(No Model.) 2 Sheets—Sheet 1.

H. J. MILLER.

SPOKE TENONING AND FELLY BORING MACHINE.

No. 278,995. Patented June 5, 1883.

Fig. 14.

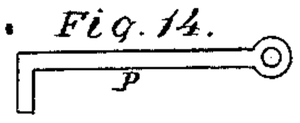


Fig. 1.

Fig. 11.

Fig. 10.

Fig. 13.

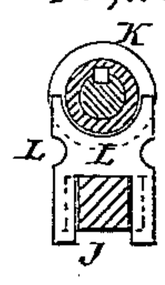


Fig. 8.

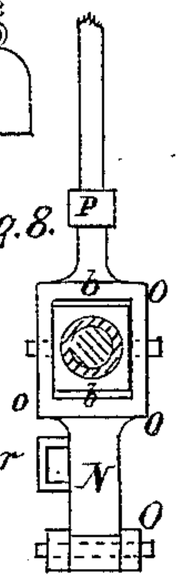


Fig. 9.

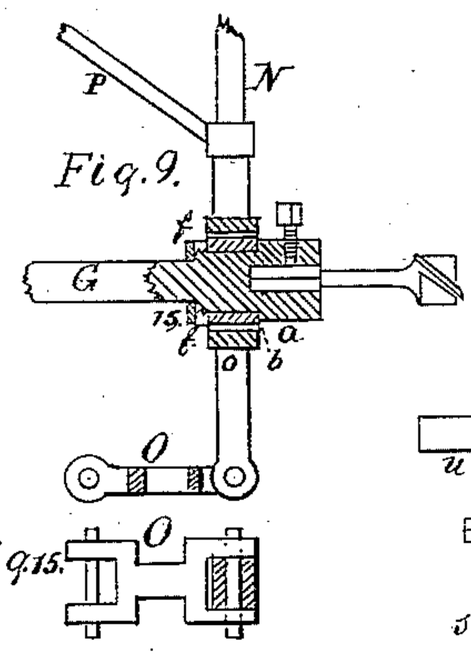


Fig. 4.

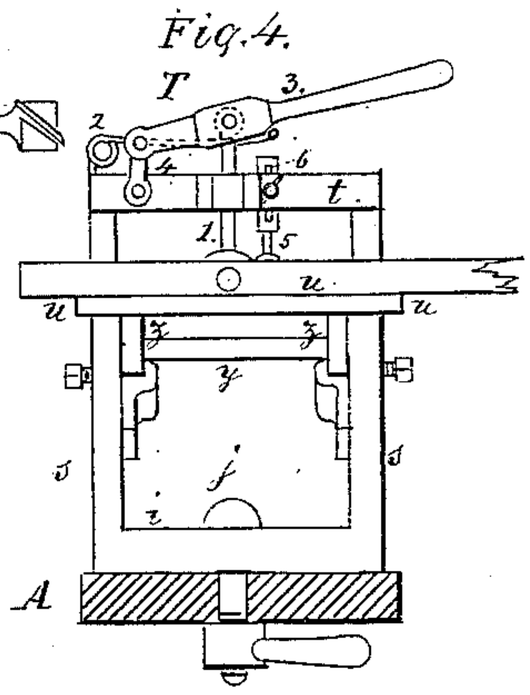


Fig. 12.

Fig. 7.

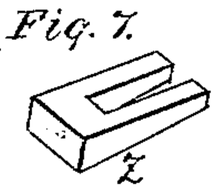


Fig. 6.

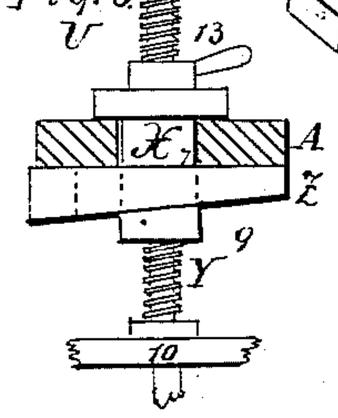


Fig. 15.

Fig. 5.

