(No Model.) 4 Sheets—Sheet 1.

W. H. DOANE & G. W. BUGBEE.

SPOKE TENONING AND CHAMFERING MACHINE.

No. 258,852. Patented May 30, 1882.

Fig. 1.

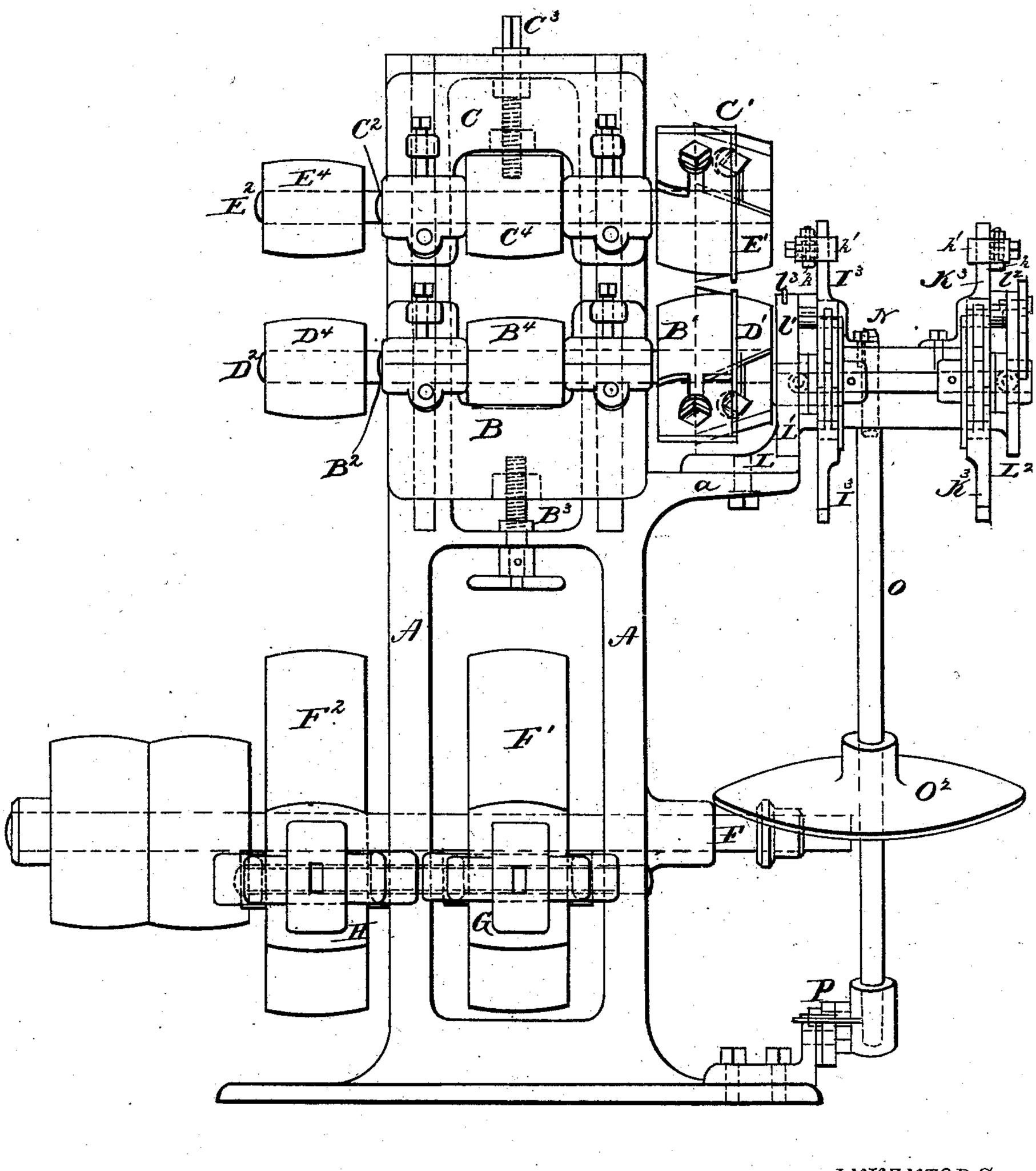

