

(No Model.)

8 Sheets—Sheet 1.

J. J. PHILBRICK.

MACHINE FOR MANUFACTURING BARREL STAVES.

No. 362,901.

Patented May 10, 1887.

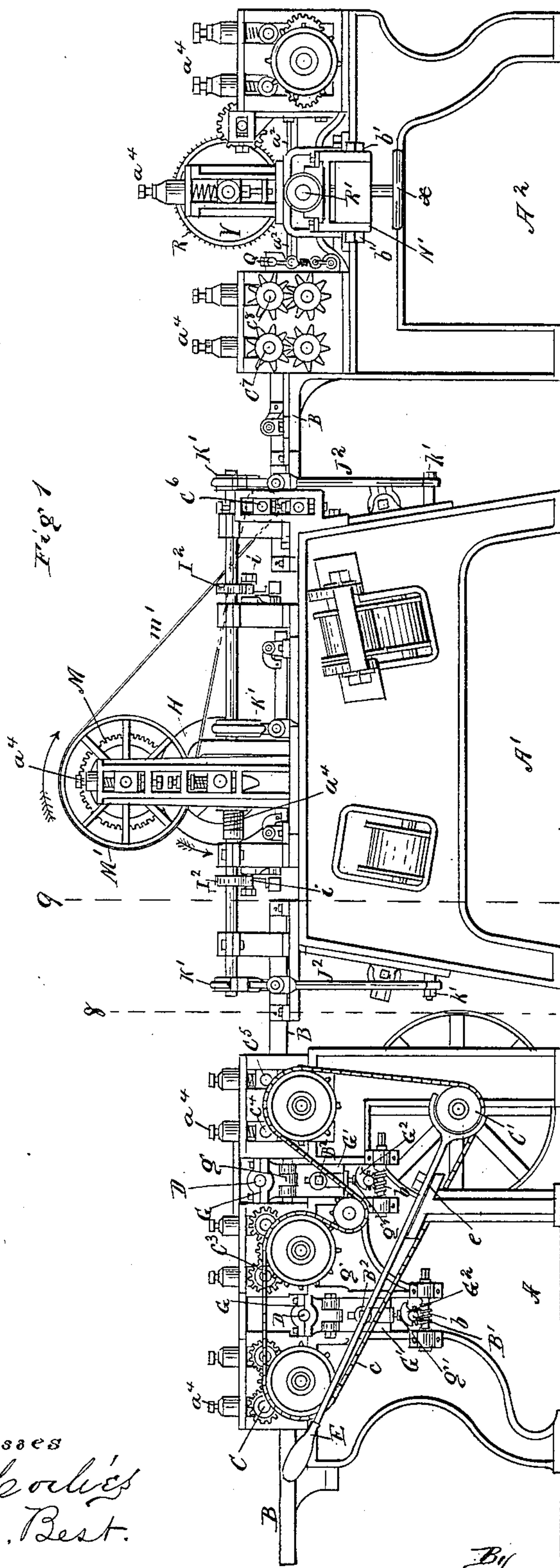


Fig. 3

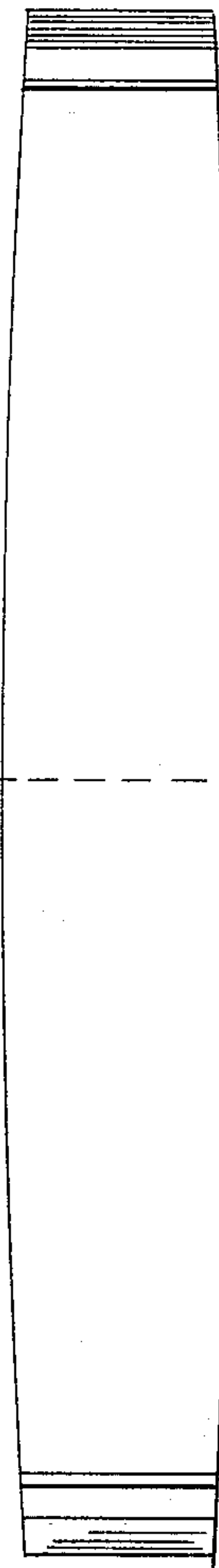


Fig. 2

Witnesses
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(No Model.)