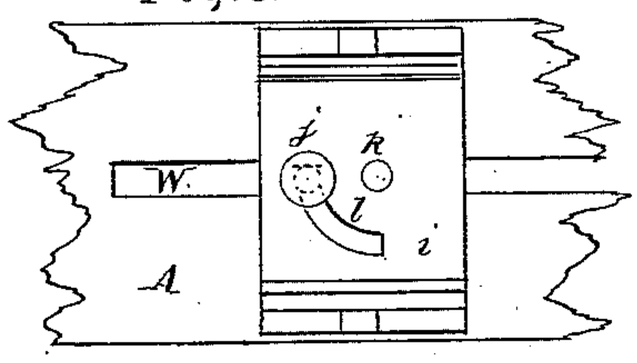


Fig. 3.

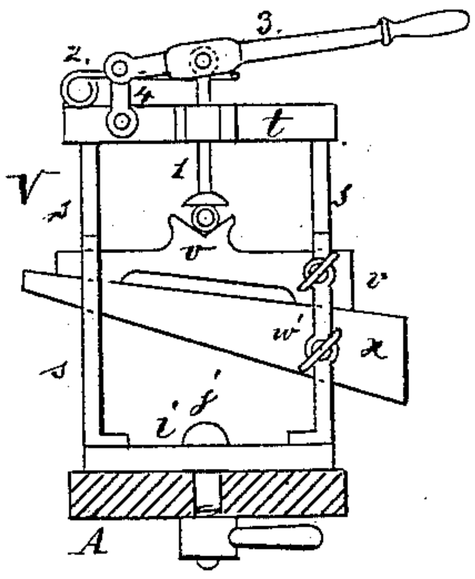
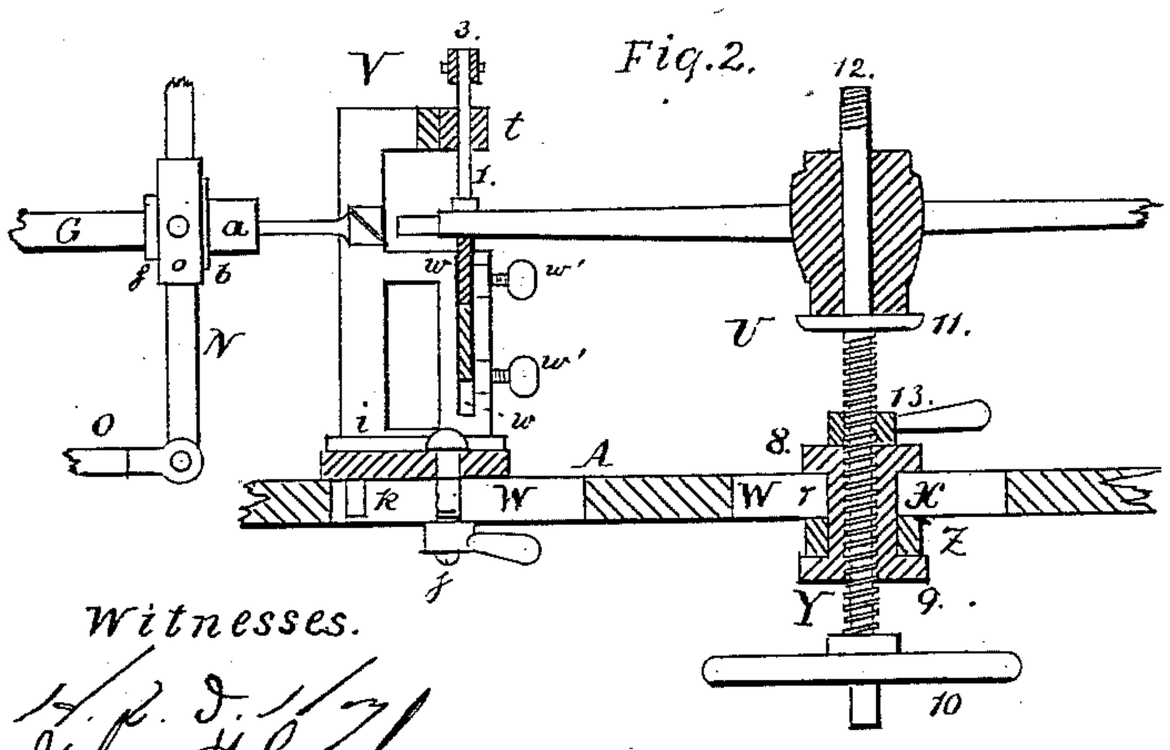


Fig. 2.



Witnesses.

J. L. D. [illegible]

John W. Graham

Inventor.

