(No Model.) 6 Sheets—Sheet 1.

B. F. GIBBS.

MACHINE FOR WORKING WOOD OR METAL.

No. 582,195. Patented May 11, 1897.

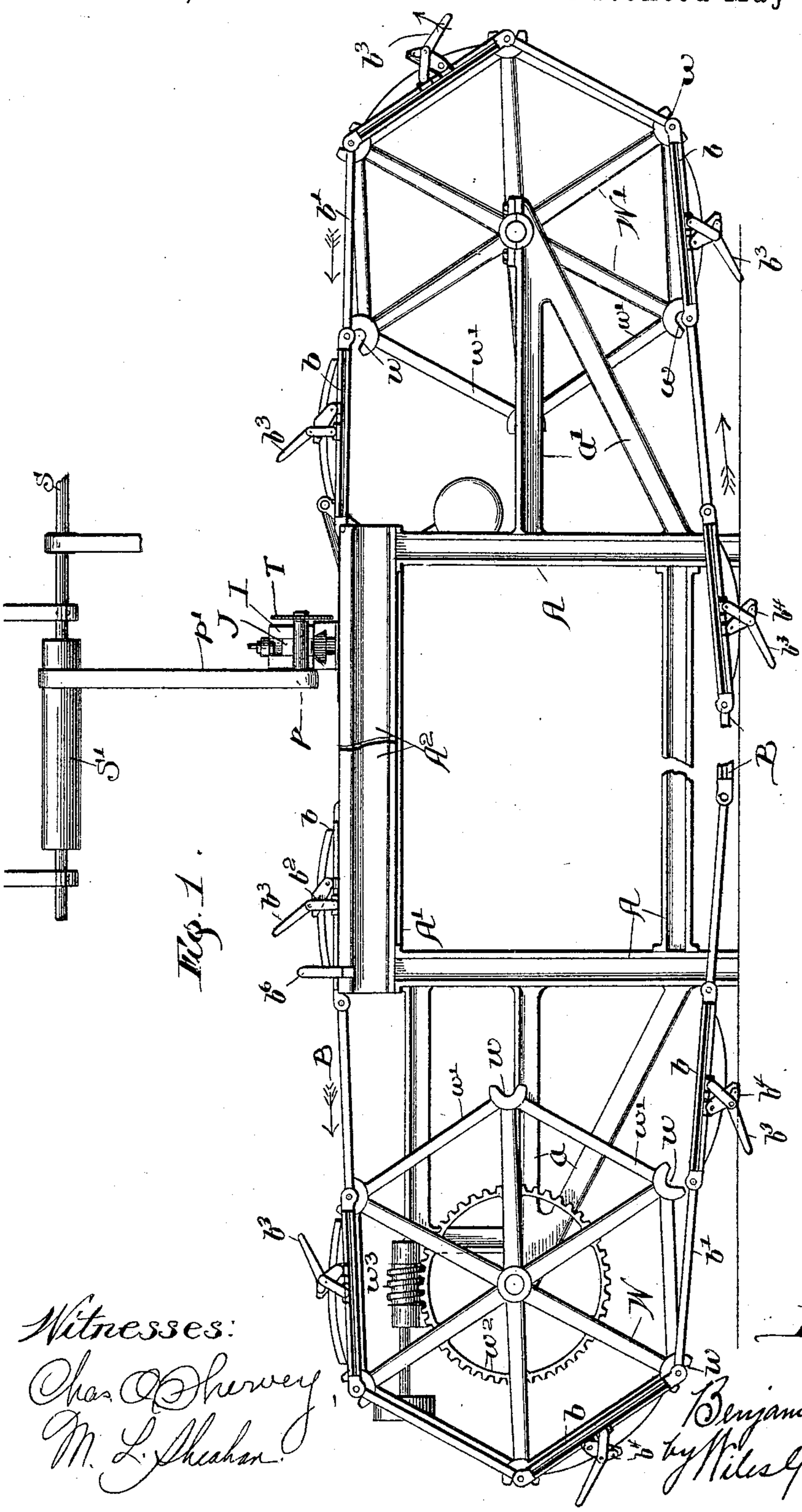

Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

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MACHINE FOR WORKING WOOD OR METAL.

No. 582,195. Patented May 11, 1897.

Fig. 3.

Fig. 2.

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B. F. GIBBS.

