

No. 719,769.

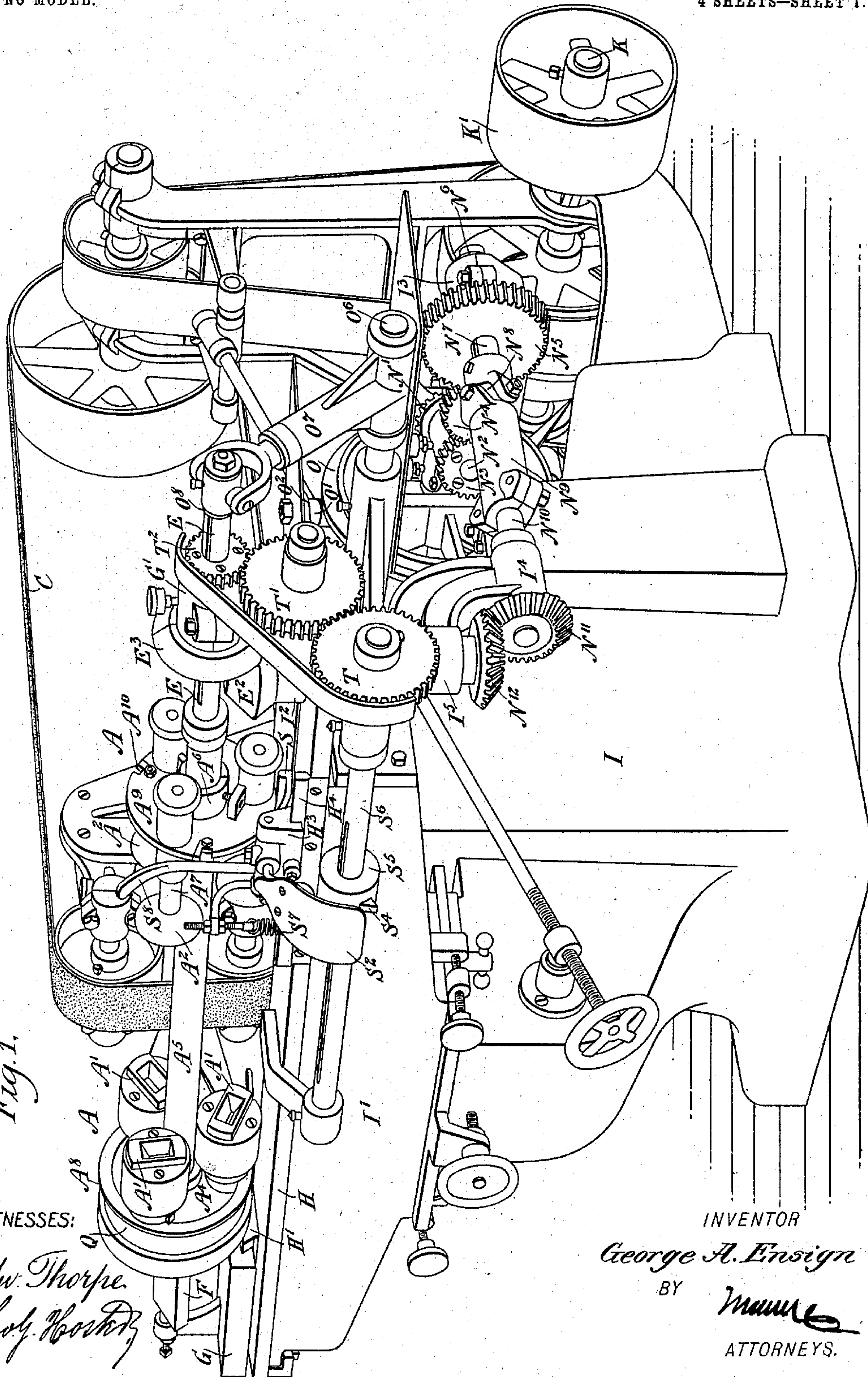
PATENTED FEB. 3, 1903.

G. A. ENSIGN.
SPOKE FINISHING MACHINE.

APPLICATION FILED OCT. 4, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

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Rev. Hooker,

INVENTOR

George A. Ensign

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No. 719,769.