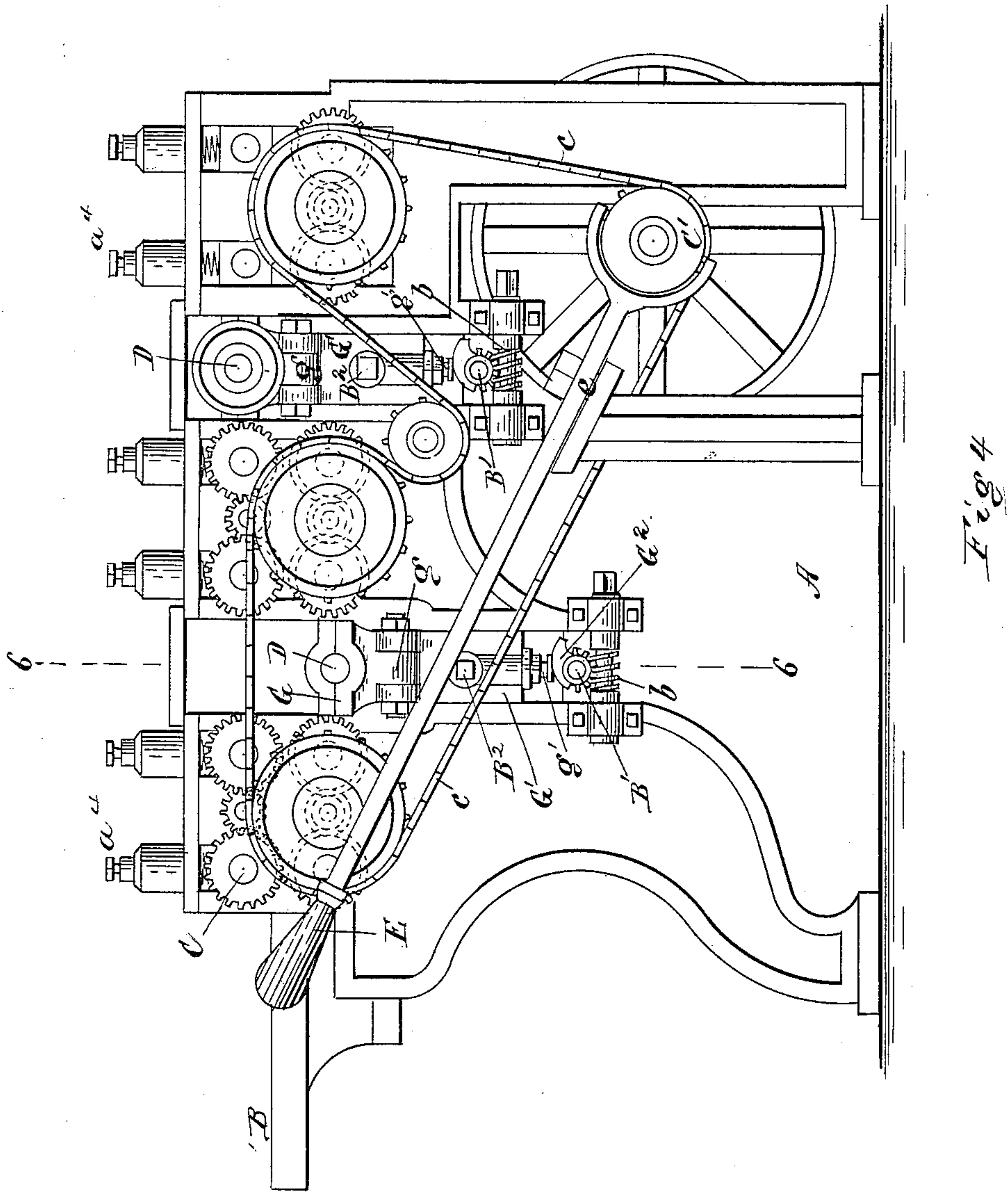
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Witnesses
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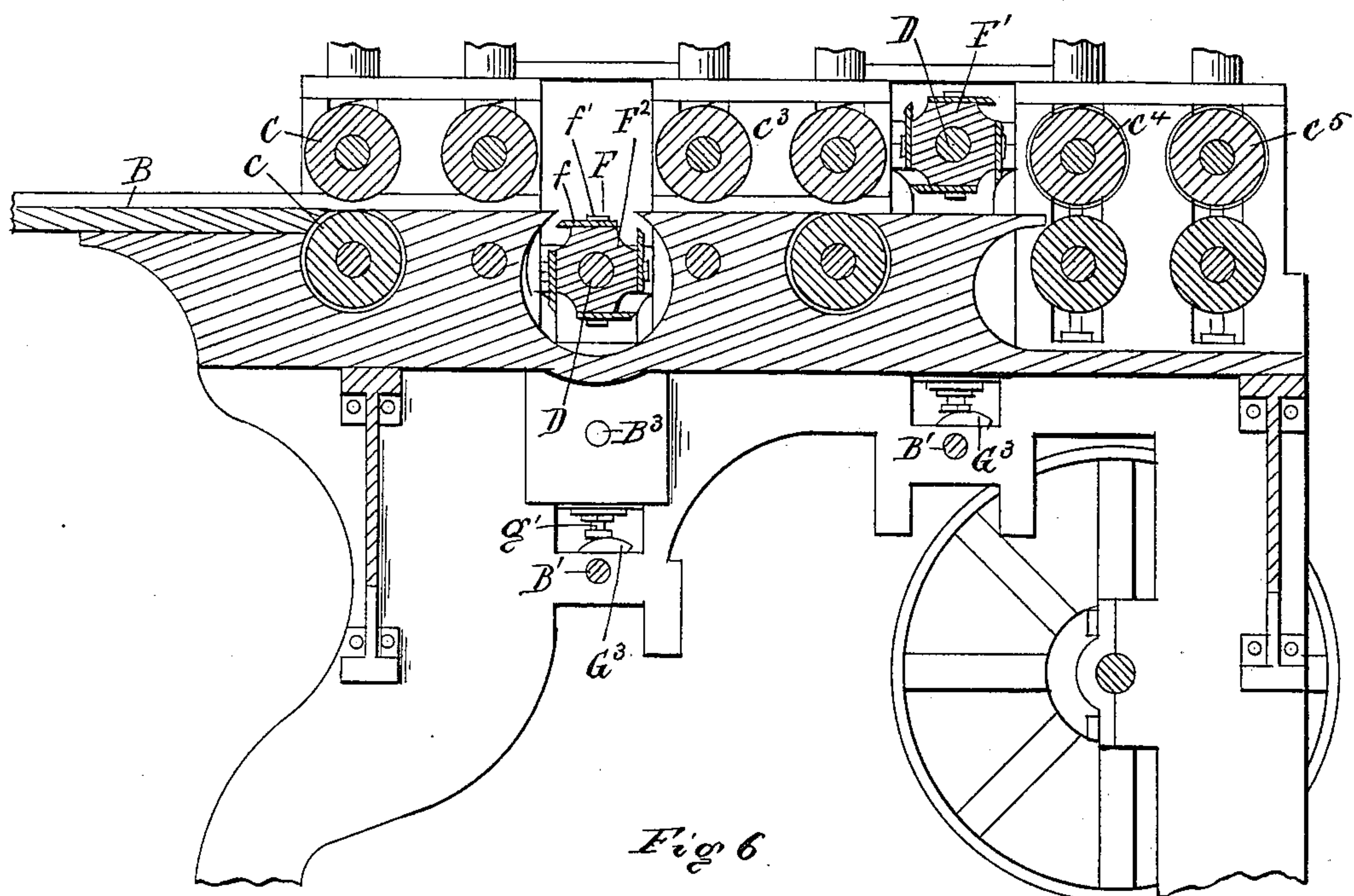
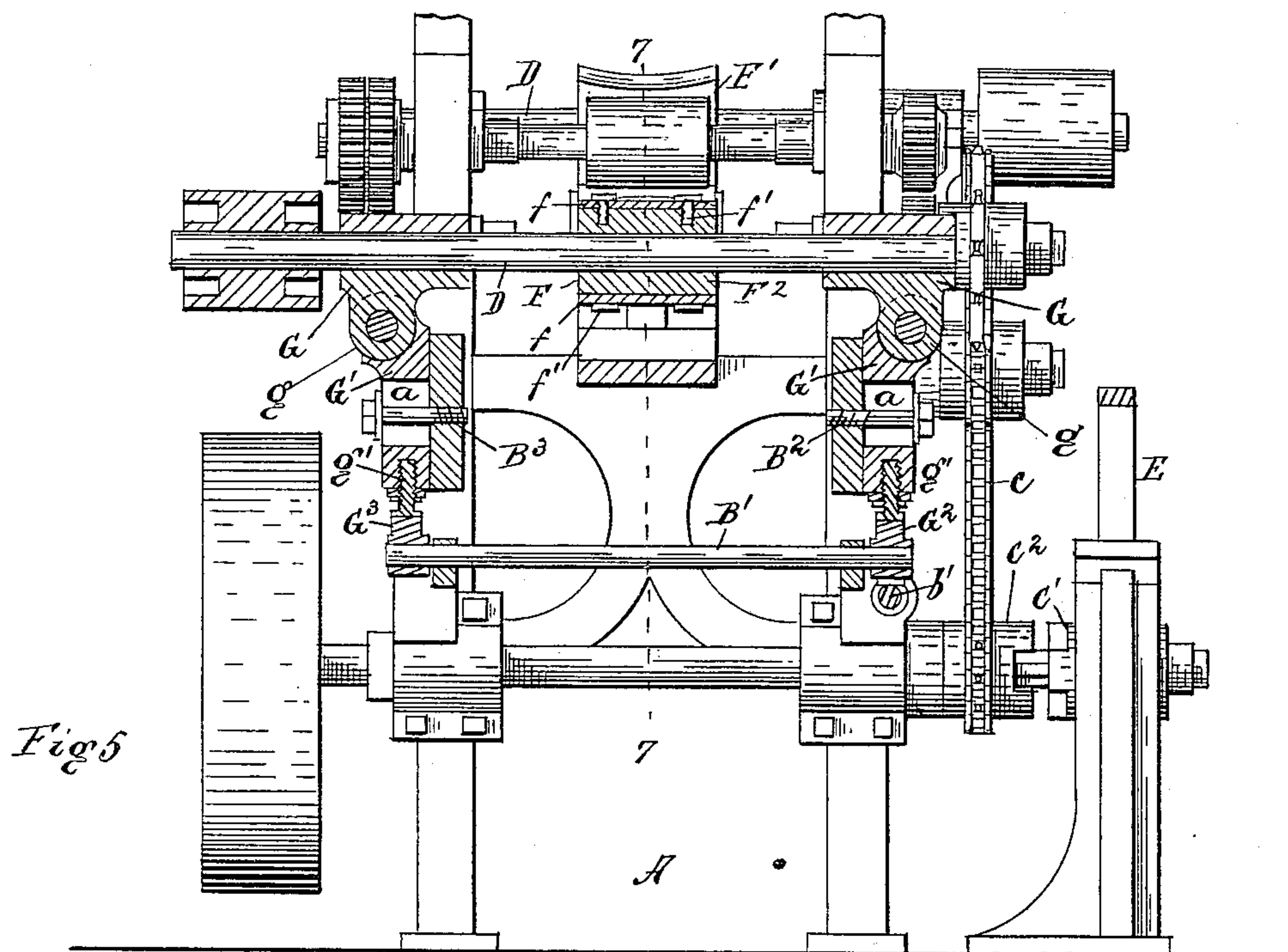
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8 Sheets—Sheet 3.

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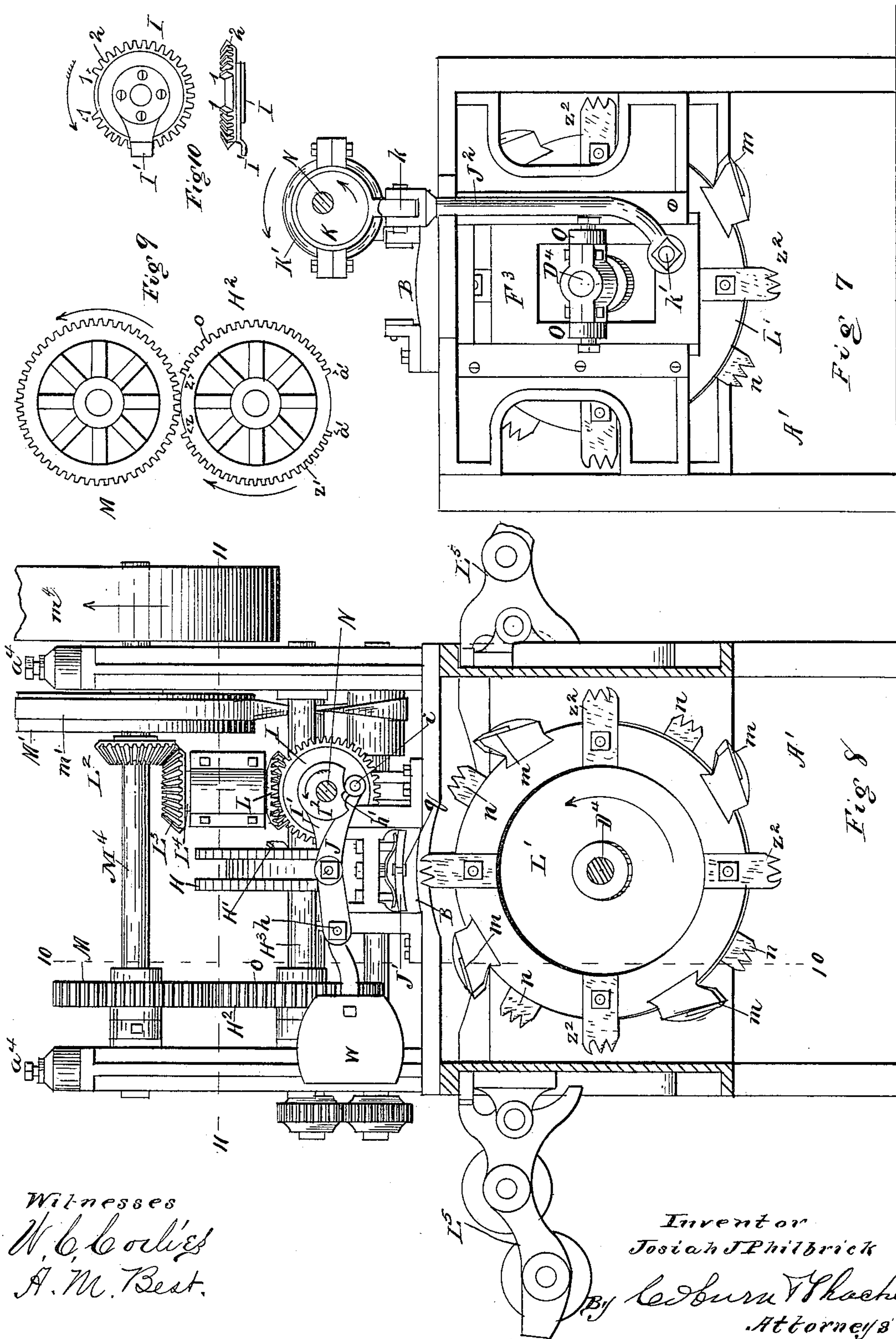
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J. J. PHILBRICK.

