No. 679,611. Patented July 30, 1901.

G. A. ENSIGN.

SPOKE FINISHING MACHINE.

(Application filed Apr. 11, 1901.)

(No Model.) 5 Sheets—Sheet 1.

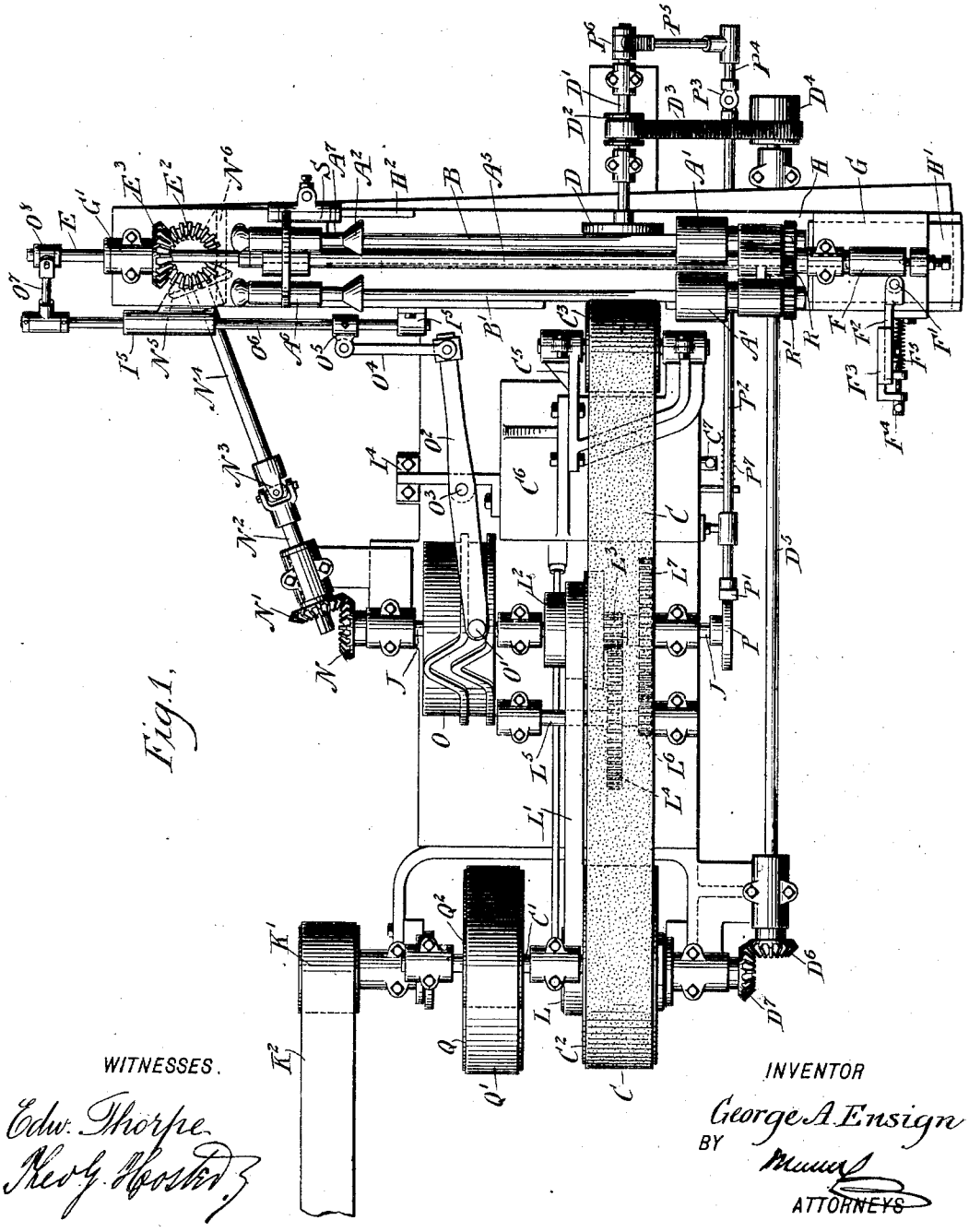


Fig. 1.

WITNESSES.