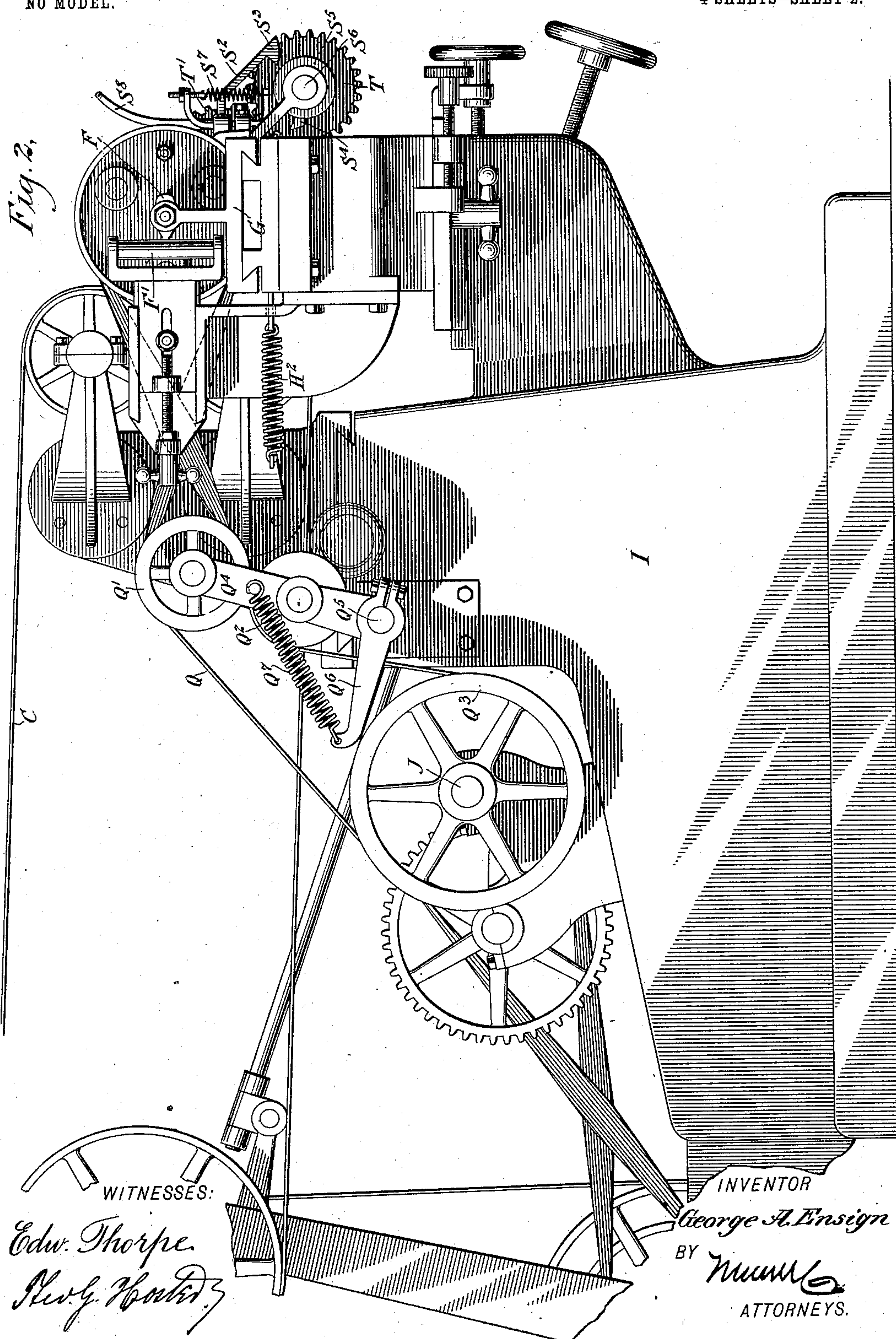
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4 SHEETS—SHEET 2.



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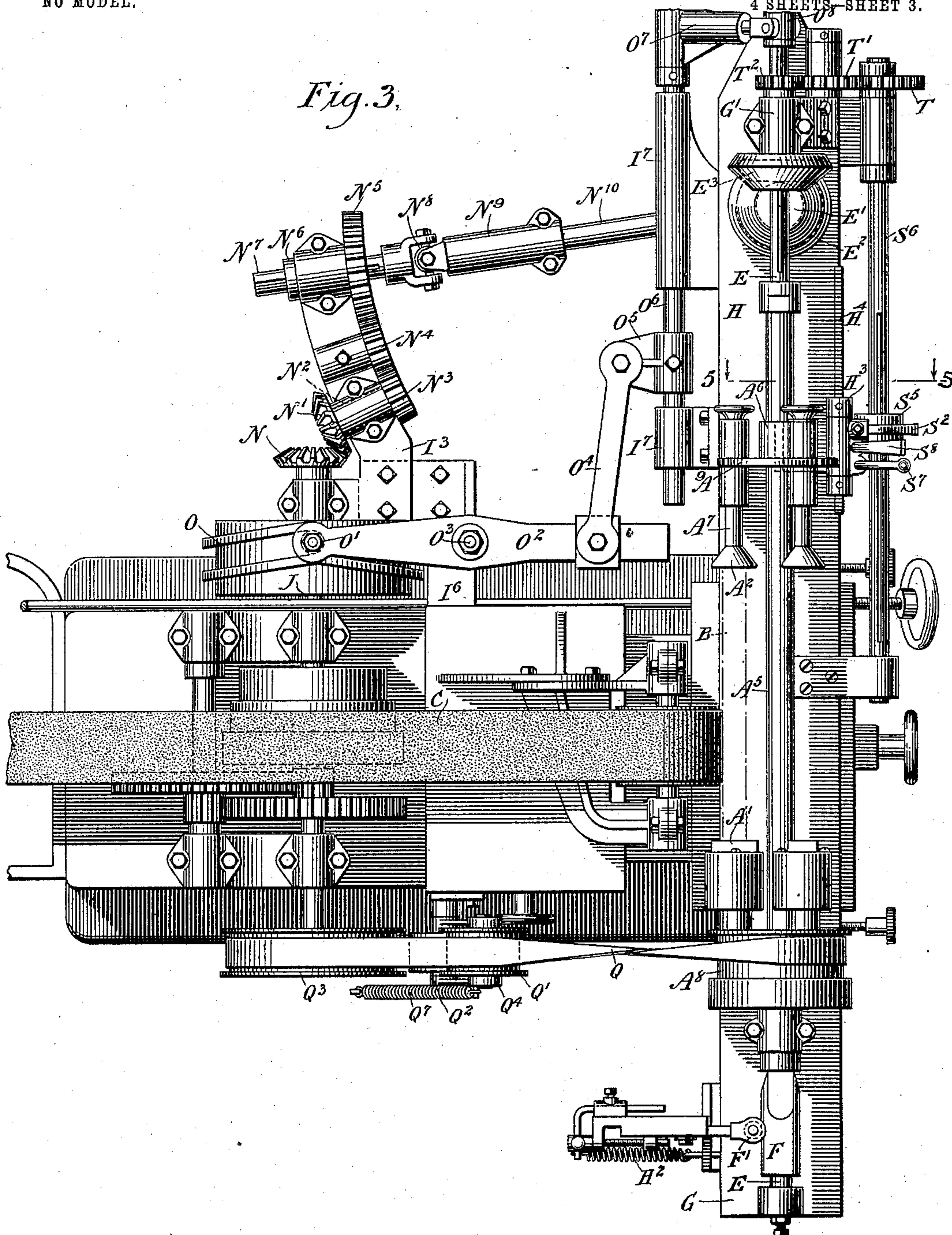
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4 SHEETS-SHEET 3.