MACHINE FOR MANUFACTURING BARREL STAVES.

No. 362,901.

Patented May 10, 1887.



Witnesses
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(No Model.)

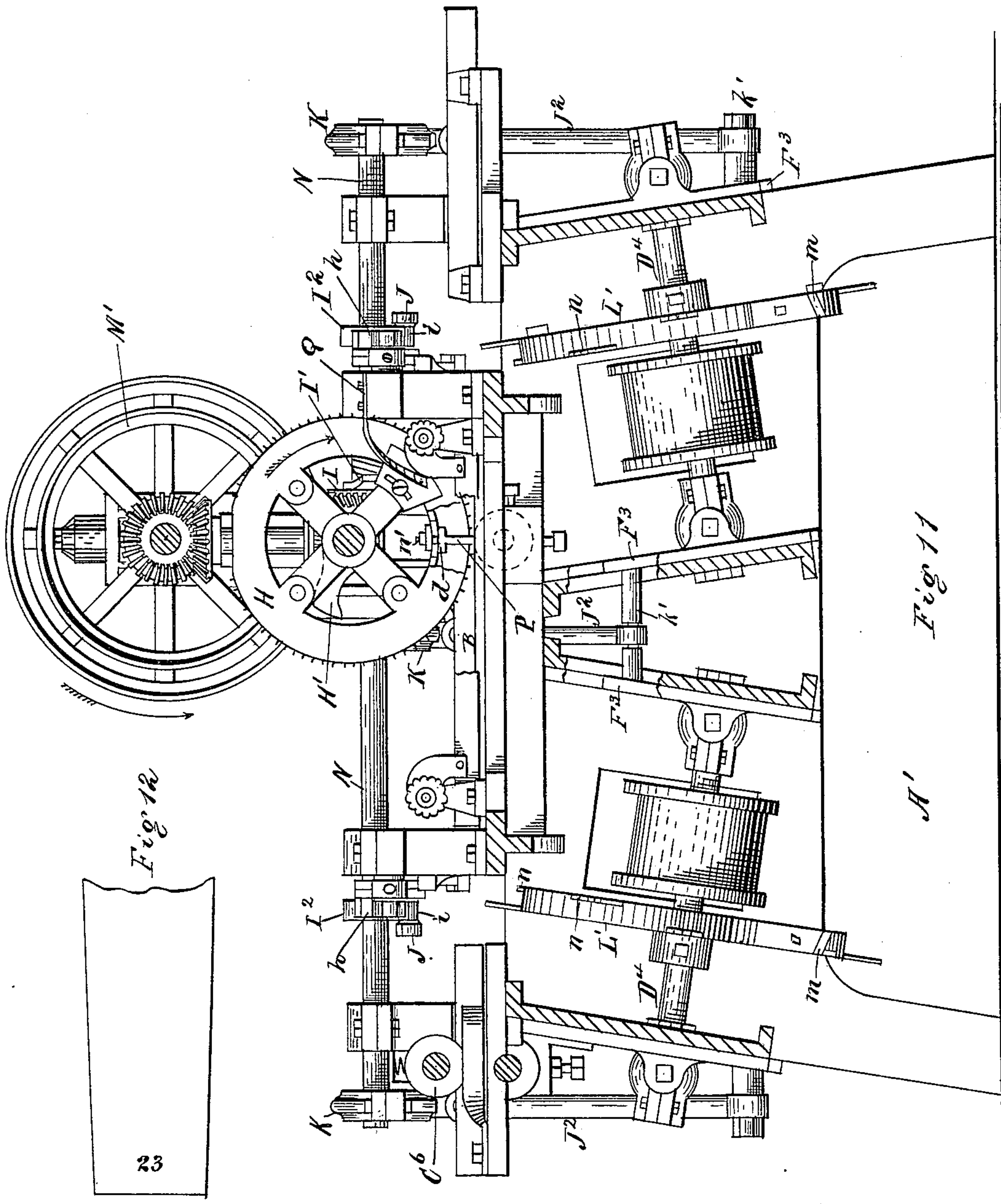
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J. J. PHILBRICK.

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Witnesses
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(No Model.)

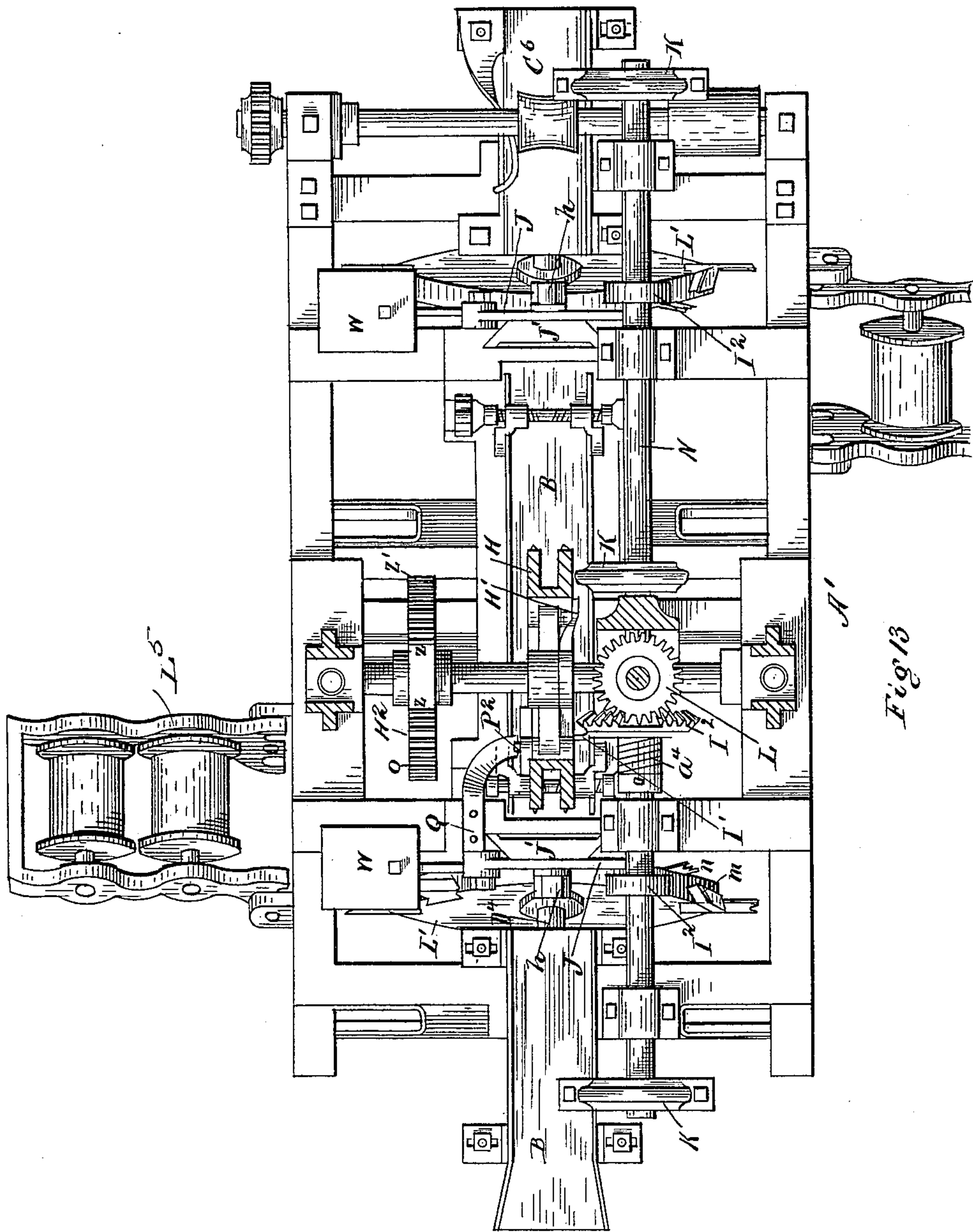
8 Sheets—Sheet 6.

J. J. PHILBRICK.

MACHINE FOR MANUFACTURING BARREL STAVES.

