinafter explained,

keeps the chain to its ways, insuring rigidity of the chain in operation when passing through the machine during the cutting operation and accuracy in the work. Suitable plates k^5 are secured to the hanger on its other side by means of bolts k^6, passing through slots k^7, the angle on this plate extending away from the hanger and serving as a shelf for suitable **Z**-plates k^8, fastened thereto by means of bolts k^9, passing through slots k^{10} therein and into the angle-plate k^5, the upper ledge of the **Z** extending over the idlers of the chain. By this construction perfect adjustment may be given to the chain with relation to its runners both horizontally and vertically and perfect alinement given the component links of the chain without abrasive action between them while passing from the point where the feeding force is first exerted past the point where the last cutting agency operates. While passing the cutting agencies, the line of travel of the material is maintained in a straight line at right angles to the axes of the cutting agencies. On their return the chains H H' pass through the channels L, bolted to the hangers, the channels having ledges l l' for supporting the idlers of the chain in their travel.

In Fig. 11 we show an alternative construction of the chain-support. In this construction the links are provided with **V**-ways h^{13} h^{14}, running on **V**-tracks h^{15} h^{16}, the apex of the **V**-track being somewhat blunted to allow for wear and the chain held to its track by means of angle-plates h^{17} h^{18}. The chain is operated by means of gears N N'. The gears N are secured to a shaft n, journaled in the standard B and splined to the standard B', so as to allow the gear to pass along the same when the standard B' is adjusted to and from the standard H. The gear N operates an idler-gear N^2, journaled to a stud n^2 on each of the standards. This stud is secured by a nut n^3 and is given a vertical adjustment in a slot m and held against displacement by means of a bolt n^4. The idler-gear N^2 in turning operates the gear N', meshing with the chain, and, in combination with its mate N, serves to force the chain forward. The gear N' is mounted on a stud n^5, secured similarly to the idler-gear. At the end of the runners the chains pass over arched ways O, one of these ways being rigidly secured to the runner-hanger. The other is preferably adjustable, being secured to the hanger by means of bolt o, passing through a slot o' in the hanger. Pressure-bars P P' are provided for the material and may be raised and lowered by suitable means. Sectional pressure-plates p p' p^2, &c., are secured to the bars, having springs p^3 forcing them to their work. The lower edges of the plates are forked, the tines p^4 p^5, projecting on either side of the shoes I, straddling the same and preferably forming a bearing-surface over each of the extensions h^2 h^2 on the links h and on each side of the shoe, insuring accuracy and efficiency. The shaft n is provided with a suitable cone-pulley n'. A corresponding cone-pulley g^6 is attached to the main shaft G. The belt for driving the gear-shaft n passes from one to the other and is tightened by means of a belt-tightener Q. The cone-pulley g^6 is preferably mounted on a sleeve g^7 and is so constructed that it may either run with the shaft or act as an idler, and when running with the shaft it is secured to the same by means, preferably, of a blind bolt g^8. If it is desired to vary the speed of the machine beyond the scope of the cone-pulley of the main shaft, this blind bolt is unfastened, the cone-pulley thereby becoming an idler, and is then driven through the medium of belts passing over the pulley X to the pulley r on a shaft R, a second belt passing over the pulley r' on the shaft R to one of the sheaves of the cone-pulley g^6. The speed of the cone-pulley may be either increased or decreased, according to the size of the intermediate pulleys. A screw-shaft b, journaled in the standard B, takes into the standard B', having on its end a friction-pulley b'. An apron C is supported on the screw-shaft b and carries friction-pulleys c, c', and c^2, mounted on studs c^3 c^4 c^5, adjustably secured to the apron C. The studs pass through slots c^6, c^7, and c^8 in the apron and are fastened thereto by means of nuts c^9, c^{10}, and c^{11}. Bolts c^{12}, c^{13}, and c^{14}, provided with set-nuts c^{15}, c^{16}, and c^{17}, impinge against the studs, giving them additional stability. The friction-pulleys c and c^2 impinge against the friction-pulley b', being respectively driven in reverse directions when in motion and adjusting the movable standard B' with reference to the standard B. A lever c^{18}, pivoted to the standard B, as at c^{19}, connects with the apron C by means of a link c^{20}, pivotally secured to both the lever and apron. The pulleys c c' are rotated, respectively, by a running friction-pulley c^{21} on the rear shaft of the machine. Normally the friction-pulleys are out of contact with this running pulley; but when an adjustment of the standard B' is desired the lever c^{18} is thrown forward or back, bringing one of the pulleys c c' in contact with the running friction-pulley. The pulley c impinges directly on the pulley b'. The pulley c' impinges against the friction-pulley c^2, driving the latter in the reverse direction and giving to it a motion reverse to that imparted to the friction-pulley c when that is in contact with the running friction-pulley c^{21}. When the desired adjustment has been obtained, the friction-pulleys are brought into their normal position—namely, out of contact with the running friction-pulley—and fastened by means of bolts c^{22} c^{23}, passing through slots c^{24} c^{25} in the apron C and into a plate c^{26}, secured stationarily to the frame.