Fig. 3.



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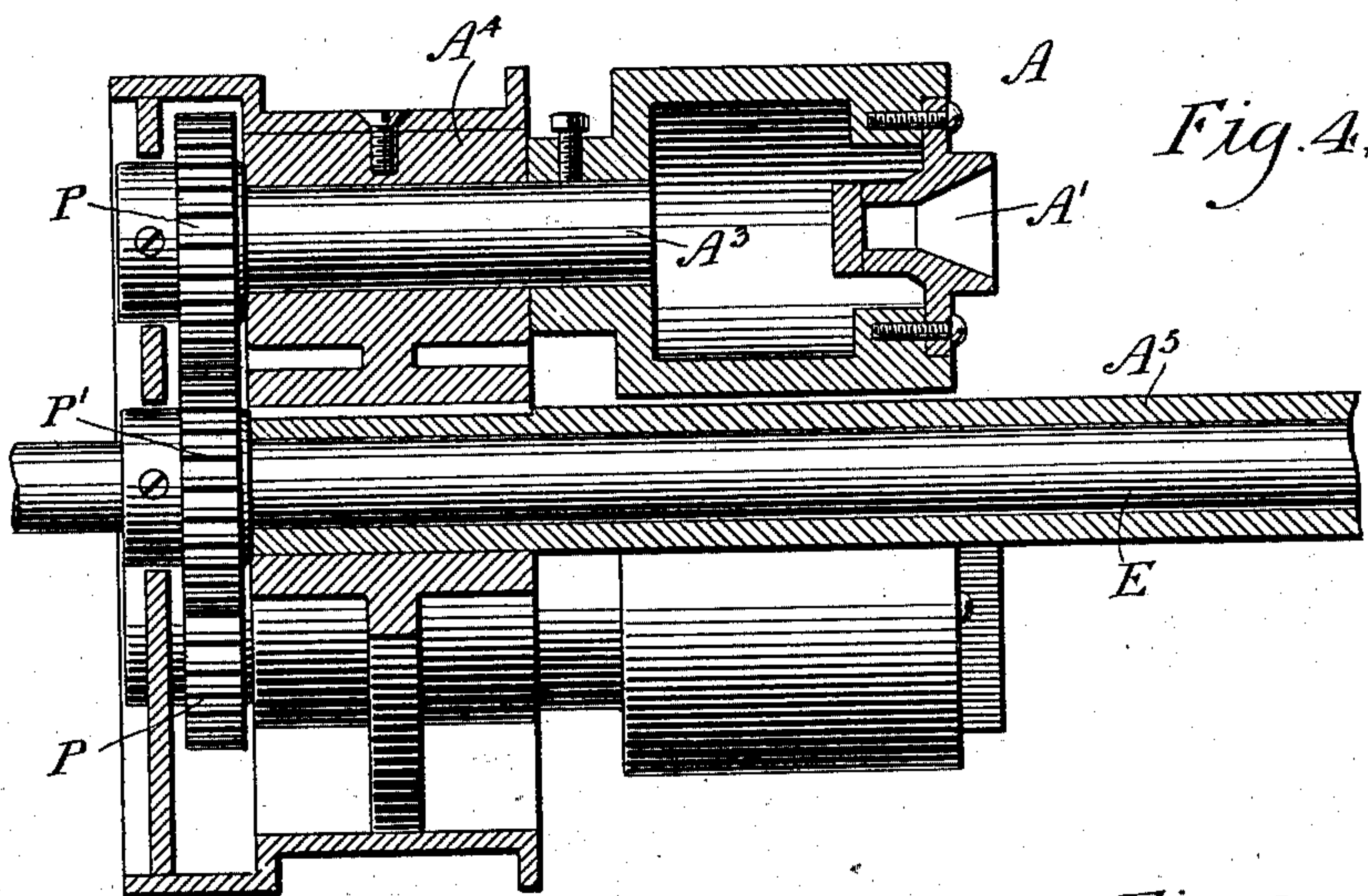


Fig. 4.