No. 362,901.

Patented May 10, 1887.



Witnesses

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(No Model.)

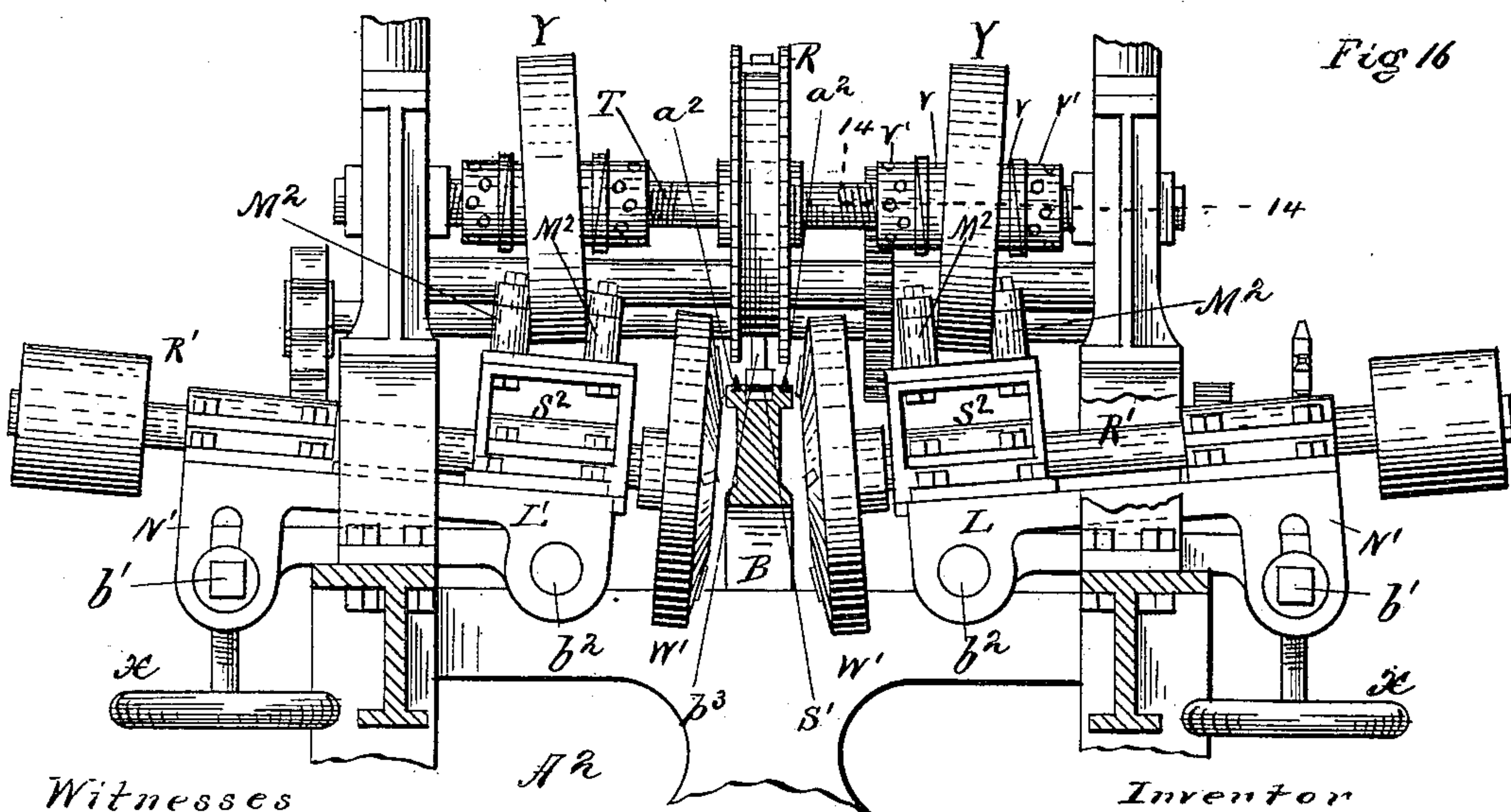
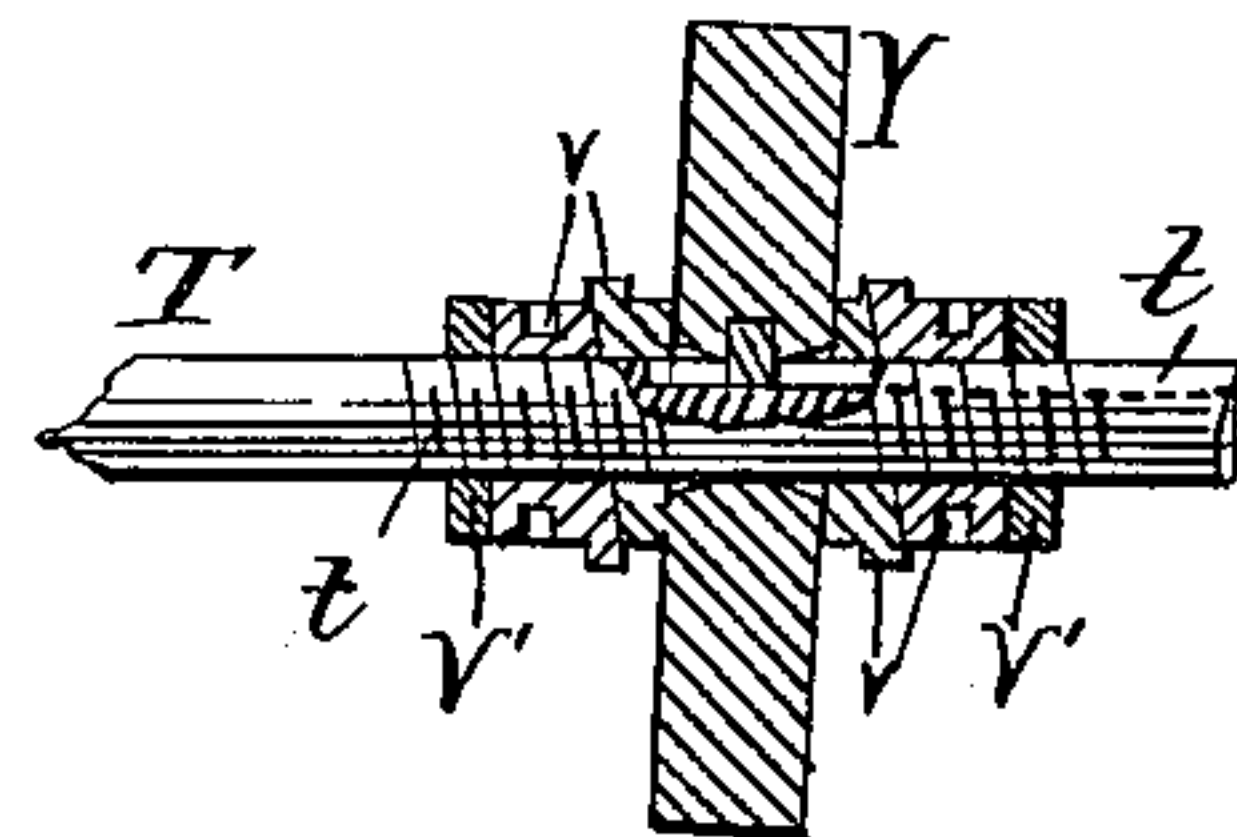
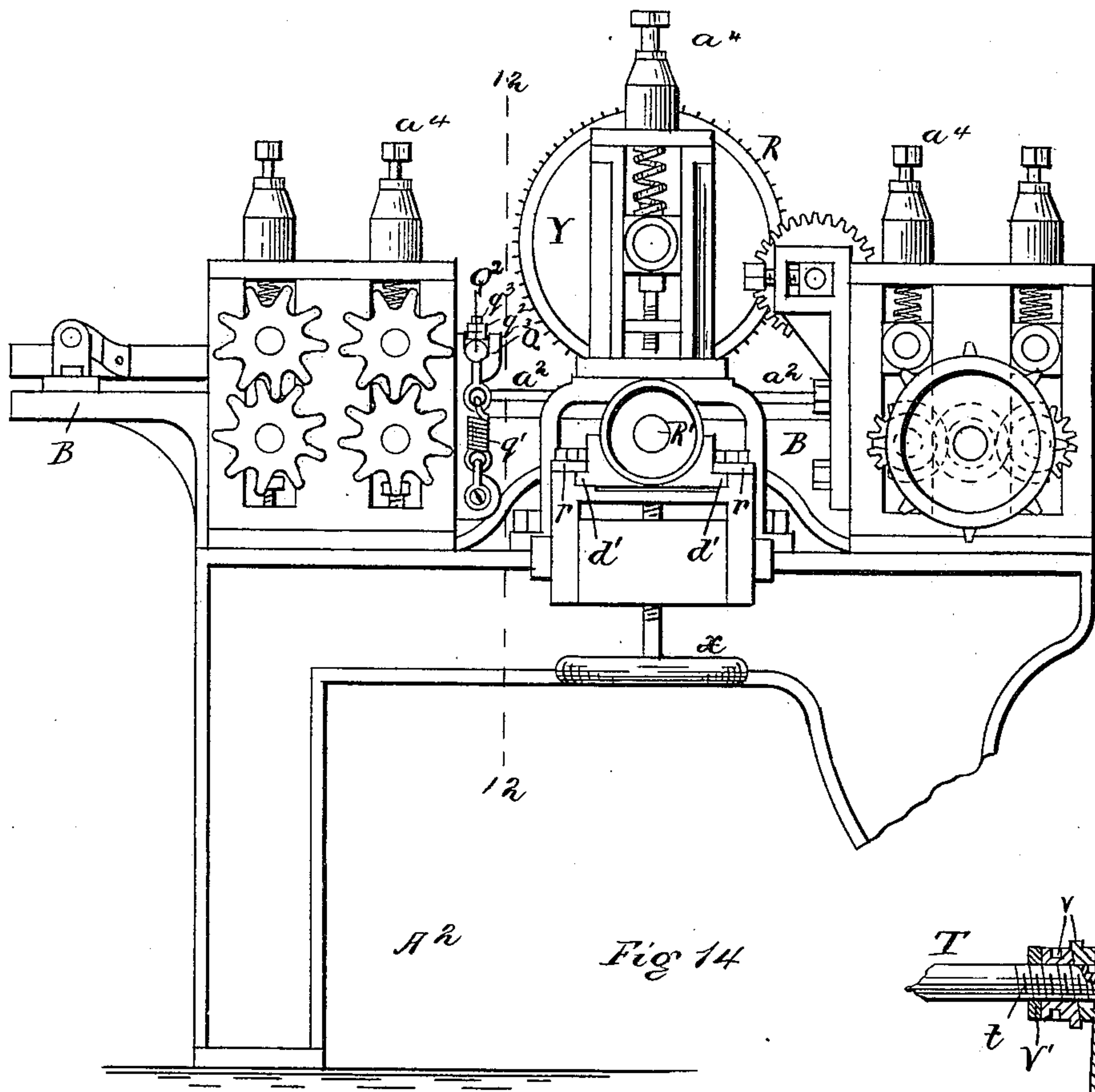
8. Sheets—Sheet 7.