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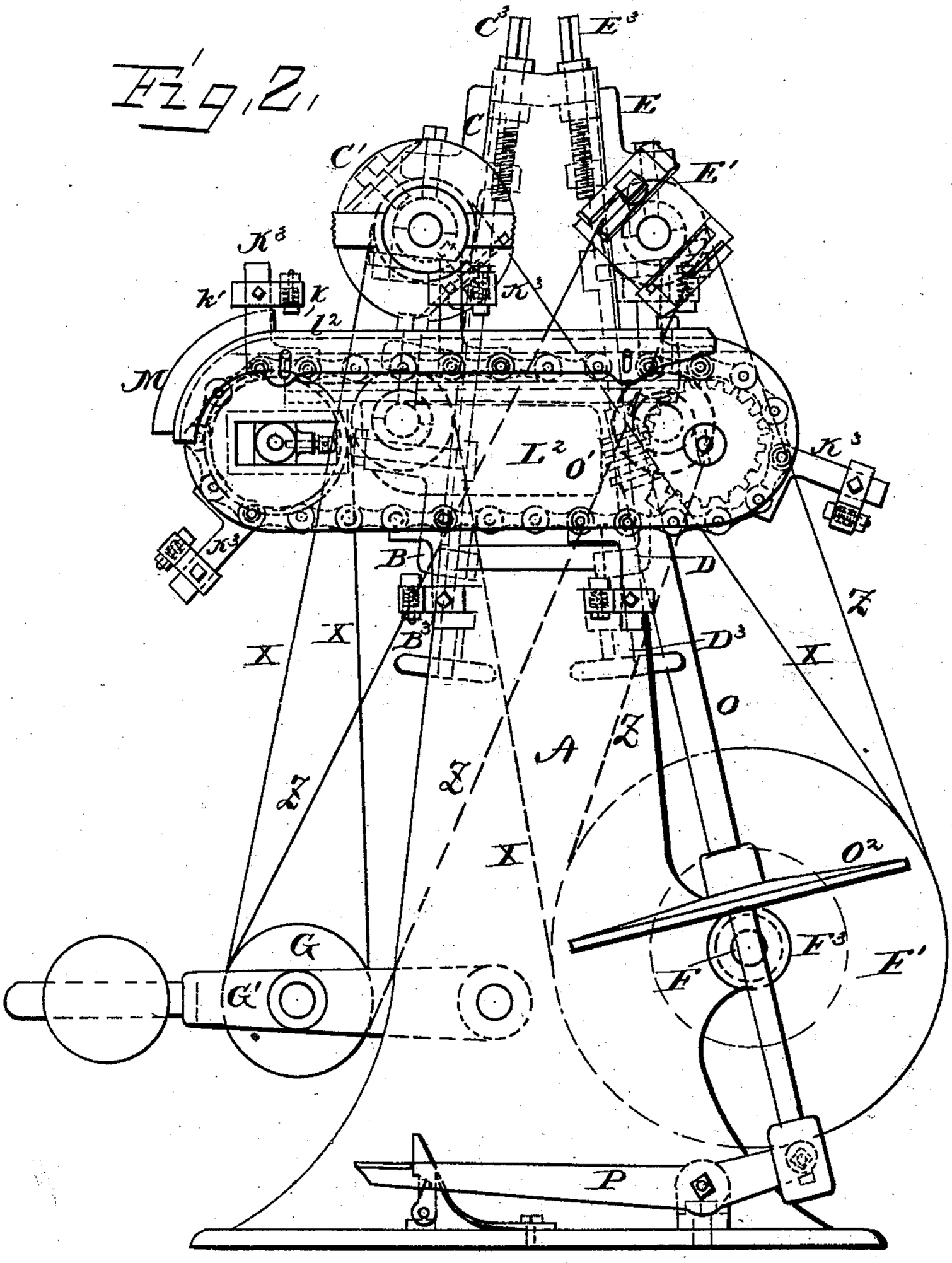
Fig. 2.



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SPOKE TENONING AND CHAMFERING MACHINE.