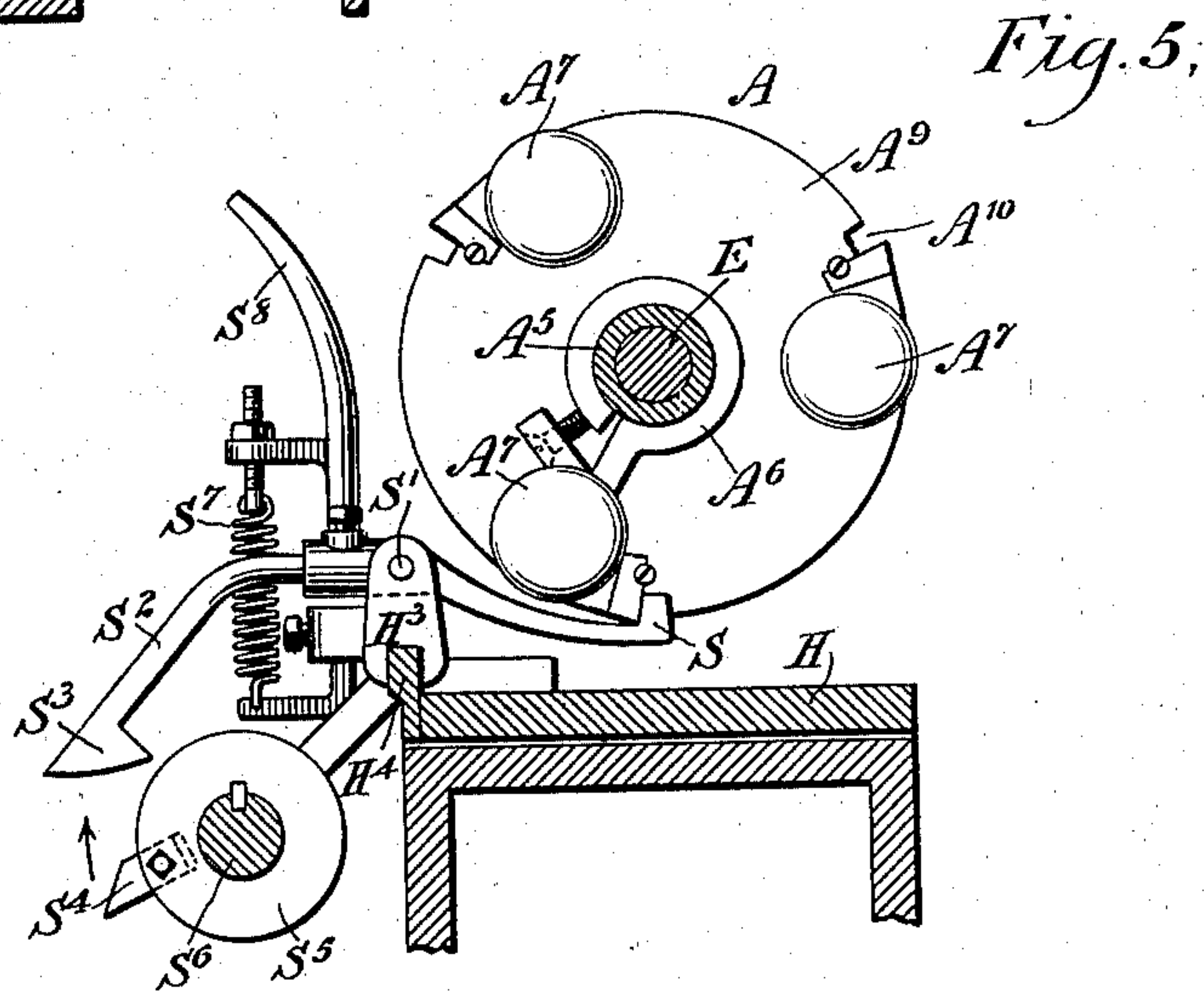


Fig. 5.

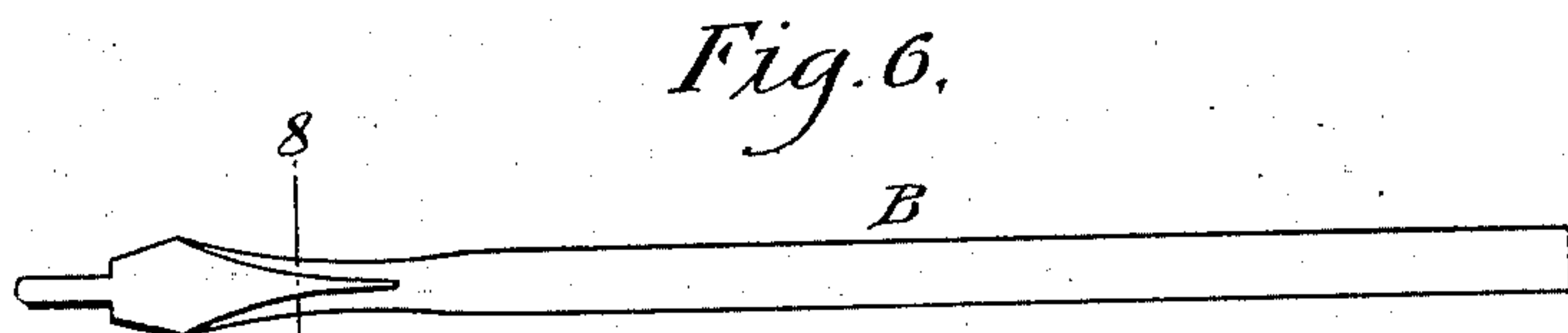


Fig. 6.

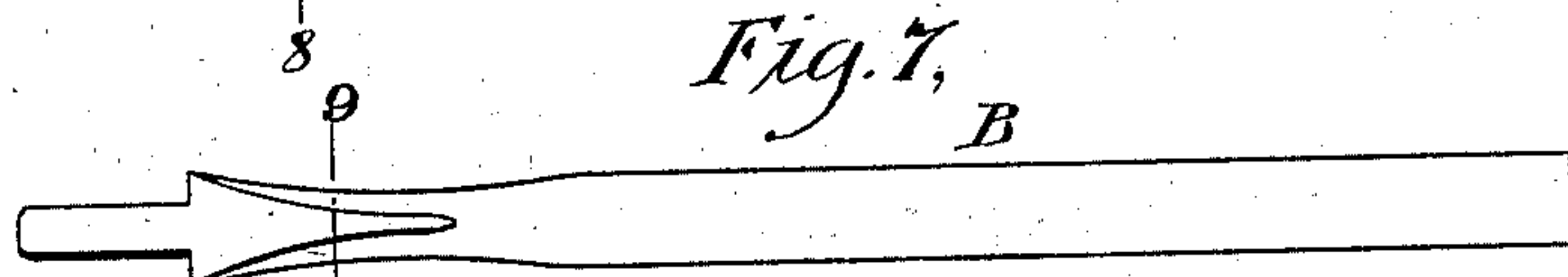


Fig. 7.