J. J. PHILBRICK.

MACHINE FOR MANUFACTURING BARREL STAVES.

No. 362,901.

Patented May 10, 1887.



Witnesses,
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Fig 15 By Osburn T. Thacher
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8 Sheets—Sheet 8.

MACHINE FOR MANUFACTURING BARREL STAVES.

Patented May 10, 1887.

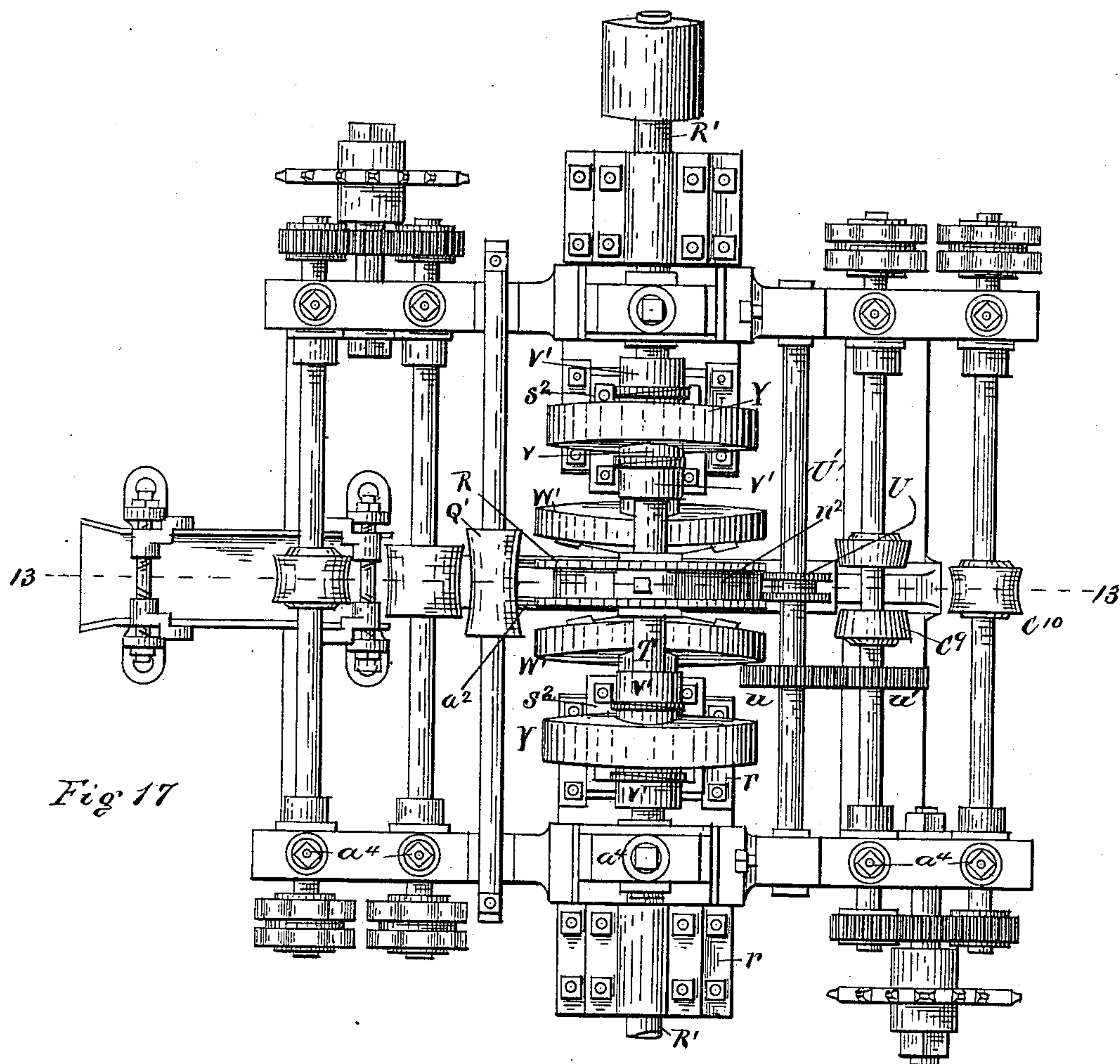


Fig. 17

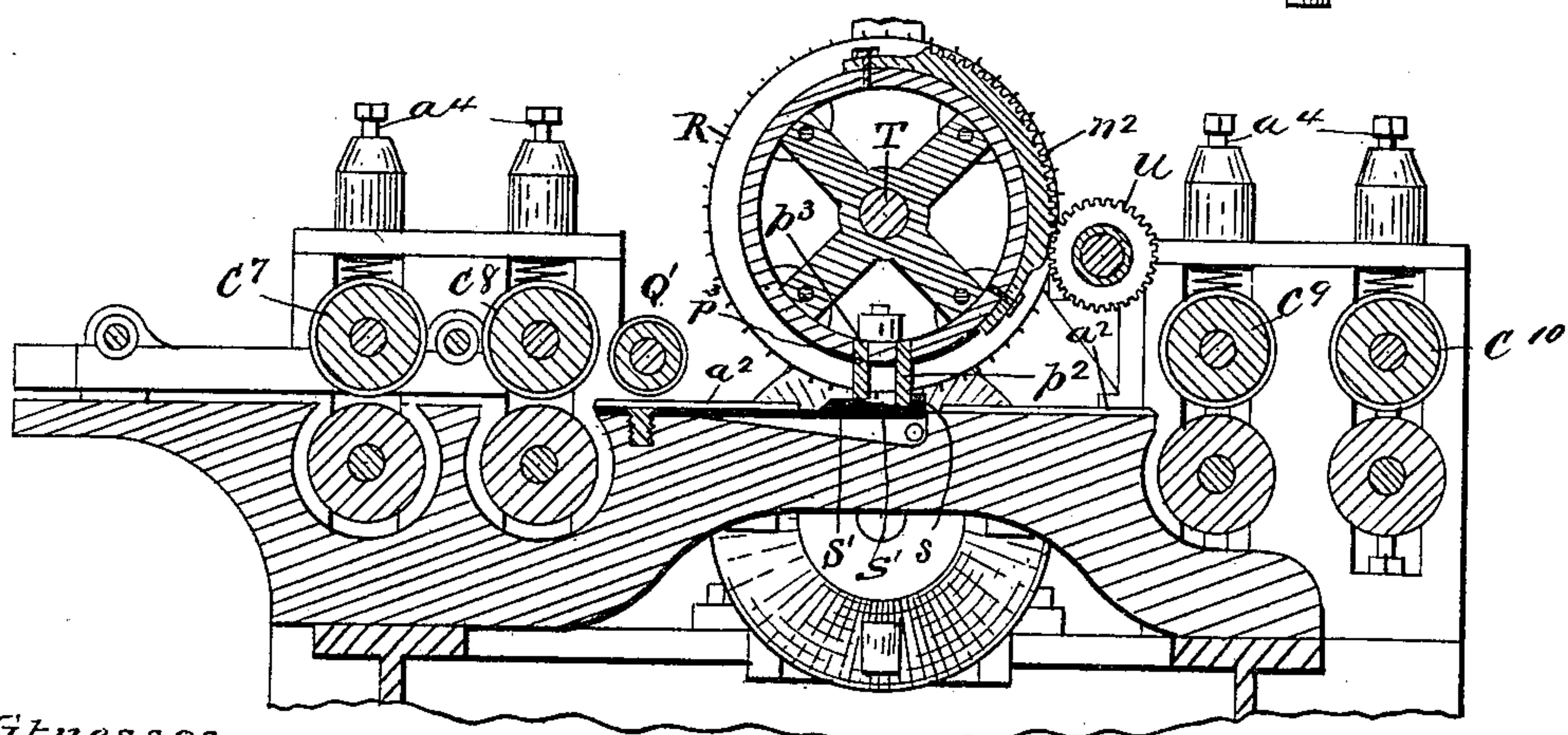


Fig 18

Witnesses
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Ar

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Attorneys

UNITED STATES PATENT OFFICE.