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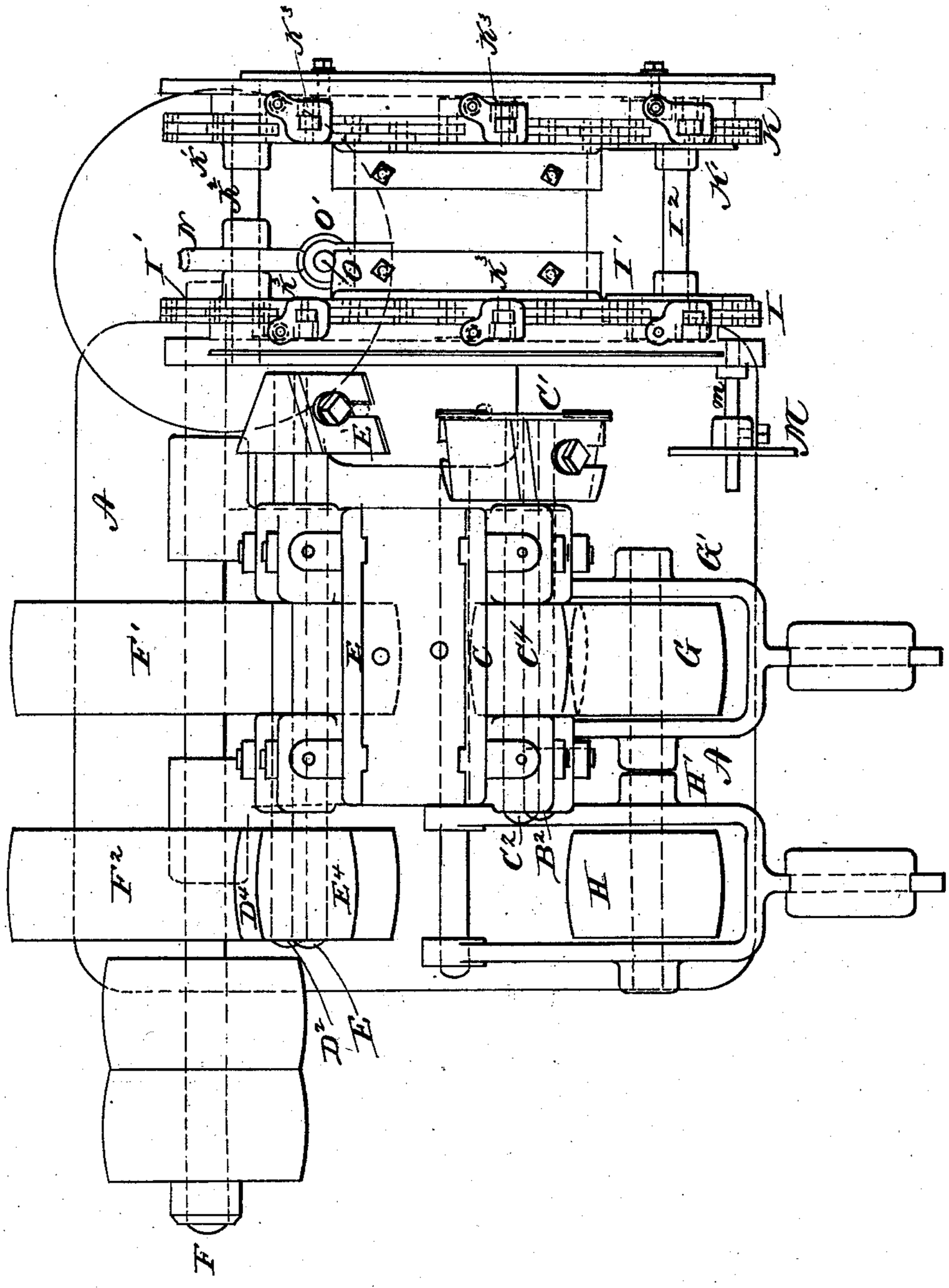
Fig. 3.



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SPOKE TENONING AND CHAMFERING MACHINE.

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Fig. 4.