WITNESSES:

Edward Thorpe.
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Fig. 8.

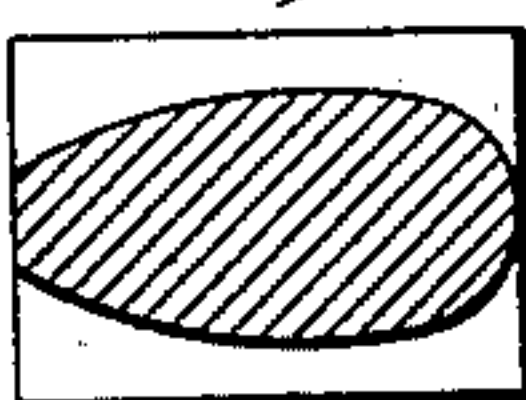
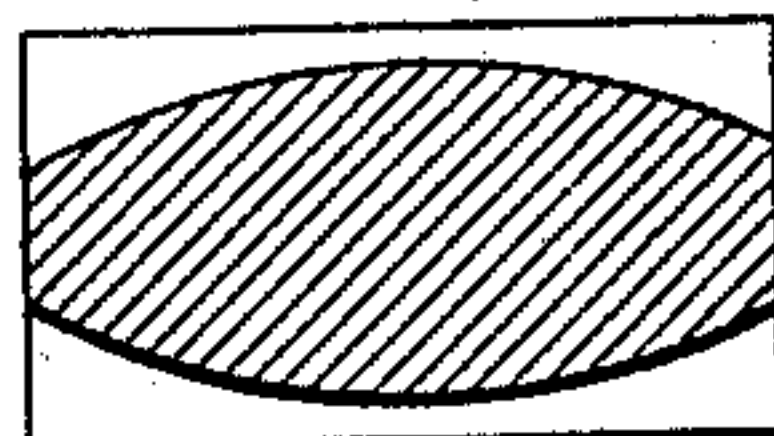


Fig. 9. George A. Ensign



INVENTOR

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UNITED STATES PATENT OFFICE.

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

SPOKE-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 719,769, dated February 3, 1903.

Application filed October 4, 1902. Serial No. 125,966. (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 more particularly to spoke-finishing machines, such as shown and described in the Letters Patent of the United States No. 679,611, granted to me July 30, 1901.

The object of the present invention is to provide certain new and useful improvements in spoke-finishing machines whereby ordinary wagon-spokes or Sarven spokes can be accurately and uniformly finished at the throat, it requiring only an unskilled workman to attend the machine—that is, to remove the finished spokes and to place unfinished spokes in the automatically-turning spoke-holder.

The invention consists of novel features and parts and combinations of the same, as will be more 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 perspective view of the improvement as arranged for finishing the throats of ordinary wagon-spokes. Fig. 2 is an end elevation of the same. Fig. 3 is a plan view of the same. Fig. 4 is an enlarged sectional front elevation of the tenon-socket end of the spoke-holder and the driving-gear for the tenon-sockets. Fig. 5 is an enlarged transverse section of the spoke-holder and the locking and releasing device for the same, the section being on the line 5 5 of Fig. 3. Fig. 6 is a front elevation of a finished spoke of the Sarven type. Fig. 7 is a like view of an ordinary wagon-spoke. Fig. 8 is an enlarged cross-section of a Sarven spoke, the section being on the line 8 8 of Fig. 6; and Fig. 9 is a similar view of a wagon-spoke on the line 9 9 of Fig. 7.

In my present invention a spoke-holder A is arranged to carry and rotate a plurality of

spokes B, to swing transversely toward and from a sand-band C or other finishing means, to slide bodily in a longitudinal direction for engaging a revolving spoke with the sand-band for a certain length, to finish the throat of a spoke, and to turn periodically to automatically bring an unfinished spoke in position for treatment by the traveling sand-band C, the arrangement being such that the only manual labor required by the attendant is the removal of a finished spoke from and the insertion of an unfinished spoke into the spoke-holder.

The spoke-holder A, as shown, is preferably provided with sets of tenon-sockets A' and butt-sockets A² for supporting at one time a spoke to be finished by the sand-band C, a finished spoke for removal by the attendant, and an unfinished spoke for subsequent treatment by the sand-band C. 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', the said left-hand end of the shaft being mounted to turn in a bearing G, mounted to slide in the direction 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 I² on the bed-head I', (see Fig. 1,) and said shaft E' carries at its upper end a bevel friction-wheel E² in mesh with a similar bevel friction-wheel E³, 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 friction-wheel E³, 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 to shift the spoke-holder A and the spokes B 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 H² (see Figs. 2 and 3) 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, which is also connected with the sand-band C to impart a traveling motion thereto.

The main shaft K is provided with a pulley K', connected by belt with other machinery for rotating the shaft K, and as the connection between the main shaft K, cam-shaft J, and sand-band C is the same as the one shown and described in the Letters Patent above referred to it is not deemed necessary to describe such connection in detail, it being understood, however, that when the shaft K is rotated a reduced rotary motion is given to the shaft J, while the sand-band C is caused to travel at a high rate of speed.