JOSIAH J. PHILBRICK, OF MOBILE, ALABAMA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE BLOUNT STAVE MACHINE COMPANY, OF CHICAGO, ILLINOIS.

MACHINE FOR MANUFACTURING BARREL-STAVES.

SPECIFICATION forming part of Letters Patent No. 362,901, dated May 10, 1887.

Application filed June 14, 1884. Serial No. 134,869. (No model.)

To all whom it may concern:

Be it known that I, JOSIAH J. PHILBRICK, a citizen of the United States, residing at Mobile, in the county of Mobile and State of Alabama, have invented certain new and useful Improvements in Machines for Manufacturing Barrel-Staves, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a stave-machine embodying my invention; Fig. 2, a plan view of a finished stave; Fig. 3, a sectional view of the same on the line 5 5 of Fig. 2; Fig. 4, a side elevation of the planer; Fig. 5, a sectional view of the same on the line 6 6 of Fig. 4; Fig. 6, a sectional view on the line 7 7 of Fig. 5; Fig. 7, a sectional view of the crozing and chamfering machine on the line 8 8 of Fig. 1; Fig. 8, a similar section taken on the line 9 9 of Fig. 1. Figs. 9 and 10 are detail views of the mutilated gearing of the crozing and chamfering machine. Fig. 11 is a sectional view on the line 10 10 of Fig. 8; Fig. 12, a detail view of the stamped end of the stave; Fig. 13, a plan section of the chamfering and crozing machine, taken on the line 11 11 of Fig. 8; Fig. 14, a side elevation of the jointer; Fig. 15, a sectional view of the same on the line 12 12 of Fig. 14; Fig. 16, a detail sectional view of one of the wobble-wheels; Fig. 17, a plan view of the jointer, and Fig. 18 a sectional view of the same on the line 13 13 of Fig. 17.

Like letters refer to like parts in all the figures.

My invention relates to machines for manufacturing barrel-staves, and is in the nature of an improvement on the machine set forth in Letters Patent No. 184,751, granted to Alexander C. Blount, November 28, 1876; and it consists in certain improvements in the crozing and chamfering mechanism, whereby not only a more effective machine for that purpose is produced, but the said machine is also better adapted for use, in combination with a stave planer and stave-jointer, to produce a complete machine, by which all the various steps may be performed which are necessary for the manufacture of a complete stave.

To these ends my invention consists in certain novel features, which I will now proceed to describe, and then specifically point out in the claims.

The complete machine consists, essentially, of three members—a planer, A, in which the blanks are so planed as to have a convex upper and a concave lower surface; a chamfering, crozing, and stamping mechanism, A', in which these several operations are performed, and a jointer, A'', in which the edges of the stave are shaped to complete it.

The particular planer and jointer form no part of my present invention, they being described and claimed in two separate applications filed by me October 20, 1884, and numbered, respectively, 146,134 and 146,135, my present invention relating to the construction and arrangement of the crozing and chamfering mechanism and to its combination with the other parts of the complete machine.

The planer A is shown as consisting of a frame of ordinary construction, provided with a central longitudinal bed, B, which forms the way or path upon which the stave travels. Feed-rollers C C' C' C' are arranged in pairs above and below the way B, to carry the stave through the machine. These feed-rollers are connected by suitable gearing, and actuated by means of a sprocket-chain, c, passing over sprocket-wheels connected in any suitable manner with the feed-roller shaft, and also over a sprocket-wheel, C'', mounted loosely on the main driving-shaft of the planer.

C' indicates a sliding clutch splined on the main shaft and adapted to engage with the hub of the sprocket-wheel C'', the said clutch being actuated by means of a hand-lever, E, pivoted at e on a suitable support. By engaging the clutch C' with the sprocket-wheel C'', motion is communicated with the feed-rollers, and by disengaging the said clutch the feed-rollers are stopped.

The planers F F' are arranged as shown in Fig. 6 of the drawings, the first planer, F, being provided with convex knives f, attached to the block or head F'', and being arranged below the path of the stave, so as to give to the under side thereof a convex shape. The

planer F' is arranged in the rear of the planer F, being provided with concave knives and arranged above the path of the stave, so as to give the upper side of the stave a convex shape. These planers are arranged to rotate in opposite directions, so that they will both cut against the direction of the feed. The planers are mounted on shafts D, provided with pulleys, by which they are driven, the said shafts being arranged to rotate in bearings G, connected by means of hinged or knuckle-joints *g* to vertical sliding pieces G', arranged in suitable ways on the frame of the planer. The lower ends of these slides rest upon suitable cams, G² G³, attached to opposite ends of the transverse shafts B', so that by rotating one of the shafts B' the corresponding slides, G', will be raised or lowered, thus simultaneously and equally raising or lowering the bearings G and thereby the cutter-shaft and cutter. The cams G are provided with worm-segments which mesh with worms *b*, mounted in the frame of the planer, said worms being provided with wrench-grasps or other devices for rotating them to actuate the cams. Adjusting-screws *g'* are interposed between the lower ends of the slides G' and the cams G² G³, their heads resting upon the cams, so that by screwing the said adjusting-screws up or down the slides to which they are attached will be raised or lowered independently, in order to properly level up the cutter-shaft, which is mounted upon the said slides. Slots *a* are formed in the slides, and through said slots pass clamp-screws B, taking into the frame of the machine, whereby the said slides may be clamped at any point after being adjusted by the mechanism just described.

The stave-blank, which is a rectangular piece shaped to approximate the size desired for the finished stave, is fed in upon the bed B and carried by the various feed-rollers through the machine, being operated upon by the planers F F', so that when it leaves the machine its lower side is concave in form and its upper side convex.

From the planer A the stave passes into the machine A', where it is chamfered, crozed, and stamped with the number of staves to the barrel.

The chamfering, crozing, and stamping machine is shown in detail in Figs. 7 to 13 of the drawings, inclusive, and consists of a suitable framing provided with a bed or way, B, upon which the stave travels, and above which, at about the center of the machine, is located a traction-wheel, H, mounted on a shaft, H³, and provided at its periphery with any suitable roughening device to enable it to have sufficient frictional contact with the stave.

P indicates a pin arranged in the path of the stave and adjustably attached to the wheel H, the pin being provided with a shoulder, *d*, for this purpose, which rests against the surface of the wheel, and a screw-threaded portion, which projects through a slot in the wheel and receives a nut and washer to clamp the

pin adjustably to the wheel. On the shaft H³ is located a gear-wheel, H², provided with blank-segments *z z* and *a' a'* arranged diametrically opposite each other, the remaining portions of its periphery being occupied by gear-segments *z'* and *o*.

M indicates a gear-wheel arranged above the gear-wheel H² on the main shaft M⁴, and capable of engagement with the gear-segments of the wheel H², this gear M being continuously rotated while the machine is in operation by means of a belt from the power passing around the main driving-pulley *m*⁴.

H' indicates a projecting arm or lug arranged on one side of the traction-wheel H, and I' indicates a similar arm, attached, as shown in detail in Fig. 10, to a mutilated bevel-gear, I, attached to a longitudinal shaft, N, extending the whole length of the machine. The bevel-gear I is provided with a blank-segment, 1 1, and a gear-segment, 2, which latter is arranged to mesh, when in position, with a bevel-gear, L, which is continuously rotated by means of a bevel-gear, L², mounted upon the main shaft M⁴ and meshing with a bevel-gear, L³, attached to the upper end of the shaft L⁴, upon which the bevel-gear L is mounted.

The longitudinal shaft N, which is intermittently rotated by means of the mechanism just described, as will be hereinafter explained, operates both the mechanism for clamping the stave in position and stamping the same, and also the mechanism for raising and lowering the cutter-wheels which perform the chamfering and crozing; and as both of these sets of mechanism are duplicated in the machine, I will describe only one set of each kind of mechanism, the same description being applicable to the other, which is identical in construction, but reversely arranged.

I² indicates a cam attached to the shaft N and provided with a recess, *h'*, in which, when the cam is stationary, rests a roller, *i*, attached to one end of the arm J, pivoted at *h* to a suitable support on the frame and having at its other end a counter balance or weight, W, which holds the roller *i* in contact with the cam I². It will be observed that the roller bears against the under side of the cam, so that this latter will force the arm and the attached clamp positively downward and hold the same positively in that position. To this arm J is attached the clamp J', which holds the stave in position on the bed while it is being operated upon, and to this clamp is attached a die, *q*, which will impress upon the stave a number indicating the number of staves which go to make a barrel, this die being removable, so that it may be changed to suit the particular stave on which the machine is operating.