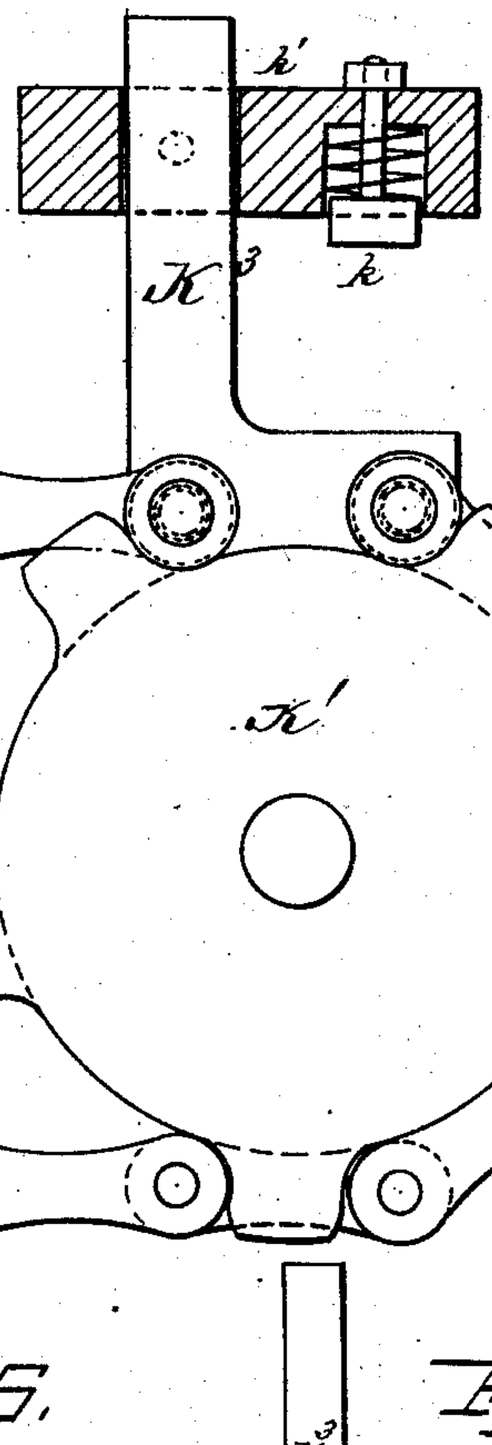


Fig. 6.

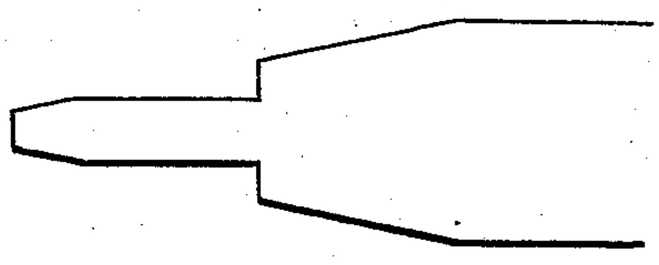
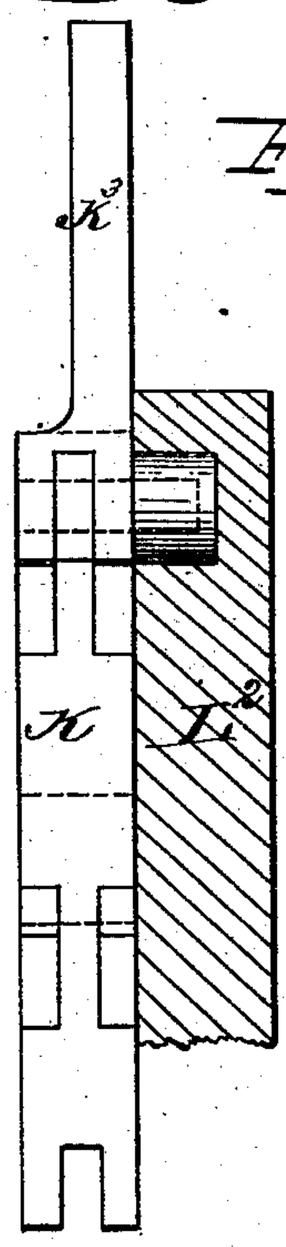


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM H. DOANE AND GEORGE W. BUGBEE, OF CINCINNATI, OHIO.