The shafts J and K 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', secured on a hollow shaft N², journaled in suitable bearings I³, carried on the bed I, the said hollow shaft N² extending radially from the shaft E', previously referred to. On the shaft N² is secured a bevel gear-wheel N³ in mesh with an intermediate bevel gear-wheel N⁴, mounted to turn on a stud attached to the bearing I³, and the said intermediate gear-wheel N⁴ is in mesh with a larger bevel gear-wheel N⁵, having a hollow shaft N⁶ likewise mounted to rotate in the bearing I³ and also extending radially relative to the shaft E'.

The shafts N² and N⁶ are formed with keys for engaging the keyway in a shaft N⁷, connected by a universal joint N⁸ with a head N⁹, adjustably secured on a shaft N¹⁰, provided with a bevel gear-wheel N¹¹ in mesh with a similar gear-wheel N¹², secured on the lower end of the shaft E'. The shaft N¹⁰ is journaled in a bearing I⁴, having a hub I⁵, mounted loosely on the shaft E', so as to allow of swinging the shaft N¹⁰, and with it the shaft N⁷, to engage the latter with either the shaft N² or the shaft N⁶. When the shaft N⁷ is in engagement with the shaft N⁶, as shown in the drawings, then the rotary motion of the shaft J is transmitted to the shaft E by the bevel gear-wheels N and N', rotating the shaft N², which by the gear-wheel N³ and intermediate gear-wheel N⁴ rotates the gear-wheel N⁵ and shaft N⁶ at a lower rate of speed than the shaft J, and the rotary motion of the shaft N⁶ is transmitted by the shaft N⁷, universal joint N⁸, shaft N¹⁰, and gear-wheels N¹¹ and N¹² to the shaft E', which by the friction gear-wheels E² and E³ rotates the shaft E. The gear-wheels N³, N⁴, and N⁵ are so proportioned that when the shaft N⁷ engages the shaft N⁶ then the shaft N⁷, and with it the shaft E, is rotated at one-half the speed of the shaft J. This motion is required when finishing ordinary wagon-spokes, as hereinafter more fully described. When it is desired to rotate the shaft E at a higher rate of speed—

that is, when a Sarven spoke is to be finished—then the operator disconnects the shaft N⁷ from the shaft N⁶ and engages the said shaft N⁷ with the shaft N², so that the shaft N⁷ is rotated from the cam-shaft J by the gear-wheels N and N' and shaft N² at the same speed as the shaft J.

On the cam-shaft J is secured a cam-wheel O, having its cam-groove engaged by a friction-roller O', journaled on one end of a lever O², fulcrumed at or near its middle at O³ on a bracket I⁶, attached to the bed I, and the other end of the said lever O² is pivotally connected by a link O⁴ with a collar O⁵, adjustably held on a rod O⁶, mounted to slide longitudinally in suitable bearings I⁷, attached to the bed I. The right-hand end of the rod O⁶ carries a shifting fork O⁷, engaging a shifting collar O⁸, held on the right-hand end of 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 the said cam-wheel by the connection just described. Thus when the shaft J is rotated a simultaneous rotary and sliding motion is given to the shaft E, and the speed of the shaft E is varied according to the type of spoke to be treated at the time, while the sliding motion given to the shaft E remains the same in both cases.

The detail construction of the spoke-holder A is preferably the same as the one shown and described in the Letters Patent above referred to—that is, the tenon-sockets A' are secured on shafts A³, journaled in a head A⁴, attached to a sleeve A⁵, through which extends loosely the spoke-holder shaft E, and on the said sleeve is secured a head A⁶, in which are mounted to rotate spring-pressed spindles A⁷, carrying the butt-sockets A². The shafts A³ are positively driven from the shaft E by gear-wheels P and P', and the spoke-holder A is rotated when unlocked by a friction-gear from the cam-shaft J, and for this purpose the head A⁴ is provided with a pulley A⁸, over which passes a crossed belt Q, also passing over tightening-pulleys Q' and Q² and a driving-pulley Q³, secured on the left-hand end of the cam-shaft J. The tightening-pulleys Q' and Q² are journaled on an arm Q⁴, fulcrumed on a stud Q⁵, attached to the bed I, and on the said stud Q⁵ is secured an arm Q⁶, connected by a spring Q⁷ with the arm Q⁴, so as to move the pulleys Q' and Q² in firm contact with the runs of the belt Q. Now it is evident that when the spoke-holder A is unlocked, as hereinafter more fully described, then the friction-gearing described rotates the spoke-holder; but when the latter is locked against rotation then the belt Q slips over the pulley A⁸.

In order to temporarily lock the spoke-holder against rotation by the friction-gearing above described and to periodically unlock the said spoke-holder automatically, the following device is provided: A catch S (see Figs. 1 and 5) is adapted to engage one of a series of

notches A^{10} in the peripheral face of a disk A^9 , forming part of the head A^6 , and the said catch S is pivoted at S' on a bearing H^3 , adjustable longitudinally on a guideway H^4 , secured on the plate H , and the forward end of the said catch S is provided with a downwardly-extending arm S^2 , having a cam S^3 , adapted to be engaged by a lug S^4 , held on a wheel S^5 , secured to a shaft S^6 , extending longitudinally at the front of the machine and journaled in suitable bearings carried by the swing-plate H . The right-hand end of the shaft S^6 is provided with a gear-wheel T , in mesh with an intermediate gear-wheel T' , in mesh with a gear-wheel T^2 , mounted to rotate with the shaft E and allowing the shaft to slide through it, so that when the shaft is rotated the gear-wheel T^2 rotates with it and drives the intermediate gear-wheel T' , which in turn rotates the gear-wheel T and shaft S^6 for the lug S^4 to periodically engage the cam S^3 to impart a swinging motion to the catch S to disengage the latter from the corresponding notch A^{10} . When this takes place, the spoke-holder is unlocked, and the belt Q now rotates the pulley A^8 , thus rotating the spoke-holder to move the finished spoke away from the sand-band C and to bring an unfinished spoke to the sand-band, it being understood that while this operation takes place the lug S^4 leaves the cam S^3 to allow the catch S to engage the next notch A^{10} to again lock the spoke-holder against rotation. A spring S^7 is connected with the catch S to hold the same in engagement with the notches A^{10} , and the said catch S is also provided with a hand-lever S^8 under the control of the operator to permit the attendant to release the spoke-holder whenever it is desired to do so.