At the end of the shaft N is located an eccentric, K, surrounded by a strap, K', and to this strap is pivoted at *k* a connecting-rod, J², the other end of which is pivoted at *k'* to a suitable gate or slide, F³, moving in ways formed therefor in the frame of the machine. On this gate is mounted, as shown in Fig. 7,

one of the bearings O of the shaft D^1 , which carries the cutter-wheel, the bearings of the other end being mounted on a similar slide actuated by an eccentric located near the middle of the shaft N. The cutter-wheel L^1 is provided at its periphery with three series of knives—a series of chamfering-knives, m , a series of crozing-knives, n , and a series of equalizing-knives, z^2 . L^3 indicates guides arranged at the side of the machine to steady and direct the belts which operate the cutter-wheels. It will be observed that the gates F^3 , on which the inner ends of the shafts D^1 are mounted, are provided with tubular sockets k^2 , and a single pivot-bolt, k' , is employed at this point, extending into the said sockets and being capable of longitudinal motion therein, to allow for the variation in distance between the gates which arises from their moving in lines not parallel. A single eccentric, K, and a single connecting-rod, J, are employed to operate these two gates at the center of the machine, although it is of course obvious that separate eccentrics and connecting-rods may be employed to operate the inner gates.

Arranged at the rear end of the machine are a pair of feed-rollers, C^6 , the one above and the other below the bed B, connected to each other by suitable gearing and driven by means of a belt, m' , passing over a pulley, M' , on the main shaft M^1 .

It will be observed that the traction-wheel H has that portion of its periphery which is diametrically opposite the pin P somewhat flattened, as shown in Fig. 11, for the purpose hereinafter described. This wheel is also provided with a stop pin, P^2 , in the path of which is arranged a spring, Q, attached to the frame of the machine.

The operation of this machine is as follows: The stave being fed in by the last set of feed-rollers of the planer, as hereinbefore described, passes along the bed B until it comes in contact with the pin P, which is in the position shown in Fig. 11 of the drawings. When the stave strikes the pin P, it rotates the traction-wheel H and its shaft H^3 , and consequently the gear-wheel H^2 , whereby the gear segment z' therein is brought into engagement with the continuously-rotating gear-wheel M. The traction-wheel H is then positively rotated, and its roughened periphery engages with the surface of the stave and feeds the same along the bed B into the position in which it will be operated upon. During this operation the cutter-wheels are below the path of the stave, so as to offer no obstacle to its advancement, and the clamps J^2 are raised for the same purpose. During this rotation of the traction-wheel H the lug or arm H' therein comes in contact with the arm I' on the bevel-wheel I, and thereby rotates the gear I sufficiently to bring the geared segment 2 thereof into engagement with the continuously-rotating pinion L, thereby rotating the shaft N to operate the clamping mechanism and raise the cutter-wheels into operative position. At the same

time that the arm H' strikes the arm I' the blank-segment $a' a'$ of the wheel H^2 is presented to the gear M, so that the latter ceases to act upon the former, thereby stopping the traction-wheel H with its flattened portion over the stave, which no longer advances. The rotation of the shaft N causes the cams I^2 to act upon the arms J, to depress the clamps J' , to hold the stave down on the bed, while at the same time the dies attached to the clamps impress upon the stave at each end thereof, as shown in Fig. 12 of the drawings, a number indicating the number of staves which are necessary to make a barrel. The rotation of the shaft N also operates the eccentrics K, and, through the connecting-rods J^2 , the gates F^3 , on which the bearings of the cutter-shafts are mounted, so as to raise the cutters and bring their knives into contact with the ends of the stave to perform their several operations, the stave being held in the meanwhile by the clamps J' , as hereinbefore described. By the time these operations are completed the cams I^2 , having made a complete or almost complete revolution, return to the position shown in the drawings, the rollers i enter the recess h' , the arms J' being raised for this purpose by means of the weight W, and at the same time raising the clamps J' , the eccentrics K lower the cutter-wheels, and the arm I' strikes the arm H' , thereby rotating the traction-wheel shaft H^3 and causing the blank-segment $a' a'$ to pass from its position opposite the gear-wheel M, when the gear-segment o of the wheel H^2 comes into mesh with the gear-wheel M. The traction-wheel H is now once more revolved, carrying the stave along the bed B until it is seized by the feed-rollers C^6 and carried out of the machine. As the gear-segment o leaves the teeth of the wheel M the stave has passed from under the traction-wheel, the pin P^2 comes in contact with the spring Q, and the traction-wheel is stopped in its original position, with the blank-segment $z z$ of the wheel H^2 presented to the driving-gear M and the pin P arranged in the path of the stave, as before. The rotation of the shaft N ceases when the arm I' has come in contact with the arm H' and started the traction-wheel anew, the blank-segment 1 1 of the bevel-gear I being then presented to the bevel-gear L, and the whole machine being ready to operate upon the next stave.

From the crozing, chamfering, and stamping machine A' the stave passes into the jointing and shaping machine A'. (Shown in detail in Figs 14 to 18 of the drawings.) This machine consists of a suitable framing provided with a longitudinal bed or way, B, to support the stave. In suitable bearings in the frame are mounted the pairs of feed-rollers $C^7 C^8 C^9 C^{10}$, driven by any suitable means. The central portion of the bed B is provided with knife-edged guides a^2 , against which the stave is held by means of a pressure-roller, Q' , loosely mounted on a shaft, Q^2 , resting in notched brackets Q^3 and held down in place

by springs q' , attached to the frame and to the ends of the shaft, whereby a yielding pressure is obtained. The tension of these springs may be regulated by nuts q^2 on the upper end of the bolts q^3 , which connect the springs to the shaft Q^2 .

Above the bed B, and between the front and rear sets of feed-rollers, is arranged a traction-wheel, R, secured to the shaft T, mounted as shown. The distance between the bed and the traction-wheel is such that when a stave is fed between them the serrated or toothed periphery of the wheel will engage with and be moved by the stave. In a suitable recess in the bed B is arranged the spring or detent S' , provided with a shoulder or stop, s , to engage a pin or projection, p^2 , on the wheel R, and having an inclined projection, s' , arranged in the path of the stave. The traction-wheel is also provided with a pin, p^3 , arranged in the path of the stave immediately in front of the pin p^2 ; or a single projection of sufficient size to occupy the space of both pins may be used.

The traction-wheel may be provided, for the purpose hereinafter stated, with a gear-segment, n^2 , arranged to mesh with a pinion, U, mounted on a shaft, U' , having a pinion, u , meshing with the pinion u' on the shaft of the feed-roller C^9 . In this case the traction-wheel will be grooved, as shown, to receive the segment, and the pinion U will be grooved to allow the pins p^2 p^3 to pass.

On the shaft T, and operated thereby, are mounted the adjustable wobble-wheels or cams Y, by means of which the cutter-shafts and cutters are reciprocated. These wheels are secured on the shaft, as shown in detail in Fig. 16, the shaft being screw-threaded at t and grooved, as shown, and the wheel fitted loosely therein, the aperture through which the shaft passes being flaring at each end, to admit of tilting the wheel to any desired angle, while the wheel has a projection or spline, which enters the groove in the shaft to cause the wheel to rotate therewith. Loosely surrounding the shaft on each side of each wheel are washers v , having their adjacent faces beveled, as shown; and V' are nuts working on the threaded portions t of the shaft outside the washers. It is obvious from this construction that the wheels Y may be adjusted to different points on the shaft and there secured, and also that when the parts are in the position shown by the simultaneous rotation of the washers v the wheels may be set or adjusted to the desired angle of inclination to the axial line of the shaft.

The cutters W' are attached to the inner ends of shafts R' , mounted in suitable boxes or slides, S^2 , working on the beds L, and retained in position by means of caps or strips r , attached to the beds and projecting over the flanges d' of the boxes or slides. In order to adjust the angle of the cutters and their shafts, the beds L are each pivoted at the inner end at b^2 to a cross-piece forming part of the frame,

the outer end resting on an adjusting-screw, X, working in the cross-piece. To secure the bed after adjustment, clamp-screws b' pass through slots in the dependent arms of the bed and screw into the cross-piece to clamp the two in position. The cutters are moved automatically to and from the bed B and the stave therein by means of the wobble-wheels Y, as before stated, the wheels Y passing between guides or projections on the slides S^2 , these guides being shown in the present instance as anti-friction rollers M^2 , mounted on a yoke or frame attached to the slides at or near their inner ends. The cutter-shafts are provided with suitable pulleys, by means of suitable belting applied to which the cutters are operated.