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

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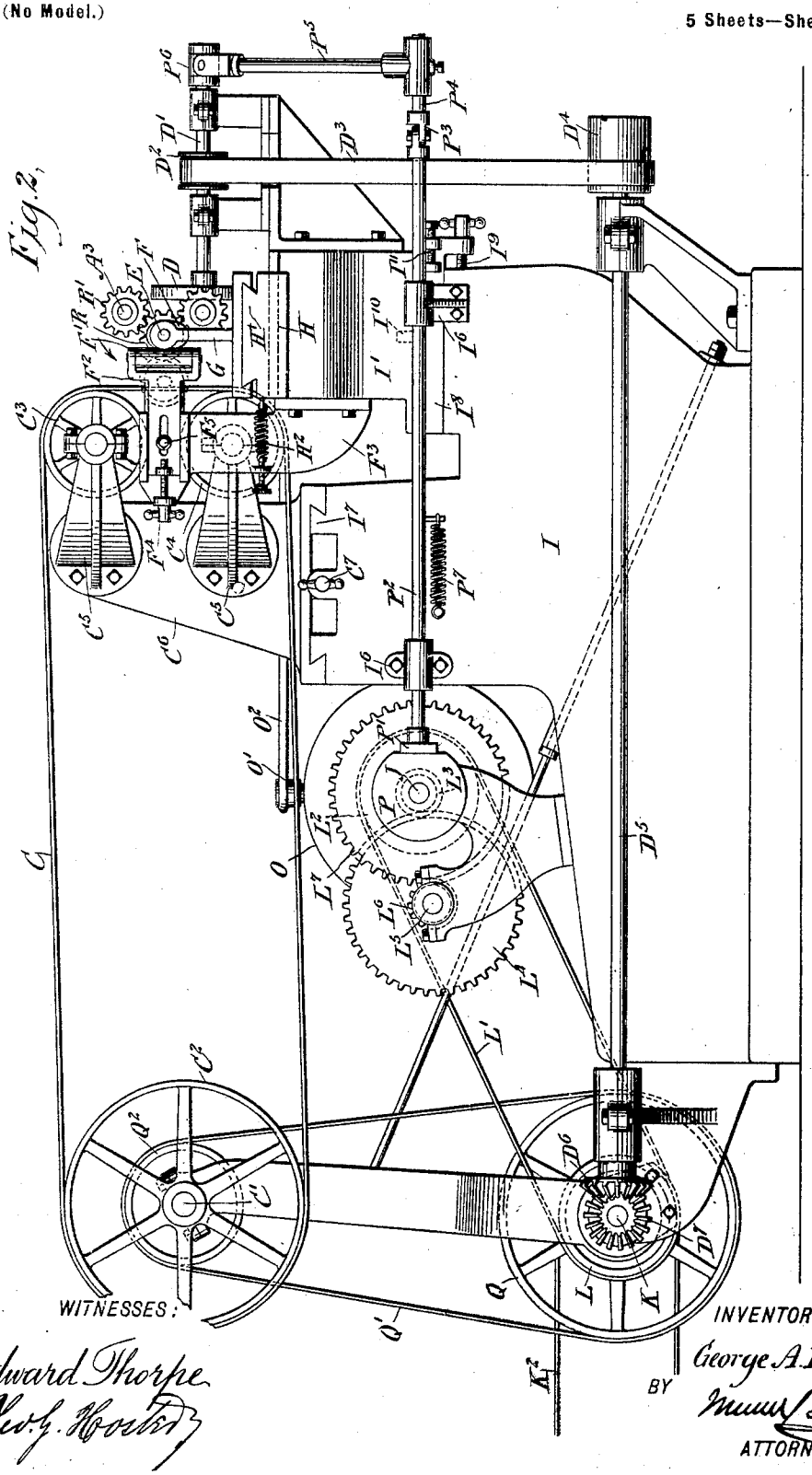
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SPOKE FINISHING MACHINE.

(Application filed Apr. 11, 1901.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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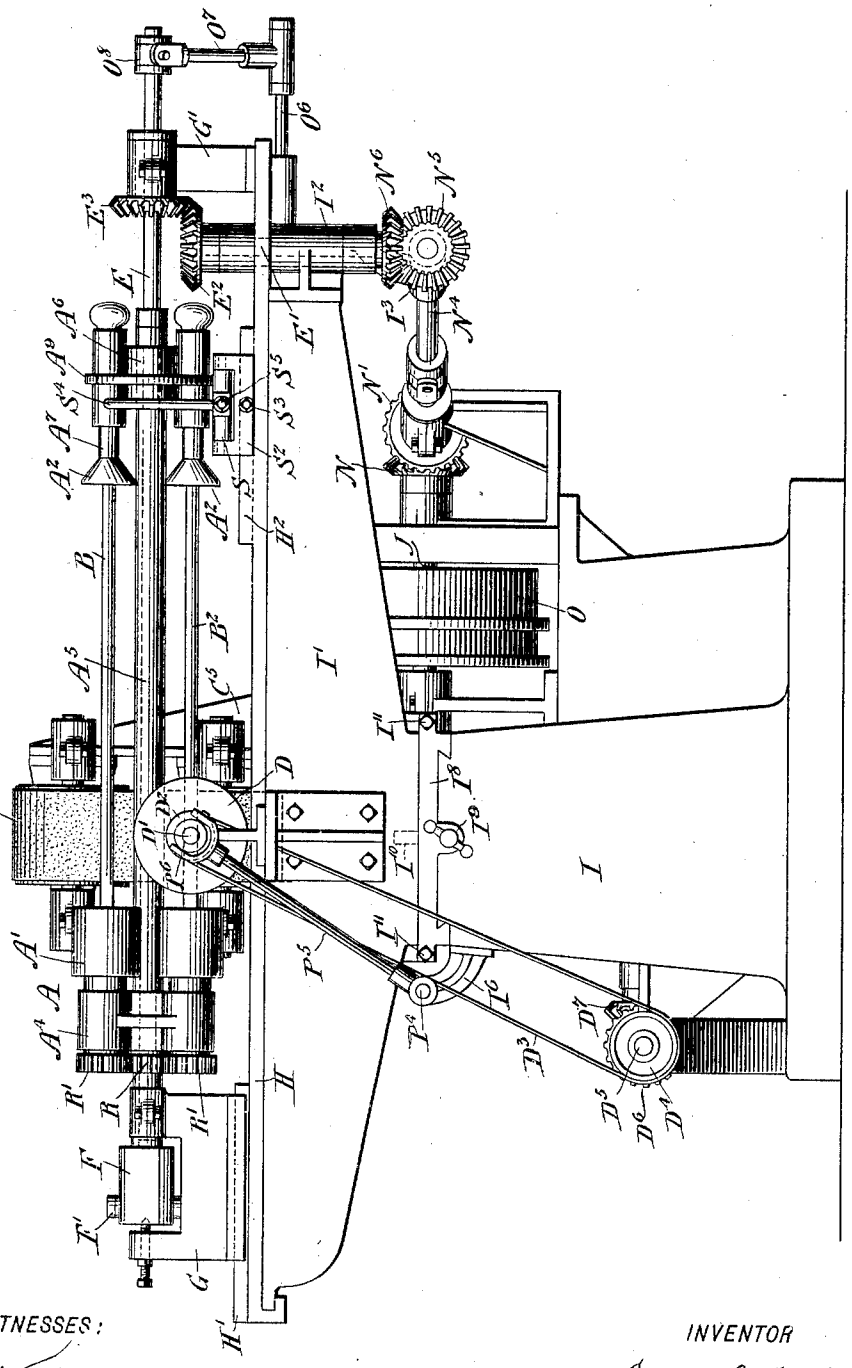
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(Application filed Apr. 11, 1901.)