We claim—

1. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, and means for varying the distance between the stand-

ards consisting of a screw-shaft, a friction-wheel rigidly secured to the latter, an apron pivotally mounted about the shaft, a pair of friction-pulleys adjustably mounted on the apron for making continuous frictional engagement with the friction-wheel, a second friction-pulley on the apron for continuously engaging one of the former pulleys, a shifting-lever for the apron, a fulcrum therefor separate from the apron, a moving connection between the lever and the apron, and a second friction-wheel normally revolving, constructed and arranged to receive separate frictional contact from two of the friction-pulleys on the apron for operating the screw-shaft in reverse directions, substantially as described.

2. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, and means for varying the distance between the standards consisting of a screw-shaft, a friction-wheel rigidly secured to the latter, an apron pivotally mounted about the shaft, a pair of friction-pulleys adjustably mounted on the apron for making continuous frictional engagement with the friction-wheel, a second friction-pulley on the apron for continuously engaging one of the former pulleys, a shifting-lever for the apron, a fulcrum therefor separate from the apron, a moving connection between the lever and the apron, and a second friction-wheel normally revolving, constructed and arranged to receive separate frictional contact from two of the friction-pulleys on the apron for operating the screw-shaft in reverse directions, and a bolt taking through the apron into the frame for rigidly securing the friction-pulleys out of contact with the friction-wheel, substantially as described.

3. In a double end-tenoning machine, the combination of a base, a pair of independent standards mounted transversely on the base, cutter-heads independently rotatably journaled in each of the independent standards, means for varying the distance between the standards longitudinally of the base, an independent endless feeding-chain mounted on each standard and both moving thereon in parallel lines transversely of the base, and adjustable to distance between them simultaneously with the variation of distance between the cutter-head-carrying standards and cutter-heads thereon for accommodating stock of different lengths, a propelling-shaft mounted in the feeding-in end of the standards respectively and constructed and arranged for continuously pushing the stock past the cutting agencies while the latter are operatively cutting by forcing the links comprising the chains respectively toward each other, pivotal connections between the links, and adjustable guideways for the chains, substantially as described.

4. In a double end-tenoning machine, the combination of a base, with a pair of independent standards mounted thereon, independent rotatable cutter-heads journaled on each standard, with an independent pushing feed-chain for each standard, and means for pushing the same mounted at the feeding-in end of the standards, with means for adjusting the distance between the standards and chains respectively for accommodating different lengths of stock and continuously pushing the stock while the cutter-heads are cutting, substantially as described.

5. In a double end-tenoning machine, the combination of a base, with a pair of independent standards mounted thereon, a cut-off saw independently journaled at the feeding-in end and tenoning-cutters independently journaled at the feeding-out end of each standard for first cutting off and then tenoning both ends of boards simultaneously, an independent pushing feed-chain for each standard, and means for pushing the same mounted at the feeding-in end of the standards, with means for adjusting the distance between the standards and chains respectively, constructed and arranged for accommodating material of different lengths and continuously pushing the stock by means of pushing feed-chains while the cutting agencies are actively cutting, substantially as described.