SPOKE TENONING AND CHAMFERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 258,852, dated May 30, 1882.

Application filed April 18, 1882. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. DOANE and GEORGE W. BUGBEE, citizens of United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Tenoning and Mitering Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention was more especially designed for use in machinery for tenoning and tapering spokes; but parts of it are applicable to other wood-working machines.

As applied to tenoning and tapering spokes, it consists of the combination of a pair of spoke-tenoning cutter-heads and a pair of spoke-tapering cutter-heads, mounted in succession, to first tenon and then taper the spoke.

It further consists in the use of endless feed-chains for feeding the spokes past and through between the respective cutter-heads.

It further consists of various minor combinations of mechanical devices for suitably clamping and feeding the spokes, and for conveniently stopping and starting the spoke-feeding devices.

In order that our invention may be clearly understood, we have illustrated in the annexed drawings and will proceed to describe the best form thereof at present known to us as regards its applicability to tenoning and tapering spokes.

Figure 1 is a side elevation of our improved machine for tenoning and tapering spokes. Fig. 2 is a front elevation of the same. Fig. 3 is a plan view thereof. Figs. 4 and 5 are detailed views on a larger scale of portion of the spoke carrying or feeding devices.

The same letters of reference are used in all the figures to designate identical parts.

The various operative parts of the machine are mounted on a substantial frame, A, on one side of the upper portion of which are arranged the two slides B and C, one above the other, which respectively carry the tenoning cutter-heads B′ and C′, fixed on the overhung ends of the horizontal shafts B^2 and C^2, which are journaled in suitable bearings on said slides B and C, and are provided with pulleys B^4 and C^4 between the bearings for driving them.

The slides B and C are mounted on suitable ways of frame A, and each is engaged by a screw, B^3 and C^3, respectively, swivelingly connected to the main frame A, so that said slides may be properly adjusted and held in position by said screws. On the other side of the upper portion of the main frame are arranged the slides D and E, one above the other, which respectively carry the spoke-tapering cutter-heads D′ and E′, fixed on the overhung ends of the horizontal shafts D^2 and E^2, which are journaled in suitable bearings on the slides D and E, and are provided with pulleys D^4 and E^4 on the other overhung ends for driving them. Screws D^3 and E^3, swivelingly connected to the main frame and engaging nuts on the slides D and E, are used for adjusting the slides and holding them in position. Extra clamping-bolts may be used to firmly clamp the different slides to the main frame after they have been properly adjusted by the adjusting-screws. The tenoning cutter-heads B′ and C′ are driven by a belt, X, from a pulley, F′, on the counter-shaft F, mounted on the lower portion of the main frame A. This belt passes from said pulley F′ over the pulley C^4 of cutter-head C′, thence downward and under belt-tightener pulley G, thence upward over pulley B^4 of cutter-head B′ and back to pulley F, so as to drive the cutter-heads B′ and C′ to cut in the same direction. The spoke-tapering cutter-heads D′ and E′ are driven in like manner by a belt, Z, from a pulley, F^2, on counter-shaft F, the belt Z passing from said pulley over pulley E^4 of cutter-head E′, thence downward and under a belt-tightener pulley, H, thence upward over pulley D^4 of cutter-head D′, and back to pulley F^2.

The belt-tightener G is journaled in a weighted yoke, G′, pivoted on the main frame, and belt-tightener H is journaled in a similar weighted yoke, H′, also pivoted on the main frame. Thus the belts X and Z may be kept under suitable strain under varying adjustments of the cutter-head-carrying slides. The spokes are carried and fed through between the tenoning cutter-heads, and afterward through between the spoke-tapering cutter-heads, by