Henry J. Miller

(No Model.) 2 Sheets—Sheet 2.

H. J. MILLER.

SPOKE TENONING AND FELLY BORING MACHINE.

No. 278,995. Patented June 5, 1883.

Fig. 16.

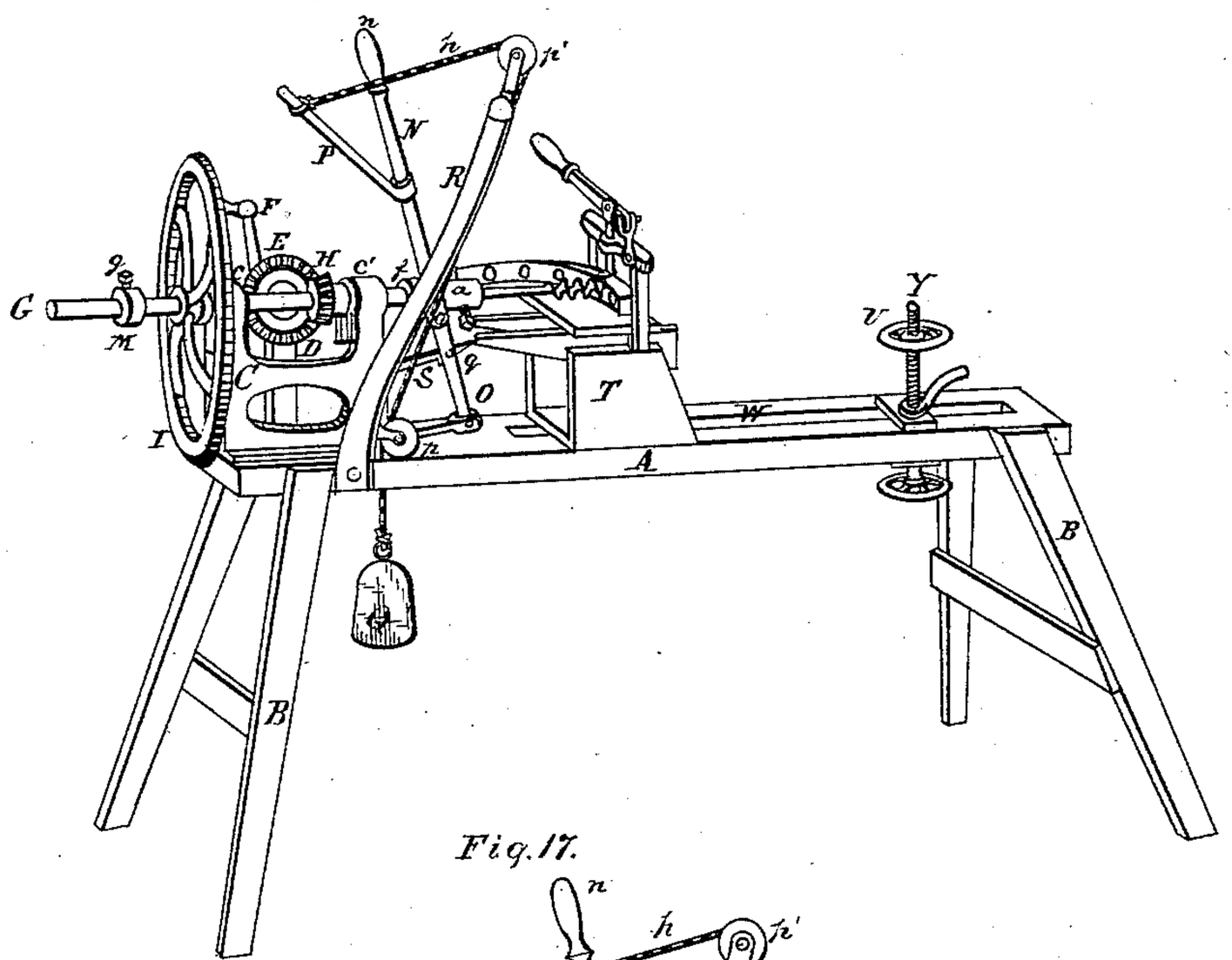
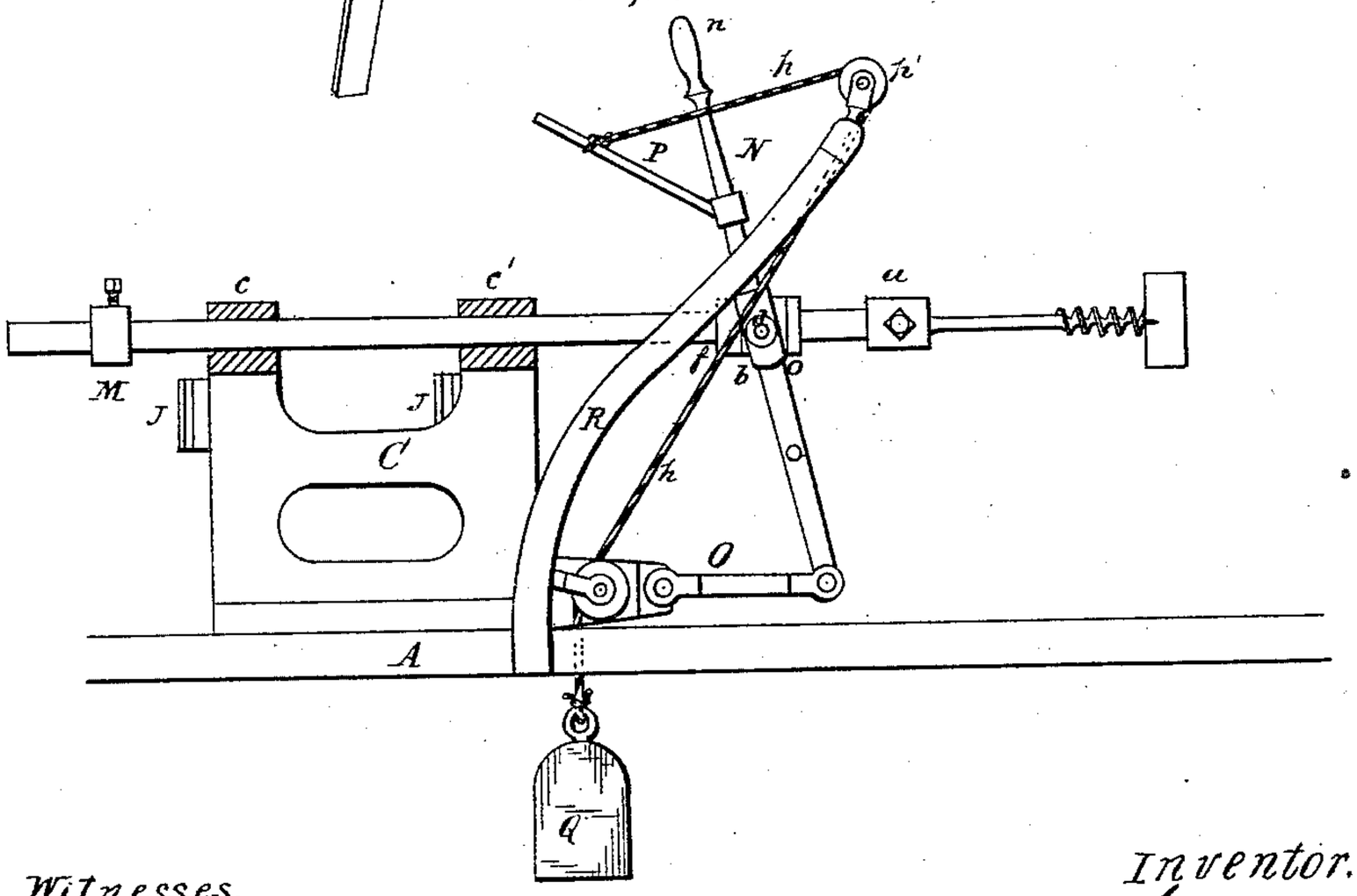