6. In a double end-tenoning machine, the combination of a base, with a pair of cutter-carrying standards mounted thereon, with independent feed-chains for the stock, each composed of a series of links and connections between the chain-links, with means for adjusting the distance between the respective standards and chains and arranged for cutting both ends of a board at the same time, and a propelling-shaft for the chains at the feeding-in end of the standards for pushing the chains toward the cutting agencies, with a guideway for each chain preventing displacement of the chain-links laterally and vertically, and an abutting face for each end of each link stationary with relation thereto and arranged to contact with its neighboring abutting face while traveling between the propelling agency contacting with the chain and the cutting agencies and to slightly recede from each other during the balance of the travel of the chains, substantially as described.

7. In a double end-tenoning machine, the combination of a base, with a pair of cutter-carrying standards mounted thereon, and means for varying the distance between them, and independent feeding-chains for pushing the material past the cutting agencies and adjustable for varying the distance between them for accommodating different lengths of stock, and a propelling-shaft for the chains mounted at the feeding-in end of the standards, with the chains forming separate loops extending from in advance of the propelling-shaft to the rear of the cutting agencies, with an abutting face for each end of each chain-

link stationary with relation thereto and arranged to contact with the abutting face for its neighboring link end, with guideways for the chains extending from substantially the vertical plane of the propelling-shaft rearwardly to the last cutting agency for maintaining the chains in parallel lines, with means for rotating the propelling-shaft to continuously push the chains past the cutting agencies and force the links of each chain between the propelling agency contacting therewith and cutting agencies toward each other with the neighboring contact-faces in intimate contact, substantially as described.

8. In a double end-tenoning machine, the combination of a base, a pair of independent standards mounted on the base, cutter-heads independently rotatably journaled in each of the standards, an independent endless chain mounted on each standard for pushing the stock, with means for varying the distance between the standards and the chains for accommodating different lengths of material, a propelling-shaft mounted in the feeding-in end of the standards and constructed and arranged for continuously pushing the stock from the feed-in end of the standards in parallel lines past the cutting agencies while the latter are operatively cutting by forcing the links comprising the chains respectively toward each other between the shaft and the cutting agencies, connections between the links, with means for permitting the links to slightly recede after the cutting agencies are passed, with each chain arranged in a loop extending from in advance of a propelling-shaft to the rear of the cutting agencies, and with parallel independent guideways adjustable to vary the distance between them for guiding the chains in parallel lines against lateral or vertical movement and in a straight line while passing the cutter-heads, and a yielding pressure agency above for forcing the material against its supporting agency, substantially as described.

9. In a double end-tenoning machine, the combination of a base, a pair of independent standards mounted on the base, cutter-heads independently rotatably journaled in each of the standards, an independent endless chain-table mounted on each standard for directly supporting and for pushing the stock, with means for varying the distance between the standards and the chains for accommodating different lengths of material, a propelling-shaft mounted in the feeding-in end of the standards and constructed and arranged for continuously pushing the stock from the feeding-in end of the standards in parallel lines past the cutting agencies while the latter are operatively cutting by forcing the links comprising the chains respectively toward each other between the shaft and the cutting agencies, connections between the links, with means for permitting the links to slightly recede after the cutting agencies are passed, with each chain arranged in a loop extending from in advance of a propelling-shaft to the rear of the cutting agencies, and with parallel independent guideways adjustable to vary the distance between them for guiding the chains in parallel lines against lateral or vertical movement and in a straight line while passing the cutter-heads, and a yielding pressure agency above for forcing the material against its supporting agency, substantially as described.

10. In a double end-tenoning machine, the combination of a base, a pair of independent standards mounted on the base, cutter-heads independently rotatably journaled in each of the standards, an independent endless chain mounted on each standard for pushing the stock, with means for varying the distance between the standards and the chains for accommodating different lengths of material, with adjustable shoes on each of the chains for accommodating wide or narrow stock, a propelling-shaft mounted in the feeding-in end of the standards and constructed and arranged for continuously pushing the stock from the feeding-in end of the standards in parallel lines past the cutting agencies while the latter are operatively cutting by forcing the links comprising the chains respectively toward each other between the shaft and the cutting agencies, connections between the links, with means for permitting the links to slightly recede after the cutting agencies are passed, with each chain arranged in a loop extending from in advance of a propelling-shaft to the rear of the cutting agencies, and with parallel independent guideways adjustable to vary the distance between them for guiding the chains in parallel lines against lateral or vertical movement and in a straight line while passing the cutter-heads, and a yielding pressure agency above for forcing the material against its supporting agency, substantially as described.