means of two endless link-chains, I and K, which respectively travel around sprocket-wheels I′ I′ and K′ K′, keyed to the shafts I² and K², respectively, which are mounted in bearings on the bracket-frame L, fixed to and supported upon a shelf or bracket, *a*, of the main frame and in front of the cutter-heads. The spoke-carrying chains are arranged between and move respectively in close proximity to the two parallel sides L′ and L² of the bracket-frame L. These sides L′ and L² are constructed or provided with top bars, *l′* and *l²*, the ends in front of the tenoning cutter-head of which are curved downward to about the center line of the bracket-frame, as clearly shown in Fig. 2, which line is in the plane of the axes of the shafts I² and K². The curved portion of these top bars is eccentric to the sprocket-wheels I′ and K′, and gradually recedes from the center thereof until it reaches the horizontal portion of the top bars. Each chain is provided with a number of dogs, I³ and K³, respectively, arranged in pairs on the respective chains, against which dogs the spokes are placed at a point where the dogs begin to pass the lower ends of the curved portions of the top bar, *l′* and *l²*. On being moved upward by the dogs and chains the spoke is gradually forced away from the chains by the eccentric portion of the downward curve of the top bars, and is clamped between said top bars and the spring-clamps *k*, mounted on adjustable arms or brackets *k′* of the dogs K³ and L³. These spring-clamps consist of a bolt fitted in a socket in the arm *k′*, and encircled by a spiral spring between the head of the bolt and the bottom of the socket, as best shown in Fig. 4, the shank of the bolt passing through the bottom of the socket, and being provided with a nut by which the tension of the spring may be regulated to some extent. The arms *k′*, in which these spring-clamps are mounted, are adjustable on the dogs K³ and L³, in order to provide for the feeding of different sizes of spokes. Each dog is constructed with a laterally-projecting stud, carrying an anti-friction roller, which moves in a groove formed in the side of the bracket-frame, so as to prevent the dogs from being moved upward by the eccentric portion of the curved ends of the top bars, *l′* and *l²*, and to cause said dogs to move forward past the cutter-heads in a horizontal direction. The spring-clamps should be so adjusted on the dogs that on placing a spoke upon them at the lower end of the curved portion of the top bars, L′ and L², the spoke will snugly fit between said curved bars and the spring-clamps, so that on carrying the spoke forward it will be firmly forced down upon the top bars, *l′ l²*, by the spring-clamps, and firmly held down during its whole movement past and through between the two sets of cutter-heads. The rear ends of the top bars, *l′* and *l²*, terminate just beyond the spoke-tapering cutter-heads, as best seen in Fig. 2, so that the spoke will be released from between the bars and spring-clamps immediately after it has been tapered and fall from the dogs on the carrying-chains soon after by its own gravity. The top bars, *l′* and *l²*, can be vertically adjusted to some extent on the sides of the bracket-frame L.

In order that the spokes may be accurately placed on the dogs with respect to the cutter-heads, a guide, M, is fixed to a laterally-projecting stud or bar, *m*, of bracket-frame L. The guide M is adjustable.

In placing a spoke on a pair of dogs the end to be tenoned and tapered is pushed up against guide M, previously adjusted with respect to the cutter-heads, to cause the end of the spoke to pass to the desired extent in between the tenoning cutter-heads for cutting the tenon to the desired length.

To prevent the action of the cutter-heads from pushing the spoke endwise in either direction, a dull-edged rib, *l³*, is formed on the top bar *l′*, which will slightly embed itself in the wood of the spoke by reason of the spring-pressure of the spring-clamps upon the spoke, and hold the latter steady during its movement through between the cutter-heads.

The tenoning cutter-heads may be of the ordinary construction; so, also, the spoke-tapering cutter-heads; but the latter should be so constructed and arranged as to taper both the end of the tenon of the spoke and the shoulder of the tenon.

The bearings of the shaft I² are so arranged in the sides of the bracket-frame that they may be horizontally adjusted in order to stretch the chains to the required extent. The shaft K² turns in stationary bearings, and is provided with a worm-wheel, N, in order that it may be driven with the required slow motion by the worm O′ on the upright shaft O. The worm O′ is feathered to shaft O; but the latter is capable of sliding up and down to a limited extent through the worm. At its lower end shaft O is supported in a step-bearing formed on the treadle P, near the base of the machine. A friction-disk, O², is keyed to shaft O at a point which will bring it in contact with the friction-driver F³ on counter-shaft F when shaft O is allowed to descend to its lowest position. Friction-driver F³ will then drive friction-disk O², and thereby impart the required rotation to shaft O for driving the carrying-chains I and K through the intervening gearing heretofore described. By depressing treadle P shaft O may be lifted sufficiently to disconnect its friction-disk from the friction-driver on the counter-shaft, so as to stop the rotation of the shaft O and the movement of the carrying-chains. The treadle may be locked, when depressed, by spring-latch *p*, so arranged as to automatically engage or hook over the foot-piece of the treadle.