Fig. 17.



Witnesses.
R. Burlen
W. H. Wood

Inventor.
H. J. Miller

UNITED STATES PATENT OFFICE.

HENRY J. MILLER, OF GOSHEN, NEW YORK.

SPOKE-TENONING AND FELLY-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 278,995, dated June 5, 1883.

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

To all whom it may concern:

Be it known that I, HENRY J. MILLER, a citizen of the United States, residing at Goshen, in the county of Orange and the State of New York, have invented certain new and useful Improvements in Spoke-Tenoning and Felly-Boring Machines, of which the following is a specification.

My invention relates to that class of machines described and claimed in United States Letters Patent granted to me bearing number 268,118; and it consists in certain improvements therein, as hereinafter set forth.

Heretofore the ordinary carriage-maker has obtained hubs, fellies, and spokes ready made, but in an unfinished state. To make and put together a wheel the spokes are first fitted and set in the hub. Each is then cut with a tenon on its outer end, and the fellies are drilled with holes for said tenons to fit, accurate manipulation of experienced mechanics being required to perform this work by hand.

The sole object of this invention is to provide for the use of an ordinary carriage-maker a suitable hand-machine with all the required contrivance for the accurate cutting of the tenon in the spoke and the corresponding accurate boring of the fellies. To this end the machine consists of a revolving spindle carrying the cutter or auger, suitable clamps for holding the fellies, hubs, and spokes, all of which are required in the preparation and construction of a wheel.

My improvements consist in constructing the machine with a stationary spindle-head provided with a sliding automatic feeding-cutter spindle, having a feed-lever attached to said spindle by a universal joint, and connected to a weight by a rope moving over guide-pulleys. By this means the cutter or auger attached to the spindle is fed automatically into the wood, and performs its work with more accuracy and regularity than by a machine in which the spindle-head moves to feed with the spindle, or a machine in which the spindle is fed into the wood by means of a treadle.

My improvements also consist in the combination of the spindle and a feed-lever with suitable clamps for securing the spokes, fellies, and hubs in position while the machine is in operation.

Referring to the annexed drawings, Figure 1 represents a side elevation of the machine, partly in section, when adapted for boring fellies. Fig. 2 represents a detached longitudinal section of a portion of the bench with a spoke and hub rest in use, and showing the tenon-cutter in connection therewith. Fig. 3 is a front view of the spoke-clamp detached. Fig. 4 is a similar view of the felly-clamp. Fig. 5 is a plan view of the stand of the felly-clamp, the table and its top cross-piece being removed. Fig. 6 is a side view of the threaded bed-block and wedge of the hub-clamp. Fig. 7 is a perspective view of said wedge. Fig. 8 is a front view of the feed-lever, showing the universal joint with the bore-spindle. Fig. 9 is a longitudinal section of the same. Fig. 10 is a front view of the stopping-ring on bore-spindle. Fig. 11 is a longitudinal section of the same. Fig. 12 is a view of one of the projections on the spindle-head for holding the fly-wheel and pinion-gear to the head while the spindle is sliding backward. Fig. 13 is a cross-section of this projection with the hub of the fly-wheel above and the connecting-plate between them. Fig. 14 is a view of the arm of the feed-lever detached. Fig. 15 is a view of the link to which the feed-lever is attached. Fig. 16 is a perspective view of the machine. Fig. 17 is a view of the spindle, the feed-lever, weight-rope, and guide-rollers.

A represents the work table or bench of the machine, having legs B to support it, and upon its rear end portion is arranged the spindle-head C and driving-gear standard D. In said standard is arranged the horizontal hand-arbor with a bevel-gear, E, and a hand-crank, F, to rotate by hand the bore-spindle G of the machine. Said spindle is arranged to rotate horizontally and slide longitudinally in the bearings *c* and *c'* of the spindle-head C, and it has a head, *a*, with a set-screw on its forward end for holding the auger or tenon-cutter in the usual manner. Its shank has a long groove, *e*, and upon its rear portion is employed the stop-ring M.

Between the bearings *c* and *c'* is the bevel-pinion H, and at the back of the bearing *c* is the balance or fly wheel I. Close to the rear of the head *a* of said spindle is arranged a cross-head, *b*, which has trunnions *d* at each side, as shown. The spindle is furnished with

a collar, *f*, at the rear side of the cross-head *b*, which, with the head *a*, form bearing portions for the cross-head *b*. The collar *f* is threaded, and the spindle is threaded to fit said collar tightly, but will allow the cross-head *b* to turn loosely thereon. It is also provided on its outside with a rubber washer, 15, to cushion the backward motion of the spindle against the spindle-head.