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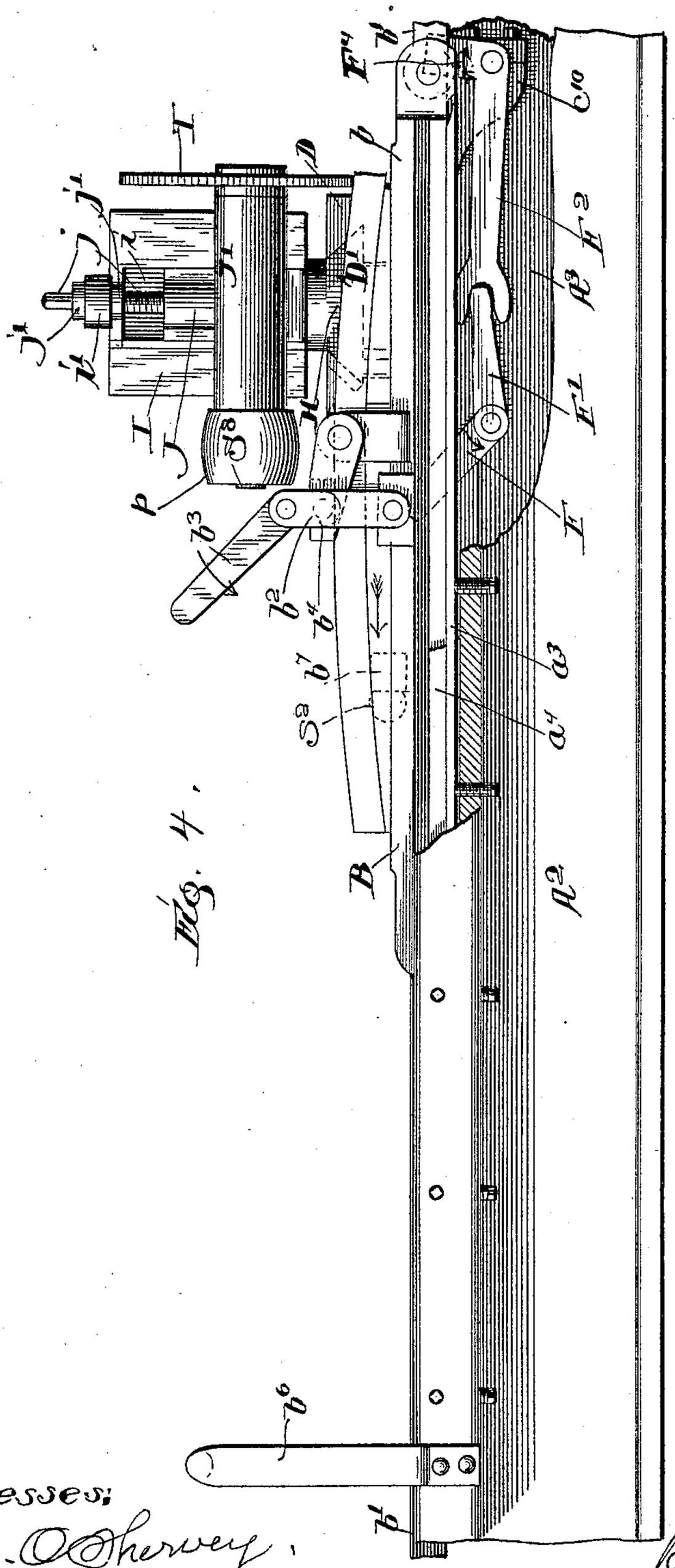