The catch S is of sufficient width to remain at all times in engagement with the notches A^{10} of the disk A^9 during the longitudinal movement of the spoke-holder A ; but the wheel S^5 and the bearing H^3 are longitudinally adjusted on the shaft S^6 and guideway H^4 to allow adjustment when setting the spoke-holder for spokes of different lengths.

The other detail constructions of the machine are approximately the same as those shown and described in the Letters Patent above referred to, so that further description thereof is not deemed necessary.

The operation is as follows: When the main shaft K is rotated, the spokes in the spoke-holder are rotated and move 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 thereof. Now when ordinary wagon-spokes (see Figs. 7 and 9) are under treatment in the machine then the shaft N^7 is in engagement with the shaft N^6 of the gear-wheel N^5 , so that the spokes are rotated twice and two full longitudinal movements are given to the spoke-holder and spokes to cause the sand-band C in contact with the rearmost spoke to abrade the throat thereof with the exception of the

two faces, and at the end of the two revolutions of the shaft E the gear-wheels T^2 , T' , and T have given a single revolution to the shaft S^6 for the latter to cause the lug S^4 to act on the catch S to temporarily unlock the spoke-holder and allow the belt Q to turn the spoke-holder once around. When Sarven spokes (see Figs. 6 and 8) are under treatment in the machine, then the spokes make two revolutions; but only one full longitudinal movement is given to the spoke-holder and the spokes to cause the sand-band C in contact with the rearmost spoke to abrade the throat thereof with the exception of the single face, it being understood that during the time the face of the spoke approaches the sand-band C the spoke moves lengthwise for the sand-band to gradually leave the face.

It is expressly understood that by the variable gear described and consisting of the shafts N^2 and N^6 , gear-wheels N^3 , N^4 , and N^5 , and shaft N^7 a different speed can be given to the shaft E , while the sliding motion thereof remains the same, and consequently I am enabled to properly finish spokes of different types, and by rotating the spoke-holder periodically and automatically in harmony with the turning of the spokes and their longitudinal movement I am enabled to finish the spokes accurately and uniformly and without the aid of skilled labor.

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

1. A spoke-finishing machine having a spoke-holder for removably holding a plurality of spokes, means for finishing the throat of one of the spokes, and means for automatically and periodically turning the spoke-holder, to bring the next unfinished spoke to the said finishing means, as set forth.

2. A spoke-finishing machine having a revolvable spoke-holder for removably holding a plurality of spokes, a sand-band for engaging one of the spokes and finishing the throat thereof, and means for bodily sliding and swinging and automatically and periodically locking, unlocking and turning the spoke-holder, to rotate the spokes in the holder, as set forth.

3. A spoke-finishing machine having a spoke-holder for removably holding a plurality of spokes, means for finishing the throat of one of the spokes, a locking device for holding the spoke-holder against turning while finishing the throat of the spoke, means for automatically unlocking the spoke-holder periodically, and means for automatically turning the spoke-holder after being unlocked and after a spoke is finished, to bring the next unfinished spoke in contact with the said finishing means and to allow removal of the finished spoke, as set forth.

4. A spoke-finishing machine having a spoke-holder for removably holding a plurality of spokes, means for finishing the throat of one of the spokes, a friction driving device

for the said spoke-holder, to rotate the latter, a locking device for holding the spoke-holder against rotation by the said friction device, and means for automatically unlocking the
 5 said locking device periodically, to allow the friction device to rotate the spoke-holder, to bring the next unfinished spoke in operative connection with the said finishing means, as set forth.

10 5. A spoke - finishing machine having a spoke-holder provided with revoluble spoke-sockets for holding and revolving the spokes, means for finishing the throat of one of the spokes, means for imparting a longitudinal
 15 movement to the said spoke-holder, and a variable gear for rotating the spoke-sockets, to vary the rotation of the spokes relative to the longitudinal movement given to the spoke-holder and the spokes carried bodily thereby,
 20 as set forth.

6. A spoke - finishing machine having a spoke-holder provided with revoluble spoke-sockets for holding and revolving the spokes, means for finishing the throat of one of the
 25 spokes, means for imparting a longitudinal movement to the said spoke-holder, and a variable gear for rotating the spoke-sockets, to vary the rotation of the spokes relative to the longitudinal movement given to the spoke-
 30 holder and the spokes carried bodily thereby, and said variable gear having positively driven gear-wheels rotating at different speeds and a shaft for connection with the said gear-wheels, driven at a different rate of speed, as
 35 set forth.

7. A spoke - finishing machine having a spoke-holder, means for imparting a longitudinal movement to the spoke-holder, and a
 40 variable gear for rotating the spokes in the holder at a varying speed while the longitudinal movement of the spoke-holder and spokes remains the same, as set forth.

8. A spoke - finishing machine having a spoke-holder for carrying the spokes, rotated
 45 by a belt, means for locking the spoke-holder against rotation by the said belt, and means for automatically unlocking the spoke-holder periodically, as set forth.

9. A spoke - finishing machine having a
 50 spoke-holder for carrying the spokes, rotated by a belt, means for locking the spoke-holder against rotation by the said belt, means for automatically unlocking the spoke-holder periodically, and a spring-controlled tightening
 55 device for the said belt, as set forth.