The stop-ring M, the fly-wheel I, and pinion H are all furnished each with a sunk key, *m*, to slide easily in the groove *e* of the spindle. The key *m* of the ring M is made with a nose on each end. The nose toward the fly-wheel is sunk even with the face of the ring, and a set-screw, *g*, is provided in said ring to press said key and stop the ring as required. The fly-wheel I and pinion H have each a hub on the forward side, and each hub has a groove, K, cut in it, as shown. Both hubs are properly faced with the rear sides of the bearings *c* and *c'* to join them smoothly, and the pinion H is properly fitted to engage with the gear E and bear with its hub against the rear side of the bearing *c'*, and the hub of the fly-wheel is adapted to bear against the rear side of the bearing *c*. To hold said pinion and fly-wheel to the said bearings while the spindle is moving rearward, the spindle-head is formed with a projection, J, under each of said hubs, and said projection is grooved on the two opposite sides vertically in line with the groove K of the hub, and a flat plate, L, is employed, which has its bottom end forked to engage into the grooves of the projection J and its top end to engage in the groove K, and thereby said wheel and pinion are suitably held to the bearings *c* and *c'* while the spindle is moving rearward.

N represents the feed-lever. Its bottom end is linked to the forward end of the spindle-head by means of the link O, which moves vertically on its bearing when the feed-lever N is operated. The top portion of said lever is furnished with the handle *n*. Its central portion is made with a large square eye, *o*, in which the cross-head *b* is fitted with its trunnions to bear in the two opposite sides of the eye, as shown in Figs. 1, 8, and 9. The part of said lever between said eye and its handle is furnished with the arm P, to which the rope *h* for feeding is attached, as shown in Figs. 1 and 14. Said arm may be formed solidly on the lever, or it may be separately attached by having a proper eye formed on the said arm fitted over the said lever, as shown.

Q represents the weight for feeding the lever and spindle forward. It is suspended on the rope *h*, and to guide said rope the standard R is employed with the rope-pulleys *p* and *p'*. Said standard is secured to the bench A. It has a curved shape, and the pulley *p'* is secured to its top end and the pulley *p* secured a short distance above the bench A, as shown. The rope *h* passes from the arm P, to which it is fastened, over the pulley *p'*, thence down over the pulley *p* to the weight Q.

On the side of the spindle-head is pivoted the pawl S, which has a hook, *q*, formed on its loose end, terminating with a pointed end. The lever N has a staple, *r*, on its side, through which said loose end passes, and the hook *q* engages with said staple, thereby giving the operator time to examine the relative position of the cutting-tool and work before feeding the tool into the work; but as soon as desired the operator raises the pawl and the tool is fed into the work. The aforesaid link O is forked on both ends, as shown in Fig. 15, to guide the lever firmly in a lateral direction. With this spindle-stock is used an auger for boring the felly and a clamp to hold the felly in proper position for boring. For cutting the tenons on the spokes said auger is removed and a tenon-cutter is placed instead on the spindle, and to locate and hold the spoke in proper position the hub with the spokes inserted is held in a hub-clamp upon the bench A, and a separate clamp is used to hold the loose end of the spoke while the tenon is cut thereon, and spoke after spoke is passed in said clamp and its tenon cut until the full number of them for the wheel are passed, and the hub, with its spokes, is thereafter removed from the clamps, ready for receiving the fellies.

T represents the felly-clamp shown in Figs. 1, 4, and 5, and U the hub-rest, and V the spoke-clamp. The bench A has suitable longitudinal slots, W, through which said clamps are secured to the bench when used. Both the felly and spoke clamp have a bed-plate, *i*, to rest upon the bench, each being provided with a screw-bolt, *j*, to pass through the slot W of the bench, each being also furnished with a screw-nut having a handle under the bench to secure the clamp after it is adjusted to the bench. A guide-pin, *k*, is also provided in said bed-plate, also passing into the respective slot of the bench. The bed-plate of the felly-clamp has a curved slot, *l*, in which the bolt *j* is held. Said slot is described from the center of the guide-pin *k*, and stops at a quarter of a circle, so that the clamp T may be turned and secured at an oblique position to the auger for boring oblique holes. Both clamps T and V are constructed with two opposite upright sides, *s s*, and they are connected on their top ends by a cross-piece, *t*. The felly-clamp has a table, *u*, to rest and clamp the felly upon for boring. The spoke-clamp V has a concave rest, *v*, to clamp the spoke upon and to cut the tenon thereon. Both table and rest are raised and lowered and adjusted in height to the position proper for the tool by the use of wedges placed under them.