The operation of the machine is as follows: The beds N' are adjusted to so incline the cutters as to give the proper bevel to the edges of the stave, and the wheels Y adjusted in their position and inclination to correspond to the width and shape of stave desired. The stave is then fed into the machine by the last feed-rollers of the crozing and chamfering machine, as hereinbefore described, and, being seized by the feed-rollers C' C^8 , is forced onto the knife-guides a^2 and held thereon by the pressure-roller Q and afterward by the traction-wheel R, to prevent any wobbling or deviation from the proper line. The stave then strikes the inclined projection s' , thereby lowering the spring S' and its stop s , thus freeing the traction-wheel R. At the same time the stave strikes the pin p^3 of the wheel and causes the latter to revolve. The roughened periphery of the wheel engages with the stave, and the continuous advance of the latter, caused by the feed-rollers, creates a continuous rotation of the traction-wheel and shaft T, thereby causing the wobble-wheels Y to actuate the slides S^2 and cutters W' , so that the latter first recede and then advance, thereby giving the desired outline and bevel to the edge of the stave. The stave is then seized by the rear feed-rollers and carried out of the machine, while the pin p^2 on the traction-wheel engages with the now freed stop s and stops the wheel and the mechanism operated thereby. When the traction-wheel has been carried around the length of the stave, it may not have reached its normal position, as shown in the drawings; but the pinion U, being in constant rotation, will be in mesh with the segment n^2 and will bring the wheel to its proper position.

The various feed-rollers of the complete machine are provided with spring set screws a^4 , by means of which a yielding pressure may be obtained upon the stave, the tension of which may be regulated to suit the various sizes of staves upon which the machine operates.

It will be observed from the above description that a stave-blank fed in at the front of the complete machine will, after passing through the machine and being submitted to the various operations described, be discharged at the opposite end a complete stave ready for

use, and stamped with a number indicating the number of staves of that particular kind which go to make a barrel.

Heretofore in machines of this character, where all the various operations which go to complete the stave have been performed in one machine, it has been found necessary to employ a crozing and chamfering machine in which the stave is fed through sidewise, and thereby interrupt the travel of the stave in order to change the direction of its feed; and to do this a special device and complicated mechanism of some kind have been employed. Moreover, in order to avoid the necessity of changing the direction of feed of the stave twice, it has been found necessary to arrange the crozing and chamfering mechanism at the end of the machine, so that its operations are the last ones performed on the stave. It has been found, however, that owing to the fact that the knives which do the crozing and chamfering have to cut across the grain of the wood, they are liable to splinter and tear the stave at the point where they leave it, thereby greatly reducing the value of the finished article.

By the use of my improved chamfering and crozing machine, in which the stave is fed directly through without any change of direction in the same path in which it passes through the planer and jointer, I am enabled not only to dispense with the mechanism which has heretofore been necessary in these combined machines for changing the direction of travel of the stave, but I am also able to arrange the crozing mechanism in advance of the jointing mechanism, whereby the jointer-knives, when they remove the surplus material at the edges of the stave, and more particularly at the ends thereof, will remove any portion thereof which may have been splintered or torn by the crozing or chamfering knives, as hereinbefore described, whereby the staves are delivered from the machine in a more perfect condition than heretofore.

As I have hereinbefore stated, I make no claim in the present application to the specific construction of the planer and jointer shown and described, the same being the subject of separate applications, as specified above. Any approved form of mechanism for these purposes may be employed in conjunction with my crozing and chamfering machine herein set forth; but I prefer to use the machines hereinbefore described. I do not wish to be understood as limiting myself strictly to the precise details of construction set forth in the description and shown in the drawings, as various mechanical modifications therein may be made without departing from the principle of my invention.

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

1. The combination, with the continuously-rotating driving-gear L, of the mutilated gear H², having the blank-segments *z z* and *a' a'*, the traction-wheel H, provided with the pin

P, arranged in the path of the stave and mounted on the same shaft with the mutilated gear, and a bed or way for the stave arranged beneath the said traction-wheel, substantially as and for the purposes specified.

2. The combination, with the intermittently-rotating traction-wheel and the mechanism operated thereby, of a bed or way for the stave beneath the said traction-wheel and a pin arranged in the path of the stave and adjustably mounted in a slot in the periphery of the traction-wheel, substantially as and for the purposes specified.

3. In a barrel-stave machine, the combination, with a suitable bed or way for the stave, of the intermittently-rotating traction-wheel arranged above the same and provided with a pin arranged in the path of the stave, the stop-pin P², secured to the traction-wheel, and the spring Q, attached to a stationary part of the machine and having its free end arranged in the path of the pin P², substantially as and for the purpose specified.

4. The combination, with the intermittently-rotating traction-wheel H, having arm or projection H', of the shaft N, carrying a mutilated pinion, I, adapted to mesh with the continuously-rotating pinion L and provided with the arm or projection I', arranged in the path of the arm H', the said shaft N being provided with suitable cams and eccentrics for intermittently operating the stave clamping mechanism, and the mechanism for raising and lowering the cutter-heads, substantially as and for the purposes specified.

5. In a barrel-stave machine, the combination, with a suitable bed for the stave and crozing and chamfering cutters, of the intermittently-rotating shaft N, provided with the cams I², the pivoted arms J, extending across the bed and bearing against the under side of the said cams, and the clamping-plates J', attached to the said arms, substantially as and for the purposes specified.

6. In a barrel-stave machine, the combination, with a suitable bed for the stave and crozing and chamfering cutters, of the intermittently-rotating shaft N, provided with cams I², the pivoted arms J, extending across the bed and each provided at one end with a roller, *i*, to bear against the under side of the cam, and at the other end with a weight, W, to hold the said roller in contact with the cam, and the clamping-plates J', attached to the said pivoted arms, substantially as and for the purposes specified.

7. In a barrel-stave machine, the combination, with a suitable longitudinal bed for the stave, of the intermittently-rotating shaft N, having strap-eccentrics K, the shafts D⁴, arranged in the vertical longitudinal plane of the bed and having cutter-wheels L', the reciprocating gates F³, in which said shafts are mounted, and rods J², connecting the said gates with the eccentrics on the shaft N, substantially as and for the purposes specified.

8. In a barrel-stave machine, the cutter-

wheels L' and the reciprocating gates F³, in which they are mounted, in combination with the intermittently-rotating shaft N, having eccentrics K, arranged at its ends and middle, and the connecting-rods J, the outer ones pivoted to the outer gates and outer eccentric-straps, a bolt or pin, k', mounted in sockets k², secured to the inner gates, and the central connecting-rod pivoted to said bolt and to the central eccentric-strap, substantially as and for the purposes specified.

9. The combination, with the intermittently-rotating traction-wheel H, which feeds the stave through the machine, of the clamps J for holding the stave in position during the period of non-rotation of the traction-wheel and the reciprocating cutter-wheels L' for operating upon the stave while so clamped, substantially as and for the purposes specified.

10. The combination, with the reciprocating cutter-wheels L' and the clamps J' and the mechanism for operating the same, of the intermittently-rotating traction-wheel H for feeding the stave through the machine, the said traction-wheel being provided with an arm, H', whereby the clamp and cutter-wheel-operating mechanism is started, substantially as and for the purposes specified.

11. The combination, with the bed B, of the traction-wheel H, mounted on the shaft H³ above the said bed, the said shaft carrying the mutilated gear H², provided with diametrically-opposite blank-segments, z z and a' a', and arranged to intermittently mesh with the continuously-rotating driving-pinion M, the said traction-wheel being provided with the pin P, arranged in the path of the stave, and an arm or projection, H', and the shaft N, having mutilated pinion I, adapted to gear intermittently with the continuously-rotating pinion L and provided with the arm I', arranged in the path of the arm H', the said shaft N being provided with cams I² to operate the pivoted arms J, carrying clamps J', and eccentrics K, provided with connecting-rods J² to operate the reciprocating slides F³, in which the cutter-wheels L' are mounted, substantially as and for the purposes specified.

12. In a stave crozing and chamfering machine, the combination, with a longitudinal bed for the stave and feeding mechanism for intermittently feeding the stave along the said

bed, of vertically-reciprocating cutters arranged with their axes in the direction of the length of the bed, substantially as and for the purposes specified.

13. In a stave crozing and chamfering machine, the combination, with the longitudinal bed B, of the intermittently-rotating traction-wheel H, arranged above the said bed to feed the stave therein endwise, and reciprocating cutter-wheels L', arranged with their shafts D⁴ in the direction of the length of the bed, substantially as and for the purposes specified.

14. In a stave crozing and chamfering machine, the combination, with a bed for the stave and reciprocating cutters for crozing and chamfering the ends of the stave, of the intermittently-actuated clamps J' for holding said stave during the operation of the cutters, said clamps being provided with the removable dies q, substantially as and for the purposes specified.

15. In a barrel-stave machine, the combination, with a bed for the stave and reciprocating cutters for crozing and chamfering the ends of the stave, of the intermittently-actuated clamps for holding the stave during the operation of the cutters, substantially as and for the purposes specified.

16. In a machine for manufacturing barrel-staves, the combination, with the stave-planing mechanism and a stave jointing and shaping mechanism of the character described, of a stave crozing and chamfering mechanism, consisting, essentially, of a longitudinal bed, an intermittently-rotating traction-wheel for intermittently feeding the stave endwise along the said bed, intermittently-operating clamps for holding the stave on the said bed during the periods of non-rotation of the traction-wheel, and reciprocating cutter-wheels arranged with their shafts in the vertical longitudinal plane of the bed and operating upon the stave during the periods of non-rotation of the traction-wheel, and feeding mechanism for feeding the stave continuously in a straight line between the said mechanisms, substantially as and for the purposes specified.

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Witnesses:

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