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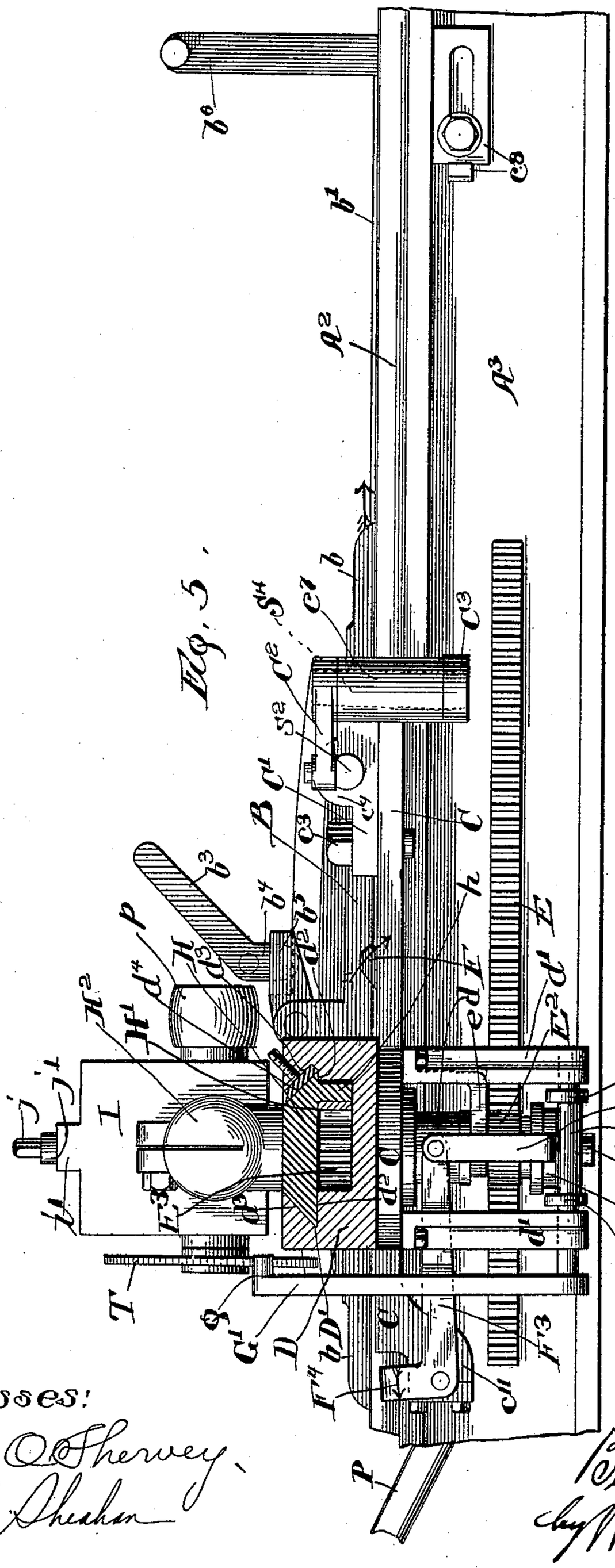
B. F. GIBBS.

MACHINE FOR WORKING WOOD OR METAL.

No. 582,195. Patented May 11, 1897.

Fig. 5.



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

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B. F. GIBBS.

MACHINE FOR WORKING WOOD OR METAL.

No. 582,195. Patented May 11, 1897.