(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



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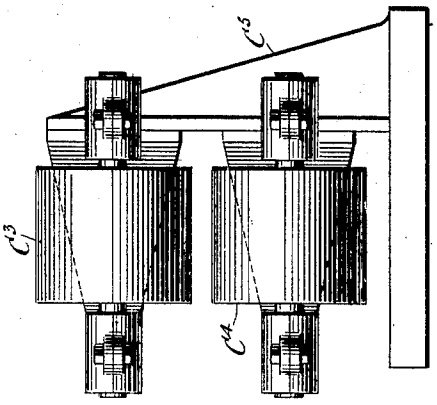
G. A. ENSIGN.

SPOKE FINISHING MACHINE.

(Application filed Apr. 11, 1901.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 5.



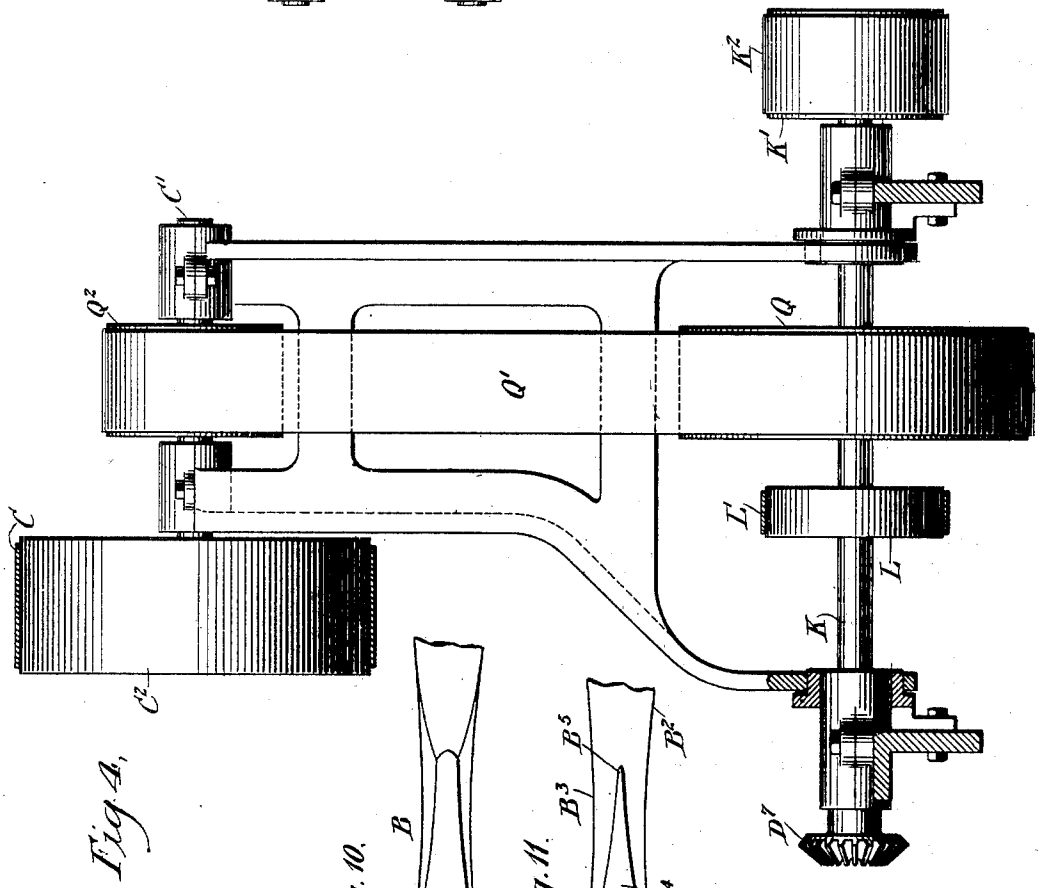


Fig. 4.

Fig. 10.



Fig. 11.