10. A spoke - finishing machine having a spoke-holder for carrying the spokes, rotated
 60 by a belt, means for locking the spoke-holder against rotation by the said belt, means for automatically unlocking the spoke-holder periodically, and a driven shaft for actuating the said belt and the said unlocking means, as set forth.

11. A spoke-finishing machine having a rev-
 65 oluble spoke-holder for carrying the spokes and provided with a pulley, a belt for the said pulley to rotate the spoke-holder, means for

imparting a longitudinal movement to the said spoke-holder, a variable driving device
 70 for rotating the spokes in the said holder, a locking and releasing device for the said spoke-holder, controlled by the said driving device, and a driven shaft for driving the said belt and the said variable driving device, as set forth.

12. A spoke-finishing machine having an abrading device, a spoke-holder for carrying the spokes in operative connection with the
 80 abrading device, means for imparting a longitudinal movement to the said spoke-holder, an automatic locking and releasing device for the said spoke-holder, a driving device for rotating the spokes in the said spoke-holder and for controlling the said locking
 85 and releasing device, and a driven shaft for actuating the said means and the said driving device in unison, as set forth.

13. A spoke-finishing machine having an abrading device, a spoke-holder for carrying the spokes in operative connection with the
 90 abrading device, means for imparting a longitudinal movement to the said spoke-holder, a locking and releasing device for the said spoke-holder, a driving device for rotating the spokes of the said spoke-holder and for
 95 controlling the said locking and releasing device, and a driven shaft for actuating the said means and the said driving device in unison, the driving device having a variable gear, to allow of varying its speed independent of the
 100 said shaft, as set forth.

14. A spoke-finishing machine having a revoluble spoke-holder provided with revoluble
 105 sockets for holding the spokes, a spoke-holder shaft geared with the said sockets, a train of driven gear-wheels, a shaft for turning connection with the gear-wheels in the said train, rotating at a different speed, and a connection between the said spoke-holder shaft and the said second-named shaft, adapted to be
 110 driven from the said train of gear-wheels, as set forth.

15. A spoke - finishing machine having a driven train of gear-wheels, sundry of which
 115 have hollow shafts, and a shaft mounted to turn and to swing and adapted to engage either of the said hollow shafts, to turn with the same, as set forth.

16. A spoke-finishing machine having a revoluble spoke-holder provided with a notched
 120 disk, a pulley and belt for driving the said spoke-holder, a spring-pressed catch for engaging the said notched disk, to lock the spoke-holder against rotation, and a revoluble wheel having a projection for engaging the
 125 said catch, to release the said spoke-holder and allow the belt to rotate the spoke-holder, as set forth.

17. A spoke-finishing machine having a revoluble spoke-holder provided with a notched
 130 disk, a pulley and belt for driving the said spoke-holder, a spring-pressed catch for engaging the said notched disk, to lock the spoke-holder against rotation, a revoluble wheel

having a projection for engaging the said catch, to release the said spoke-holder and allow the belt to rotate the spoke-holder, a spoke-holder shaft for rotating the spokes in the spoke-holder, and a gearing for rotating the said revoluble wheel from the spoke-holder shaft, as set forth.

18. A spoke-finishing machine having a revoluble spoke-holder provided with a notched disk, a pulley and belt for driving the said spoke-holder, a spring-pressed catch for engaging the said notched disk, to lock the spoke-holder against rotation, a revoluble wheel having a projection for engaging the said catch, to release the said spoke-holder and allow the belt to rotate the spoke-holder, a spoke-holder shaft for rotating the spokes in the spoke-holder, a gearing for rotating the said revoluble wheel from the spoke-holder shaft at one-half the latter's speed, means for imparting a longitudinal movement to the said spoke-holder shaft at a uniform rate of speed, and a variable gear for rotating the spoke-holder shaft at a variable speed relative to the said longitudinal movement, as set forth.

19. A spoke-finishing machine having a revoluble spoke-holder, means for operating said holder, a spring-pressed catch for engaging the holder to hold it stationary, a tripping device for disengaging the catch from the holder, and means for periodically operating the tripping device from the spoke-holder shaft, as set forth.

20. A spoke-finishing machine having a revoluble spoke-holder provided with a notched member, means for revolving said holder, a pivoted and spring-pressed catch for engaging the notched member of the holder, a revoluble shaft carrying a projection for engag-

ing one end of the catch to disengage it from the said notched member, and means for operating said shaft from the spoke-holder shaft, as set forth.

21. A spoke-finishing machine having a revoluble spoke-holder, a driven shaft, a train of gearing geared with the driven shaft, a shaft having a universal joint and adapted to be connected with the first or last wheel of the train of gearing, and gearing between said shaft and the spoke-holder shaft, as set forth.

22. A spoke-finishing machine having a revoluble spoke-holder, a driven shaft, a hollow shaft geared with the driven shaft, a second hollow shaft, gear-wheels connecting the hollow shafts, a shaft having a universal joint and adapted to engage either of said hollow shafts, and gearing between the said shaft and the spoke-holder shaft, as set forth.

23. A spoke-finishing machine having a sliding and revoluble spoke-holder, a driven shaft, means for sliding the spoke-holder from said driven shaft, a hollow shaft geared at one end with the driven shaft and provided with a gear-wheel at its other end, a second hollow shaft provided with a gear-wheel, an intermediate gear-wheel between the gear-wheels of the hollow shafts, a shaft having a universal joint and adapted to engage either of the said hollow shafts, and gearing between said shaft and the spoke-holder shaft, 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:

GEORGE W. DEATRICK,
JOS. BAUER.