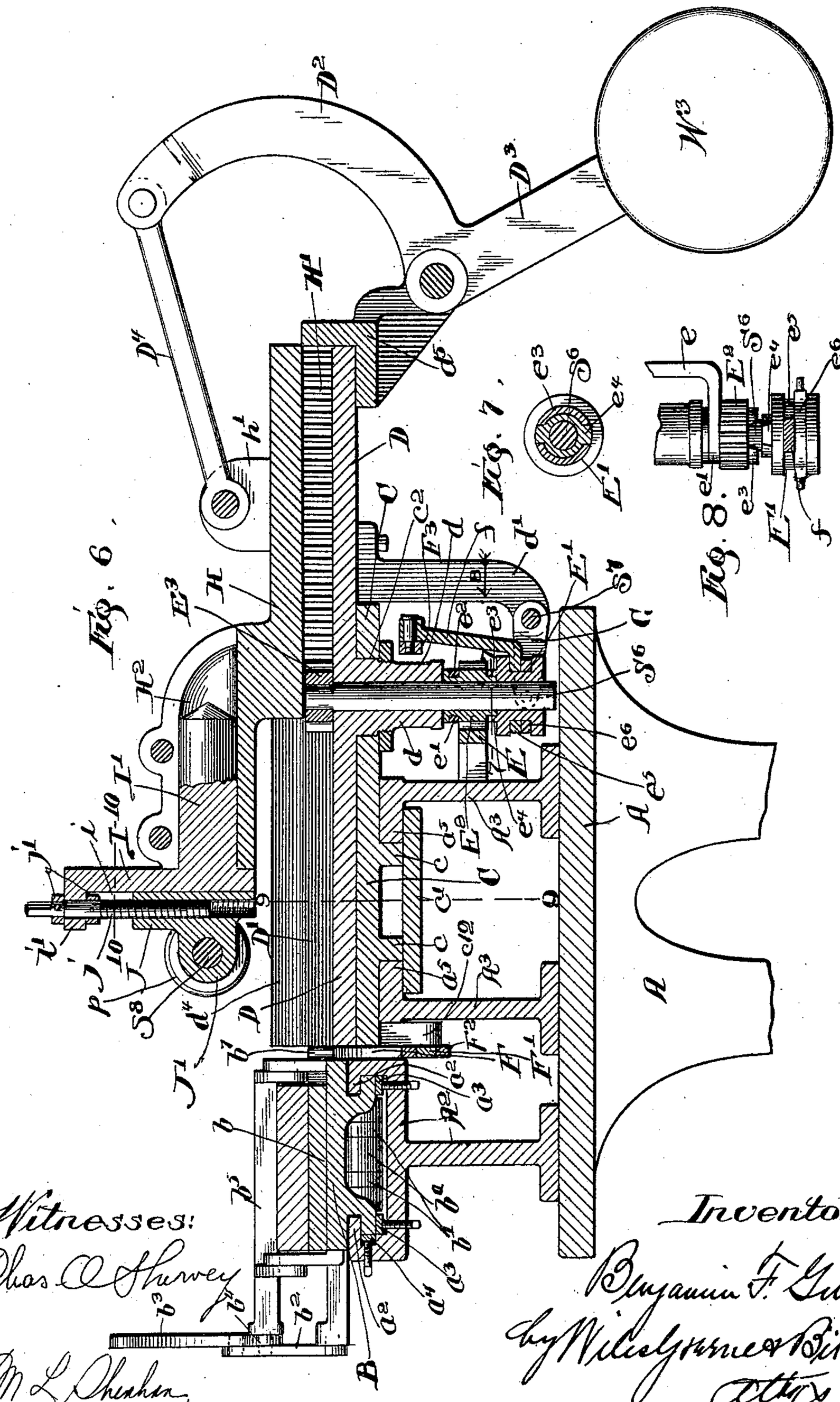

Fig. 6.

Fig. 7.

Fig. 8.

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(No Model.) 6 Sheets—Sheet 6.

B. F. GIBBS.

MACHINE FOR WORKING WOOD OR METAL.

No. 582,195. Patented May 11, 1897.

Fig. 9.