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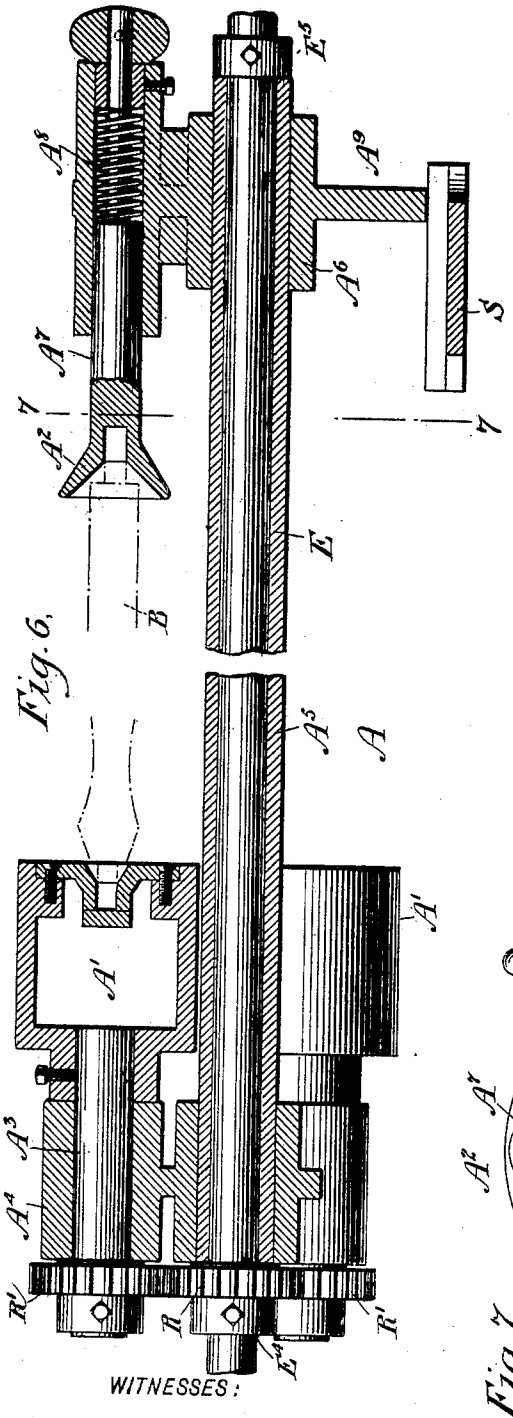


Fig. 6.

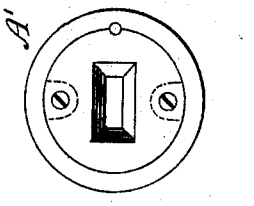


Fig. 9.

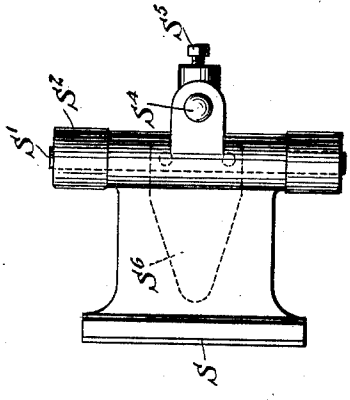


Fig. 8.

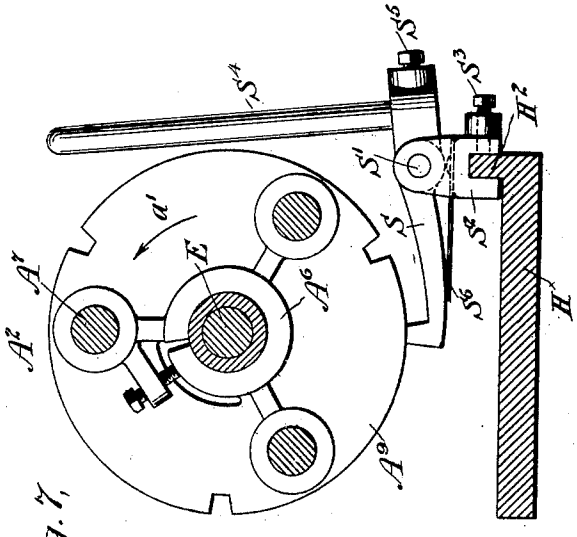


Fig. 7.

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UNITED STATES PATENT OFFICE.

GEORGE A. ENSIGN, OF DEFIANCE, OHIO, ASSIGNOR TO THE DEFIANCE MACHINE WORKS, OF SAME PLACE.

SPOKE-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 679,611, dated July 30, 1901.

Application filed April 11, 1901. Serial No. 55,318. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. ENSIGN, a citizen of the United States, and a resident of Defiance, in the county of Defiance and State of Ohio, have invented a new and Improved Spoke-Finishing Machine, of which the following is a full, clear, and exact description.

The invention relates to woodworking machinery; and its object is to provide certain new and useful improvements in spoke-finishing machines whereby the spokes are accurately and uniformly finished both at the throat and face without requiring the employment of skilled labor.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the improvement. Fig. 2 is an enlarged side elevation of the same. Fig. 3 is a front elevation of the same. Fig. 4 is an enlarged transverse section of part of the improvement, showing the driving-gear. Fig. 5 is an enlarged front elevation of the sand-band pulleys. Fig. 6 is an enlarged sectional front elevation of the spoke-holder and driving-gear for the spoke-holder sockets. Fig. 7 is a transverse section of the same on the line 7 7 in Fig. 6. Fig. 8 is a plan view of the locking-catch for the spoke-holder. Fig. 9 is a face view of one of the sockets for the tenon of a spoke. Fig. 10 is a front view of the tenon end of an unfinished spoke, and Fig. 11 is a like view of the tenon end of a finished spoke.