The spoke-clamp shown in Figs. 2 and 3 has vertical guide-slots *w w* in the side pieces, *s s*, for the accommodation of the spoke-rest *v*. This rest is made flat, and is adapted to be readily raised and lowered in the said guide-slots. Beneath the rest *v* is placed the wedge *x*, which is also made flat and adapted to slide in the slots *w w*, and its relation to rest *v* is such that any change in its position will effect a corresponding change in the position of the

rest. The sides *s* are also provided with set-screws *w'* for securing the rest and wedge in position when the clamp is in use.

The felly-clamp T has a pair of wedges to raise its table *u*. They slide close between the sides *s s*, and their rear ends are connected by a common cross-piece, *y;* and each of the sides *s* has on its inner side a way or groove for the wedges *z* to slide therein, as shown in Figs. 1, 4, and 5; and the sides *s s* have set-screws to press and hold the wedge to its position after being adjusted. Both clamps T and V have each attached to its top cross-piece, *t*, a vertically-arranged sliding foot, 1, and a spring, 2, and also a lever, 3, to which said foot 1 is pivoted. Said lever 3 is attached by a link, 4, with its fulcrum, to the cross-piece *t*, and the spring 2 is made to bear with its loose end under the lever 3 and raise the lever and foot 1 from pressing the felly or spoke in the clamp, so that the same is readily moved; but as soon as the felly or spoke is ready to be cut or bored the operator presses the lever down and the foot 1 holds the felly or spoke firmly during the operation, after which the lever is quickly released and the felly or spoke is at liberty to move. By this means the change from one hole or tenon to the next is done very rapidly. 5 represents a secondary stationary foot, also attached to the cross-piece *t* of the clamp, its object being to hold the felly from canting or overbalancing while it is being adjusted. Said foot 5 is made with a vertical slot, 6, through which the screw passes with which it is secured to the piece *t*. It is set so as to allow the felly to slide readily from under the foot 1 and 5.

The hub-rest U (shown in Figs. 2 and 6) consists of a threaded vertical block, X, and therein fitted is the vertical screw-spindle Y. Said block X has a shank, 7, which passes in the slot W of the bench A, and on the top end of the shank is provided the shoulder or collar 8 to rest the block upon the top of said bench. On the bottom end of said shank are provided the projections 9 9, with a space between them and the bottom side of the bench. In said space is employed a forked wedge, Z, by which said block is drawn down tightly upon the bench after being suitably located, as shown in Figs. 6, 7, and 2.

The bottom end of the screw-spindle Y is furnished with a balance-wheel, 10. Its top portion has a flange or face-plate, 11, with a central mandrel, 12. Said face-plate is properly turned through to receive the outside face of the hub with the spokes to be tenoned for the fellies. A counter screw-nut, 13, is provided upon the spindle Y, to bear upon the block X, and thereby stop said spindle from turning while the hub, with the spokes, is rotated upon said face-plate.

I am aware that machines for boring fellies and turning spokes have been provided heretofore with automatic feed-motion for sliding the spindle with its supports. Such machines require elaborately-finished metallic guides and bed-plates and a great and often a variable power for properly feeding the tool, for which reasons they are rendered unnecessarily expensive and unreliable. By constructing a machine with an automatic feeding mechanism attached directly to the spindle and permitting the said spindle to move independently of its supports, I do away with the clumsy and expensive mechanism now in use, and produce a machine within the means of any carriage or wagon maker.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A spoke-tenoning and felly-boring machine having an automatic feeding-spindle rotating and sliding in suitable bearings, the said feeding-spindle being provided with a head, *a*, collar *f*, and cross-head *b*, the latter having trunnions, as described, in combination with a feeding-lever turning on said trunnions and pivoted to a vertically-moving link, O, and having a rope, pulleys, and weight for feeding the spindle, and a staple and a pawl for retaining the lever in a fixed position.

2. In combination with the spoke-tenoning and felly-boring machine, a clamp for securing the spoke, which consists of a rest adapted to slide in the vertical slots of the supports *s*, a wedge with set-screw for holding the rest in position, and a vertically-moving sliding foot provided with a spring and lever, substantially as and for the purposes set forth.

3. In combination with the spoke-tenoning and felly boring machine, a clamp for securing the felly, which consists of a suitable table and supports, a vertically-sliding foot with a spring and lever, and a secondary foot for securing the felly, all substantially as set forth.

In witness whereof I hereunto set my hand this 16th day of September, 1882.

HENRY J. MILLER.

In presence of—
H. V. D. HOYT,
JOHN H. GRAHAM.