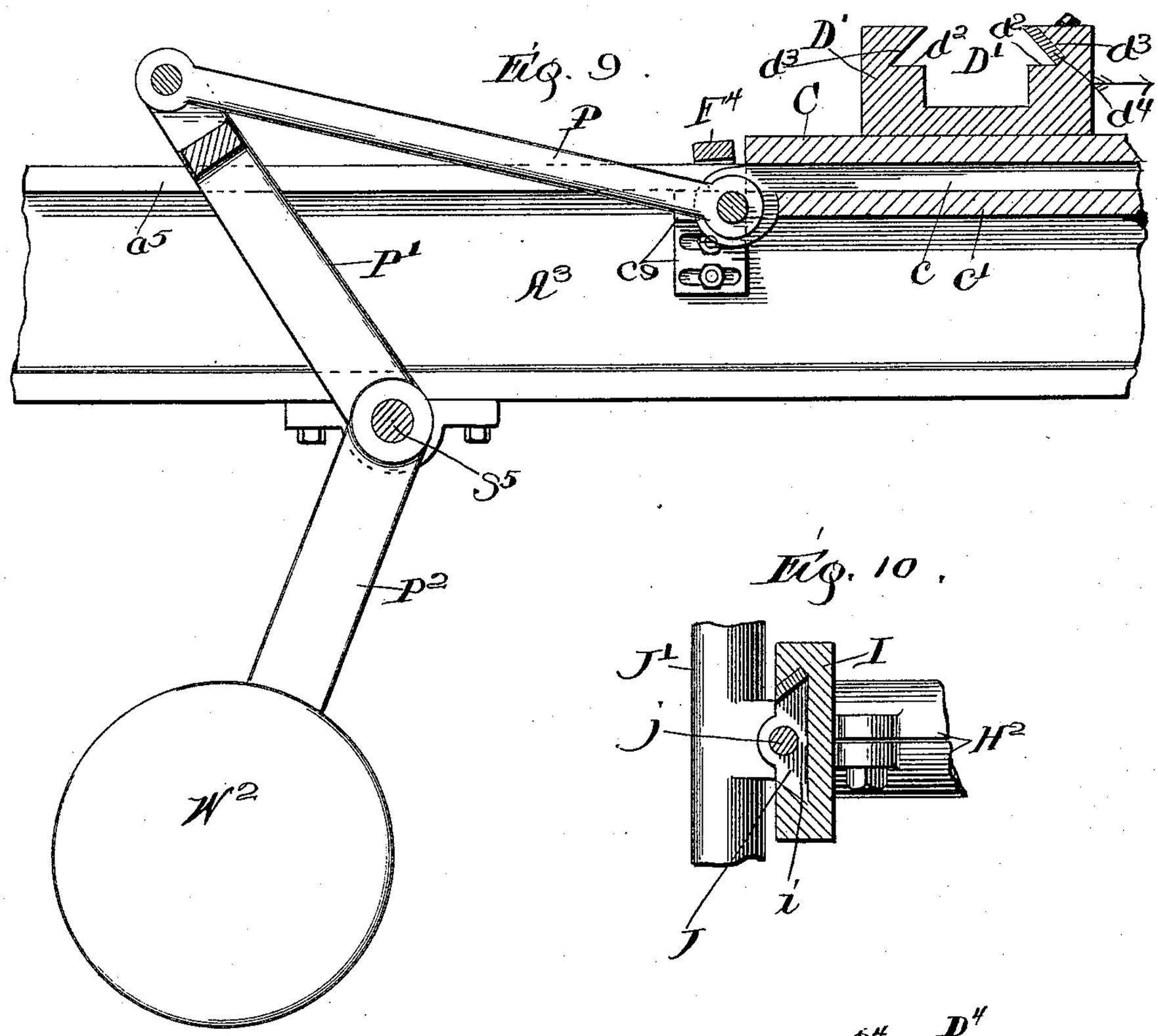
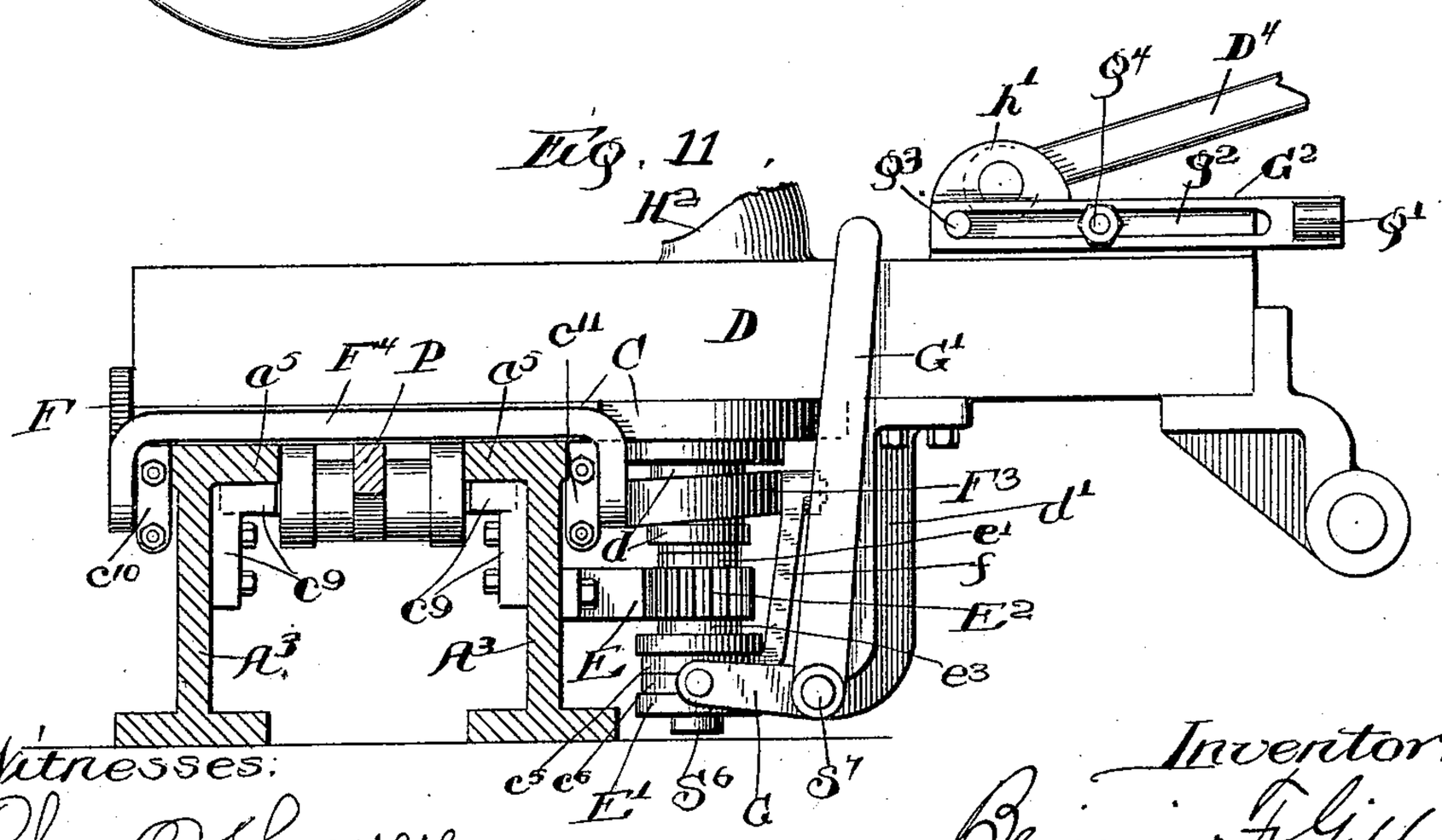


Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. GIBBS, OF KANKAKEE, ILLINOIS.