The spoke-holder A is preferably provided with sets of tenon-sockets A′ and butt-sockets A^2 for supporting at one time three spokes B B′ B^2, of which the spoke B is a newly-inserted unfinished spoke. The spoke B′ is acted on by the endless traveling sand-band C to finish the throat of the spoke, and B^2 is acted on at its face by a revoluble sand wheel or disk D to finish the face of the spoke after the throat thereof has been finished by the sand-band C. (See Fig. 11.)

The spoke-holder A is mounted to turn and to slide bodily with a revoluble and slidable shaft E, disposed horizontally and carrying at its left-hand end a pattern F, abutting against a stop F′, said left-hand end of the shaft being mounted to turn in a bearing G, mounted to slide in the direction of the length of the shaft E in guideways H′, held on a plate H, mounted to swing on the top of a bed-head I′, mounted on the bed I of the machine. The plate H is fulcrumed on a vertical shaft E′, journaled in a bearing I^2 on the bed-head I′, (see Fig. 3,) and said shaft E′ carries at its upper end a bevel gear-wheel E^2, in mesh with a similar bevel gear-wheel E^3, having its hub mounted to turn in a bearing G′, secured to the right-hand end of the plate H. The right-hand end of the shaft E is mounted to slide in and to turn with the bevel gear-wheel E^3, so that the shaft E is turned when the shaft E′ is rotated, and at the same time the shaft E is free to slide in the direction of its length, so as to shift the spoke-holder A and the spokes B′ B^2, carried thereon, correspondingly and also permit the plate H to swing transversely on the top of the bed-head I′, according to the movement given to the bearing G and said plate H by the revolving pattern F abutting against the stop F′, it being understood that a spring H^2 (see Fig. 2) pulls on the plate H and holds the pattern F against the stop F′. A synchronous sliding and turning motion is given to the shaft E by suitable devices actuated from a cam-shaft J, driven from the main shaft K, connected with the sand-band C, to impart a traveling motion thereto, the said main shaft K being also connected with the sand-wheel D to rotate the latter, and the said sand-wheel D is moved transversely to and from the spoke by mechanism actuated by said cam-shaft J, as hereinafter more fully described.

The main shaft K is provided with a pulley K′, connected by a belt K^2 with other machinery for rotating the shaft K, and on the latter is also secured a second pulley L, over which passes a belt L′, also passing over a

cone-pulley L^2, mounted to rotate loosely on the cam-shaft J. On the said cone-pulley L^2 is secured a pinion L^3, (see Fig. 1,) in mesh with a gear-wheel L^4, fastened on a shaft L^5, carrying a pinion L^6, in mesh with a gear-wheel L^7, secured on the cam-shaft J, so that when the main shaft K is rotated the said pulleys L L^2, the belt L', the pinion L^3, the gear-wheel L^4, the pinion L^6, and the gear-wheel L^7 will impart a reduced rotary motion to the shaft J. The shafts J, K, and L^5 mentioned are journaled in suitable bearings on the bed I, and on the right-hand end of the shaft J is secured a bevel gear-wheel N, in mesh with a bevel gear-wheel N', on which is mounted to turn and to slide a shaft N^2, connected by a universal joint N^3 with a shaft N^4, journaled at its forward end in a bearing I^3, depending from a bearing I^2, and on the forward end of said shaft N^4 is secured a bevel gear-wheel N^5, in mesh with a similar gear-wheel N^6, (see Fig. 3,) secured on the lower end of the shaft E', so that when the cam-shaft J is rotated, as previously mentioned, a rotary motion is given to the shaft E' by the connection mentioned, and as said shaft E' is geared to the shaft E it is evident that the latter is rotated from and at the same rate of speed as the cam-shaft J.

On the cam-shaft J is secured a cam-wheel O, having its cam-groove engaged by a friction-roller O', (see Fig. 1,) journaled on one end of a lever O^2, fulcrumed at or near its middle, at O^3, on a bracket I^4, attached to the bed I, and the other end of said lever O^2 is pivotally connected by a link O^4 with a collar O^5, adjustably held on a rod O^6, mounted to slide in suitable bearings I^5, attached to the bed I. The right-hand end of the rod O^6 carries a shifting fork O^7, engaging a shifting collar O^8, held on the right end of the shaft E, so that when the shaft J is rotated, and with it the cam-wheel O, then a sliding motion is given to the said shaft E from said cam-wheel by the connection just described.

On the left-hand end of the cam-shaft J is secured a cam-disk P, against the peripheral surface of which abuts a shoe P', held on a rod P^2, mounted to slide in bearings I^6, attached to the bed I, and the forward end of said rod P^2 has a swivel connection P^3 with a rod P^4, carrying a shifting fork P^5, engaging a shifting collar P^6, held on the outer end of the shaft D', carrying the sand-wheel D. A spring P^7, connected with the rod P^2, holds the shoe P' in peripheral contact with the surface of the cam-disk P, and when the shaft is rotated, and with it the cam-disk, then a sliding motion is given to the rod P^2 to shift the shaft P' transversely in its bearings and move the sand-wheel D quickly in engagement with the face of the spoke to finish the said face and then to move it immediately out of engagement with the face back into an outermost inactive position.

On the main driving-shaft K is secured a pulley Q, over which passes a belt Q', also passing over a pulley Q^2, secured on the shaft C', carrying a pulley C^2, over which passes the sand-band C, also passing at its forward end over pulleys C^3 C^4, having their shafts journaled in suitable bearings C^5, secured on a slide C^6, held adjustably by a screw-rod C^7 on guideways I^7 on the bed I, as is plainly illustrated in Fig. 2.