We have described the improved spoke tenoning and tapering machine in the most complete form at present known to us. It should be understood that some features of it might be wholly omitted and some parts replaced by

other means that would readily suggest themselves to a person skilled in this branch of the useful arts without an evasion of the invention. Thus the means for gradually clamping the spoke tighter and tighter to the spoke-supporting top bars until it reaches the horizontal portion thereof might be omitted, and instead thereof the spoke introduced forcibly between said bars and the clamps of the dogs at the moment of inserting it.

While it is preferable always to guide the dogs, yet the guides might be dispensed with. The spring-clamp may also be greatly varied in construction; nor is it essential that said clamps should be mounted on and move with the feed-dogs. The feed mechanism shown and described may be used with advantage on machines provided with only one cutter-head or one set of cutter-heads, whether used for spoke-tenoning purposes or for any other purpose.

Fig. 6 illustrates the tenoned end of a spoke as it appears after it has been operated on by this machine.

It will be observed that the faces of the main frame A, on which the several cutter-head slides are mounted, diverge from the top downward. The effect of this taper or divergence is that the cutter-heads B and E cut somewhat in advance of the cutter-heads C′ and D′, and that this difference in the lines of cuts is increased by increase of separation between the members of each pair of cutter-heads. Although we prefer to construct the top bars, l' and l^2, with eccentric downwardly-curved portions at the feeding-in end of the machine, that is not essential, because mere ascending cam grades or inclines may be used instead of the eccentric downwardly-curved portions. The ends of these top bars at the discharge end of the machine may terminate with descending grades, so as to gradually release the spoke.

Having thus described our invention, what we claim is—

1. The combination, substantially as before set forth, of the tenoning cutter-heads, the spoke-tapering cutter-heads, and the feed chain or chains provided with pairs of dogs for feeding spokes through between the respective cutter-heads.

2. The combination, substantially as before set forth, of the feed chain or chains, the fixed top bars over which the spoke or other object is moved, and the dogs on said chains, provided with spring-clamps.

3. The combination, substantially as before set forth, of the spoke-supporting top bars, constructed at one end with downwardly-curved eccentric portions, the feed chain or chains, and dogs on said chains, provided with spring-clamps.

4. The combination, substantially as before set forth, of the spoke-supporting top bars, constructed at one end with downwardly-curved eccentric portions, the feed chain or chains, the dogs on said chains, provided with spring-clamps and laterally-projecting anti-friction guide-rollers, and the guides for said rollers.

5. The combination, substantially as before set forth, of the spoke-supporting top bar provided with a dull-edged rib, and the spring-clamps on the feed chain or chains.

6. The combination, substantially as before set forth, of the feed chain or chains, the worm-gearing for driving the same, the upright worm-shaft carrying a friction-disk, the counter-shaft provided with a friction-driver, and the treadle for lifting the worm-shaft to disconnect its friction-disk from the said friction-driver.

7. In a machine for tenoning and tapering spokes, a frame having diverging faces, upon which are mounted the four slides supporting the two set of cutter-heads, combined with said slides and cutter-heads, substantially as before set forth.

8. In a machine for tenoning and tapering spokes, the combination, substantially as before set forth, of the endless feed chain or chains, the fixed top bars constructed with ascending grades or inclines at the feeding-in end of the machine, and independent dogs on the chain or chains, whereby a spoke is first automatically gripped for holding it firmly in feeding it through between the cutter-heads, and then automatically released and discharged.

In testimony whereof we affix or signatures in presence of two witnesses.

WM. H. DOANE.
GEORGE W. BUGBEE.

Witnesses:
SIMEON HARRIS,
B. E. J. EILS.