MACHINE FOR WORKING WOOD OR METAL.

SPECIFICATION forming part of Letters Patent No. 582,195, dated May 11, 1897.

Application filed March 23, 1896. Serial No. 584,374. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. GIBBS, a citizen of the United States, residing at Kankakee, in the county of Kankakee and State of Illinois, have invented certain new and useful Improvements in Machines for Working Wood or Metal, of which the following is a specification.

My invention relates to certain improvements in machines for working wood or metal; and to this end it consists in constructing a machine which shall be practical, complete, and positive in its operation.

The invention consists, broadly, in providing a suitable framework, an endless carrier continuously moving in one direction, a tool-carriage which shall at certain predetermined intervals be carried along with said endless carrier and perform the operations desired upon the blocks of wood or metal which are carried by said endless carrier, and to certain other minor details of construction which will hereinafter be fully described. Upon the completion of such an operation the tool-carriage shall automatically return to its normal position to be in readiness for a subsequent operation.

The invention is fully described in this specification and shown in the accompanying drawings, in which—

Figure 1 is a front elevation of a machine, partly broken away. Fig. 2 is a plan view of one of the tool-carriages, one of the links of the endless carrier, and a portion of the guiding-rails or supports upon which the movable portions are mounted. Fig. 3 is a side view of a portion of one of the links of the chain. Fig. 4 is a front view of a portion of the guiding-rails, partly broken away, and showing one of the tool-carriages. Fig. 5 is a view, partly in side elevation and partly in vertical section, the plane of section being taken in line 5 5 of Fig. 2. Fig. 6 is a vertical cross-section through one of the tool-carriages and framework of the machine, the section being taken in line 6 6 of Fig. 2. Fig. 7 is a detail horizontal section of a clutch used in connection with the device, the section being taken in line 7 7 of Fig. 6. Fig. 8 is a detail side elevation of said clutch, looking in the direction of the arrow 8 in Fig. 6. Fig. 9 is a vertical cross-section through the carriage in line 9 9 of Fig. 6. Fig. 10 is a detail cross-section of one of the adjusting devices for the tool, the section being taken in line 10 10 of Fig. 6; and Fig. 11 is a view of the carriage and guiding-rails, partly in end elevation and partly in cross-section, the section being through the line 11 11 of Fig. 2.

Referring to the drawings, and especially to Fig. 1, which shows a front view of a complete machine, but considerably broken away, A represents the framework, constructed of suitable members to form a good and substantial frame, the exact construction of which is not particular to my invention, the essential features being to form a substantial framework of simple design. The upper portion is formed with a horizontal table or plate A′, (see Fig. 6,) upon which are secured the supporting guiding-rails adapted to carry the endless conveyer and the tool-carriages, respectively.

The framework is provided at each end with brackets *a a′*, suitably braced and strengthened, upon which are journaled two wheels W W′, adapted to propel the endless carrier and having sockets *w* in their peripheries adapted to receive the connecting-pins of the endless carrier, hereinafter described. The wheels W W′, as shown, are constructed of radial arms extending to their outer peripheries, where the sockets *w* are formed, the ends of the arms being connected by flat tangential members *w′*, adapted to receive the links of the endless carriers as they are carried around with the wheels.

The wheel W is shown as the driver, and upon its shaft is secured a worm-gear w^2 in mesh with a worm w^3, journaled in suitable bearings upon the bracket *a*, and upon its shaft is a pulley adapted to be connected to any suitable source of motive power to propel the machine. This forms a very simple means for propelling the machine, but I do not, however, desire to limit myself to this particular means of gearing, as various ways of gearing the machine may be employed.

The endless carrier B is best seen in Figs. 2, 3, 4, and 6, and consists, preferably, of links *b′ b′*, connected by suitable pins, sleeves b^a being preferably placed upon the pins between the links *b′* to properly space them apart. The links *b* of the endless carrier are

preferably constructed of solid blocks, and upon these links is secured the stock which is to be shaped by the machine. The sockets *w* of the propelling-wheels W W′ receive the sleeves b^5 and carry the endless carrier around with them, thus propelling the same continuously in one direction at a comparatively slow yet steady and even motion.