By reference to Figs. 1, 4, and 5 it will be seen that the sand-band C can be readily slipped over the pulleys C^2 C^3 C^4 to permit of conveniently changing the sand-band when it is worn out or a new one is needed or one of different quality is to be used for finishing the throats of the spokes.

The detail construction of the spoke-holder A is as follows: Each of the tenon-sockets A' is secured on a shaft A^3, (see Fig. 6,) journaled in a head A^4, secured to a sleeve A^5, through which extends loosely the spoke-holder shaft E, and on said sleeve A^5 is secured a head A^6, in which are mounted to rotate spindles A^7, carrying the butt-sockets A^2. Springs A^8 press against the inner ends of the spindles A^7, so as to hold the spokes securely in place in a set of sockets A' A^2 and at the same time permit the operator to push the socket A^2 to the right when removing a spoke or placing a new one in position in the sockets A' A^2. The shafts A^3, carrying the tenon-sockets A', are rotated from the shaft E, and for this purpose the latter is provided with a gear-wheel R, in mesh with gear-wheels R', secured on the shafts A^3, so that when the shaft E is rotated the said gearing rotates the shaft A^3 and the sockets A', and as the spokes B B' B^2 are securely held in said sockets A' and in the sockets A^2 it is evident that the spokes and sockets A^2 rotate with the sockets A'.

In order to temporarily hold the sleeve A^5 and the heads A^4 A^6 from rotating, a catch S is provided adapted to engage one of a series of notches in a disk A^9, forming part of the head A^6. (See Figs. 6 and 7.) The catch S is pivoted at S' on a bearing S^2, held longitudinally adjustable on a flange H^2, extending on the plate H in the direction of its length, as is plainly shown in Fig. 3, and said bearing S^2 is adapted to be secured on said flange H^2 by a set-screw S^3. On the catch S is secured a handle S^4 by means of a set-screw S^5, and a spring S^6, held on the bearing S^2, presses the catch S so as to engage the same with a notch in the disk A^9 whenever the holder A has been turned by hand to bring the catch in register with a notch. By the operator moving the handle S^4 transversely the catch S is swung out of engagement with the disk A^9, so as to permit of giving one-third of a turn to the spoke-holder, and thereby bring a newly-inserted spoke in engagement with the sand-band C and to bring another spoke that has been operated upon by the sand-band C in position for engagement by the sand-wheel D, it being understood that the spoke-holder is turned by the operator in the direction of the arrow a', as indicated in Fig. 7.

In order to cause the spoke-holder A to move bodily with the shaft E when the latter receives a sliding motion from the cam-shaft J, as previously described, the shaft E is provided with collars E^4 E^5, (see Fig. 6,) of which the collar E^4 is adjacent to the gear-wheel R, and the collar E^5 is at the end of the head A^6. The collar E^4 mentioned may be the hub of the gear-wheel R.

The stop F′ for the pattern F is in the form of a vertically-disposed roller journaled in a transverse bar F^2, adjustably held in a bracket F^3, attached to the bed-head I′, as is plainly shown in Fig. 2, and said bar is adjustable transversely by a screw-rod F^4, and after the desired adjustment has been made the bar is locked to the bracket F^3 by a bolt F^5. The head I′ of the bed I can be adjusted to bring the spoke-holder A into an angular position relatively to the face of the sand-band C and also transversely adjusted to bring the spoke-holder nearer to or farther from said sand-band C. For the purpose mentioned the bed I is provided with a slide I^8, adapted to be moved transversely by a screw-rod I^9, and on the slide I^8 is formed a pivot I^{10}, engaging the head I′, so that the latter can be turned on said pivot and bodily moved transversely on moving the slide I^8. Screw-rods I^{11} connect the slide I^8 with the head I′, so as to lock the head in place after it has been turned to the desired angular position on the pivot I^{10}.

The operation is as follows: When the main shaft K is rotated, the spokes B B′ B^2 are rotated and moved bodily transversely and longitudinally, owing to the action of the pattern F and the sliding motion given to the shaft E and the spoke-holder A thereon. The spoke B′ is now in engagement with the sand-band C, and during the movement of said spoke B′ the throat B^3 is abraded by the sand-band, with the exception of the face B^4, as during the time the face approaches the sand-band the spoke moves from the left to the right, so that the left-hand edge of the sand-band gradually leaves the face B^4 and is at the end or point B^5 of said face B^4 at the time said face B^4 faces the sand-band. The spoke B′ is now moved from the right to the left, and as it turns at the same time the face B^4 moves away from the face of the sand-band C, so that the latter now abrades the throat on the opposite side of the face B^4 without touching the latter. The sliding of the spokes is done very quickly, as will be readily understood by reference to the form of the cam-wheel O shown in Fig. 1. During the time this operation takes place the spoke B^2, which had its throat already treated by the sand-band C in the previous operation, is engaged at its face B^4 by the face of the sand-wheel D immediately previous to the beginning of the sliding of the spoke-holder, so that the said face is abraded to give it a very fine finish, it being understood that the sand-wheel D is but a moment in contact with the face B^4, and consequently the slow turning of the spoke B^2 does not impair the finishing of the face. While the spokes B′ B^2 are thus treated, the operator removes the previously-finished spoke from the corresponding sockets A′ A^2, then places a new unfinished spoke in position in these sockets, then unlocks the spoke-holder by moving the catch S out of engagement with the notched disk A^9, and finally turns the spoke-holder until the catch S engages the next following notch to again lock the spoke-holder against turning on the shaft E. The newly-inserted spoke has its throat now first finished at the sand-band C, while the spoke previously operated is now faced at the sand-wheel D.