11. In a double end-tenoning machine, the combination of a base, a pair of independent standards mounted on the base, wood-cutting agencies journaled independently on each of the standards, means for varying the distance between the standards, a chain-table constructed to directly support the material to be worked traveling on each standard transversely of the base in parallel lines with each other, an operating-shaft geared to the chain-tables journaled in the feeding-in end of the standards with the chain-tables forming loops extending from in advance of the operating-shaft to the rear of the cutting agencies, an adjustable guideway for each chain contacting directly therewith and acting directly thereon for preventing displacement or buckling of the same both laterally and vertically independently of the stock, and a yielding pressure agency above each chain-table contacting with the material on the chain-table for holding the same rigidly thereon, constructed and arranged for continuously pushing the stock from the feeding-in end of the machine past the acting cutting agencies on

each standard in parallel lines by forcing the links comprising the chain toward each other, substantially as described.

12. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, a chain-carrying bracket secured to each of the standards, runners thereon, a chain traveling on each of the brackets and consisting of a series of links provided with teeth, ears at the ends of the links, pins taking therethrough, idlers on the ends of pins, a propelling-shaft, and gears thereon meshing with the teeth of the links, substantially as and for the purpose specified.

13. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, a chain-carrying bracket secured to each of the standards, runners thereon, a chain traveling on each of the brackets, consisting of a series of links provided with teeth, ears at the ends of the links, pins taking therethrough rigidly secured to the ears at one end of two adjoining links, an operating-shaft at the feeding-in end of the standards, gears mounted thereon and meshing with the teeth of the chains respectively, an idler-gear on each of the standards and meshing with the gears on the shaft, a second gear-wheel mounted on each of the standards and operated by the idler-gear, the two gear-wheels on each standard meshing with the chain at the forward end of its travel over its runner and constructed and arranged to push the chains through the machine simultaneously and uniformly past the cutting agencies, substantially as and for the purpose specified.

14. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, a chain-carrying bracket secured to each of the standards, runners thereon, a chain traveling on the runners of each of the brackets, consisting of a series of links provided with teeth, ears at the ends of the links, pins taking therethrough, idlers on the ends of the pins traveling on the runners and angle-plates adjustably secured to the brackets and taking over the idlers, a propelling-shaft and gears thereon meshing with the teeth on the links, substantially as and for the purpose specified.

15. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, a chain-carrying bracket secured to each of the standards, runners thereon, a chain traveling on the runners of each of the brackets, consisting of a series of links, pins taking therethrough, idlers on the ends of the pins traveling on the runners, and angle-plates adjustably secured to the inner side of each of the brackets, slots therein and bolts taking therethrough into the bracket, an angle-plate on the opposite side of each bracket vertically adjustable thereon, a **Z**-plate connected to each of the latter, and horizontally adjustable thereon, one ledge of the **Z**-plate and of the first angle-plate extending over the idlers on each side of the chain, and constructed and arranged to hold the idlers to their runners, substantially as and for the purpose specified.

16. In a double end-tenoning machine, the combination of a base, a pair of cutter-carrying standards mounted thereon, a bracket secured to each of the standards, a chain traveling on each of the latter, shoes thereon for the material, ledges projecting from the links for carrying the material, a shaft for operating the chains, a pressure-bar above each of the brackets, a series of pressure-plates arranged in advance of each other, and separately yieldingly secured to each of the pressure-bars and provided with bifurcated ends, their ends projecting above the ledges on the links and allowing the free passage of the shoes between the same, substantially as and for the purpose specified.

17. In a double end-tenoning machine, the combination of a base, cutter-carrying standards mounted thereon, a chain-carrying bracket secured to each of the standards, a chain traveling on each of the brackets, an operating-shaft for propelling the chains, a cone-pulley mounted thereon, a second shaft, a second cone-pulley mounted on the same and releasably secured thereto, a pulley on the shaft connecting with a suitable source of power and operating the second cone-pulley when rigidly secured thereto, a third shaft, a pulley thereon connecting with the cone-pulley and operating the latter when released from rotation with its carrying-shaft, substantially as and for the purpose specified.

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