Above the frame of the machine is hung a shaft S, (see Fig. 1,) which is preferably driven at a sufficient speed to impart the necessary speed to the cutting-tools to insure their perfect operation upon the stock, and upon this shaft are secured drums S′ of proper length, the object and purpose of which will hereinafter be described.

Upon the plate A′ is rigidly secured a guiding rail or track A^2, adapted to support and guide the endless carrier B. Looking at Figs. 4 and 6 it will be seen that this guiding rail or track is channel-shaped, having the overhanging edges a^2, which assist in keeping the endless carrier in perfect alinement and prevent the same from accidentally being raised out of its seat in the channel portion of the track. Within the channel portion are rails a^3 a^4, having smooth bearing-surfaces upon which the endless carrier slides. The links *b* of the carrier are provided with grooves on their edges adapted to embrace the overhanging edges of the channel guiding-rail and the lower faces of said links are smooth and slide upon the rails a^3. The rails a^3 a^4 are made adjustable, so as to take up the wear upon the same, said adjustment being shown as consisting of screws extending through the supporting-rail A^2 and bearing upon the rails a^3 a^4, and by tightening or loosening these screws the rails may be adjusted as desired.

The links *b* of the endless carrier are provided with clamps adapted to hold the stock thereto, the exact construction of which is immaterial to my present invention; but the one which I have shown I have found to be very practical and effective in its operation. As shown in Figs. 2, 4, and 6, this clamp consists of a link b^2, pivoted to a laterally-extending lug upon the link *b*. To the upper end of the link b^2 is pivoted a bell-crank lever b^3 b^4, the arm b^3 of which extends upward and away from the pivot, and the arm b^4 is pivoted to a horizontal member b^5, which extends across the face of the stock and when in a locked position impinges upon the upper face thereof and securely clamps it to the link. The horizontal member b^5 has two laterally-extending lugs pivoted to standards formed upon the link near its outer edges; and it is obvious that the horizontal member may be swung away from the stock when it is desired to disengage the same.

The endless carrier travels in the direction indicated by the arrows in the various figures, and the stock to be operated upon is secured in place upon the links *b* at the right-hand end of the machine in Fig. 1. It will be seen that at this end of the machine the clamps are in an unlocked position—that is to say, the horizontal members b^5 are swung away from the links—so that the stock can easily be secured thereon by inserting it in place and throwing the bell-crank lever in the direction indicated by the arrow thereon in Fig. 1 until the pivot of the horizontal member has passed by the line through the pivots of the link b^2, when the stock will be clamped firmly in place. At the opposite end of the machine is placed a tripping device b^6, having a pin extending into the path of the arm b^3 of the bell-crank lever. When the arm b^3 of the bell-crank lever strikes the projecting pin upon the tripping device b^6, it is swung upon its pivot, thus swinging the link b^4 upon its lower pivot, and at the same time the arm b^4 of the bell-crank lever swings the horizontal member b^5 away from the stock. When this link of the endless chain passes over the wheel W, the finished piece of stock falls into a suitable receptacle and the link is carried around to the other end of the machine for subsequent use.

Upon the plate A′ are secured the bearing-ways A^3, extending along the side of the guiding-rail A^2 and parallel therewith and adapted to support and guide the tool-carriages. These tool-carriages are located along the bearing-ways at suitable distances apart and are provided with rotating cutters or other tools adapted to shape the stock. There are as many of these tool-carriages as there are operations required upon the stock; but as all of these tool-carriers are of similar construction the description of one of them will pertain to them all.

The upper faces of the bearing-ways A^3 are formed so as to present smooth bearing-surfaces, and upon them rest bed-plates C of the tool-carriages. Each of the bed-plates is guided along the bearing-ways in any suitable manner, the one shown being by means of ribs *c*, projecting downward between the ways (see Fig. 6) and bearing down upon the inner edges of the same, and a plate *c*′, secured to the under side of the ribs and bearing upon the under sides of the overhanging edges a^5 of the ways A^3. The ribs *c* slide along the inner faces of the overhanging edges in the travel of the tool-carriage along the ways and guide the same thereon.