It is understood that the head A^6 of the spoke-holder is adjusted on the sleeve A^5 according to the length of the spokes to be treated, and the head I′ is adjusted transversely and angularly relatively to the face of the sand-band C, according to the thickness of the spokes and their shapes at the throat or tenon ends.

The catch S is made sufficiently long (see Figs. 3 and 8) to allow the sliding movement of the spoke-holder without disengaging the catch from the notched disk A^9.

As it is the duty of the operator to simply remove the finished spokes, place unfinished spokes in position, and periodically unlock and turn the spoke-holder, it is evident that no skilled labor is required to tend the machine. A large amount of finely-finished work is turned out by the machine in a comparatively short time.

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

1. A spoke-finishing machine having a revoluble spoke-holder for removably holding a plurality of spokes, means for finishing the throat of one of the spokes, and means for finishing the face of another of the spokes, as set forth.

2. A spoke-finishing machine having a revoluble spoke-holder for removably holding a plurality of spokes, a sand-band for engaging one of the spokes and finishing the throat thereof, and a facing-surface engaging another of the spokes to finish the face thereof, as set forth.

3. A spoke-finishing machine having an intermittently-revoluble spoke-holder provided with revoluble spoke-sockets for holding and revolving spokes, a sand-band for engaging and finishing the throat of one of the spokes, and a revoluble sand-wheel for finishing the face of another of the spokes, as set forth.

4. A spoke-finishing machine having an intermittently-revoluble spoke-holder provided with revoluble spoke-sockets for holding and revolving spokes, a sand-band for engaging and finishing the throat of one of the spokes, a revoluble sand-wheel for finishing the face of another of the spokes, and a manually-controlled locking device for holding the spoke-holder against rotation while the sand-

band and sand-wheel are in engagement with the spoke and finishing the throat and face thereof, as set forth.

5. A spoke-finishing machine having an intermittently-revoluble spoke-holder provided with revoluble spoke-sockets for engaging and revolving spokes, a sand-band for engaging and finishing the throat of one of the spokes, a revoluble sand-wheel for finishing the face of another of the spokes, a manually-controlled locking device for holding the spoke-holder against rotation while the sand-band and sand-wheel are in engagement with the spoke and finishing the throat and face thereof, and means for bodily sliding and swinging the spoke-holder and rotating the spoke-sockets, as set forth.

6. A spoke-finishing machine having a spoke-holder provided with revoluble sockets for the tenons and butts of the spokes, a sliding and revoluble shaft on which the spoke-holder is mounted to move endwise therewith and adapted to be turned by hand, a gearing between said shaft and the revoluble sockets for the tenons, and means for imparting a sliding motion to the said shaft, as set forth.

7. A spoke-finishing machine having a spoke-holder provided with revoluble sockets for the tenons and butts of the spokes, a sliding and revoluble shaft on which the spoke-holder is mounted to move endwise therewith and adapted to be turned by hand, a gearing between said shaft and the revoluble sockets for the tenons, means for imparting a longitudinal sliding motion to the said shaft, and means for allowing the shaft to move laterally, as set forth.

8. A spoke-finishing machine having a spoke-holder provided with revoluble sockets for the tenons and butts of the spokes, a sliding and revoluble shaft on which the spoke-holder is mounted to move endwise therewith and adapted to be turned by hand, a gearing between said shaft and the removable sockets for the tenons, a pattern secured on said shaft, a stop engaged by said pattern, means for imparting a longitudinal sliding motion to said shaft, and means for allowing the shaft to swing laterally, as set forth.

9. A spoke-finishing machine, comprising a swinging plate, a revoluble shaft mounted to turn in bearings carried by said plate, one of the bearings being movable lengthwise of the plate, a spoke-holder mounted to turn loosely on said shaft, and carrying sets of tenon-holding sockets and butt-sockets, a gearing connecting the shaft with a set of said sockets, a pattern secured on the end of the said shaft which is mounted in the movable bearing, and a stop on which the pattern abuts, as set forth.

10. A spoke-finishing machine, comprising a swinging plate, a revoluble shaft mounted to turn in bearings carried by said plate, one of the bearings being movable lengthwise of the plate, a spoke-holder mounted to turn loosely on said shaft, and carrying sets of tenon-holding sockets and butt-sockets, a gearing connecting the shaft with a set of said sockets, a pattern secured on the end of the said shaft which is mounted in the movable bearing, a stop on which the pattern abuts, and means for imparting a sliding motion to said shaft, as set forth.

11. A spoke-finishing machine having a spoke-holder provided with revoluble spoke-sockets, and a sand-wheel mounted to turn and adapted to move bodily toward or from a spoke in said sockets, to finish the face of the spoke, as set forth.

12. A spoke-finishing machine having a spoke-holder provided with revoluble spoke-sockets, a sand-wheel mounted to turn and adapted to move bodily toward or from a spoke in said sockets, to finish the face of the spoke, and means, substantially as described, for rotating the spoke-sockets in unison with the bodily movement of said wheel, as set forth.

13. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, and means engaged by said pattern, for imparting a swinging motion to the plate, as set forth.

14. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, means engaged by said pattern, for imparting a swinging motion to the plate, and a gearing connecting said shaft with the spoke-holding devices of the spoke-holder, to rotate the spokes, as set forth.

15. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft mounted in bearings on the swinging plate, one of the bearings being movable, said shaft being geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on the end of the said spoke-holder shaft which is mounted in the movable bearing, means engaged by said pattern, for imparting a swinging motion to the plate, and a gearing connecting the said shaft with the spoke-holding devices of the spoke-holder, to rotate the spokes, as set forth.

16. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder

shaft, means engaged by said pattern for imparting a swinging motion to the plate, and a locking device on said plate and engaging the spoke-holder for temporarily locking the same against rotation, as set forth.

17. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, means engaged by said pattern, for imparting a swinging motion to the plate, a locking device on said plate, for temporarily locking the spoke-holder against rotation, the locking device comprising a notched disk on the spoke-holder, and a spring-pressed catch fulcrumed on said plate and adapted to engage the notches in said disk, as set forth.

18. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, means engaged by said pattern, for imparting a swinging motion to the plate, bearings for said spoke-holder shaft to turn in, one of the bearings being mounted to slide on the plate in the direction of the length of the spoke-holder shaft, and means connected with said spoke-holder shaft, to slide the same bodily in the direction of its length, as set forth.

19. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, means engaged by said pattern, for imparting a swinging motion to the plate, bearings for said spoke-holder shaft to turn in, one of the bearings being mounted to slide on the plate in the direction of the length of the spoke-holder shaft, means connected with said spoke-holder shaft, to slide the same bodily in the direction of its length, a sand-band for finishing the throat of a spoke in said spoke-holder, and an abrading device movable toward and from another spoke in said spoke-holder, to finish the face of the spoke, as set forth.

20. A spoke-finishing machine having a bed, a driven shaft mounted to turn on said bed, a plate mounted to swing on said bed with said shaft as the fulcrum, a spoke-holder shaft geared with and driven from said driven shaft, a spoke-holder mounted on said spoke-holder shaft, a pattern on said spoke-holder shaft, means engaged by said pattern, for imparting a swinging motion to the plate, bearings for said spoke-holder shaft to turn in, one of the bearings being mounted to slide on the plate in the direction of the length of the spoke-holder shaft, means connected with said spoke-holder shaft, to slide the same bodily in the direction of its length, a sand-band for finishing the throat of a spoke in said spoke-holder, an abrading device movable toward and from another spoke in said spoke-holder, to finish the face of the spoke, and means, substantially as described, for imparting a sliding motion to said driven shaft in unison with the movement of said abrading device, as set forth.

21. A spoke-finishing machine having a a spoke-holder carrying sockets, a spoke-holder shaft for carrying said spoke-holder, a gearing for revolving said sockets from said shaft, a cam-shaft having a continuous rotary motion, a gearing connecting said cam-shaft with said spoke-holder shaft, a cam-wheel on said cam-shaft, and a connection between said cam-wheel and said spoke-holder shaft, for imparting a sliding motion to the latter, as set forth.

22. A spoke-finishing machine having a spoke-holder carrying sockets, a spoke-holder shaft for carrying said spoke-holder, a gearing for revolving said sockets from said shaft, a cam-shaft having a continuous rotary motion, a gearing connecting said cam-shaft with said spoke-holder shaft, a cam-wheel on said cam-shaft, and a connection between said cam-wheel and said spoke-holder shaft, for imparting a sliding motion to the latter, said connection comprising a lever engaging the cam-wheel, a rod mounted to slide, a link connecting said lever with said rod, and a shifting device on said rod and engaging said spoke-holder shaft, as set forth.

23. A spoke-finishing machine having a spoke-holder carrying sockets, a spoke-holder shaft for carrying said spoke-holder, a gearing for revolving said sockets from said shaft, a cam-shaft having a continuous rotary motion, a gearing connecting said cam-shaft with said spoke-holder shaft, a cam-wheel on said cam-shaft, a connection between said cam-wheel and said spoke-holder shaft, for imparting a sliding motion to the latter, a sand-wheel mounted to turn and to slide bodily, and a connection between said sand-wheel and said cam-shaft, for imparting a sliding motion to said sand-wheel, as set forth.

24. A spoke-finishing machine having a sand-band, a bed provided with a head mounted to swing on the bed, a spoke-holder supported on said head, and an adjusting and locking device for locking said head to said bed after adjusting the head to bring the spoke-holder into the desired angular position relatively to said sand-band, as set forth.

25. A spoke-finishing machine having a sand-band, a bed provided with a head mounted to swing on the bed, a spoke-holder supported on said head, an adjusting and locking device for locking said head to said bed after adjusting the head to bring the spoke-

holder into the desired angular position relatively to said sand-band, and means for bodily adjusting said head and said adjusting and locking device transversely, to move the spoke-holder bodily toward or from the sand-band, as set forth.

26. In a spoke-finishing machine, a revoluble shaft, a sleeve mounted on the shaft, and provided with spaced heads, shafts mounted in one of the heads and carrying tenon-sockets, gearing between the tenon-socket shafts and the revoluble shaft, and spindles mounted in the other head and carrying butt-sockets, as set forth.

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

GEORGE A. ENSIGN.

Witnesses:
GEO. L. DEATRICH,
JOSEPH BAUER.