The bed-plate C is provided with an opening c^2 near its rear end, (see Fig. 6,) through which projects a gudgeon *d*, formed upon a cross-feed bed-plate D, which rests upon the bed-plate C. The cross-feed bed-plate D moves longitudinally with the bed-plate C, and it may evidently be swung upon the bed-plate C, using the gudgeon *d* as a pivot, when it is desired to make certain operations upon the stock at different angles thereto to that of a right angle. As will be seen from the various figures, the cutting-tool (which is shown as a circular saw) is at right angles to the endless carrier, but by swinging the bed-plate upon which this cutting-tool is mounted, using the

gudgeon as a center, it may be made to assume any angle toward the carrier and perform such operations to the stock as readily as if it were at right angles thereto.

Looking at Figs. 2, 3, and 6 it will be seen that a lug b^7 is provided upon the inner side of the link *b*—that is, the side contiguous to the tool-carriage—and this lug is adapted, at certain predetermined moments, to engage the various tool-carriages with which the machine is provided and carry them along with it successively as it passes along, each link being obviously provided with a similar lug.

As seen in the last-named figures, the bed-plate C extends along the bearing-ways for a short distance, and near its end a bracket C′ is adjustably secured thereto. I have shown bolts c^3 passing through the bracket and through suitable slots in the bed-plate C, by which the bracket may be adjusted along the bed-plate to its proper position. The bracket C′ is formed with two ears c^4, in which is seated a reciprocating shaft S^2, one end of which projects beyond the side of the carriage and lies in the path of the lugs b^7 upon the endless carrier B. Upon the reciprocating shaft S^2 are secured two sleeves c^5 c^6, the sleeve c^5 being adapted to limit the movement of said shaft toward the endless carrier, and between the sleeve and ear c^4 is a coiled spring S^3, adapted to throw the end of the shaft into the path of the lug b^7. The reciprocating shaft S^2 is connected with a lever C^2, fast upon a rock-shaft S^4, journaled in an ear c^7, extending from the bracket C′, and upon the lower end of this rock-shaft is secured a second lever C^3, adapted to strike a stop c^8, adjustably secured to the outer face of the bearing-way. As shown, this stop is composed of a flat plate having a slot therein extending longitudinally of the bearing-way A^3, a bolt securing it to the latter at any place along the slot, and a projecting lug extending into the path of the lever C^3.

When the lug b^7 strikes the shaft S^2, it is evident that it must carry the tool-carriage with it at the same speed as the endless carrier until the lever C^3 strikes the stop c^8, the further movement toward said stop causing said lever to be swung in the direction indicated by the arrow thereon in Fig. 2, thus rotating the shaft S^4 with it, swinging the lever C^2, and drawing the shaft S^2 out of engagement with the lug b^7, allowing the endless carrier to continue its movement and the tool-carriage to return to its normal position by a suitable device, the exact construction of which is not necessarily essential, but the one which I have shown being a very simple means for returning the carriage to its normal position. By the use of this mechanism for engagement with the endless carrier I am enabled to place any number of tool-carriages along the machine, each one being adapted to be operated independently of the others.

In Fig. 9 it will be seen that the bed-plate C of the tool-carriage is provided with ears, to which is pivoted a pitman P, connected with the free end of a bell-crank lever P′ P^2, secured upon a shaft S^5, journaled upon the frame of the machine. The free end of the arm P^2 of the bell-crank lever is provided with a suitable weight of sufficient power to draw the carriage to its normal position. The working movement of the tool-carriage is in the direction indicated by the arrow thereon in Fig. 9, and when such movement takes place it draws the pitman P with it, swinging the bell-crank lever upon its shaft, raising the weight W^2 until the shaft S^2 has been released from the lug b^7, when the force of the weight W^2 will carry the tool-carriage back until it strikes a stop c^9, secured upon the inner sides of the bearing-ways. This stop is made adjustable for the purpose of limiting the backward movement of the tool-carriage for certain reasons hereinafter described.

It is obvious that by moving the reciprocating shaft S^2 toward the cutting-tool the latter will be caused to cut upon the stock nearer the middle portion thereof, and that by varying the position of the lug b^7 upon the link the cutting-tool may be made to cut or operate upon the stock at any point upon the same.

Upon the side of the bearing-rail A^3 is secured a stationary rack E, which may, if desired, extend along the entire side of the machine, or each tool-carriage may have a separate rack. A shaft S^6 is journaled in the gudgeon *d* of the cross-feed bed-plate D and carries upon its lower end a clutch E′, adapted at certain intervals to connect the shaft S^6 with a pinion E^2, loosely mounted on said shaft and in mesh with the stationary rack E. This pinion E^2 is supported in any suitable manner, the one shown being a bracket *e*, secured to the bed-plate C and having the portion *e′* seated in an annular recess e^2 in the pinion E^2.

The lower face of the pinion E^2 is provided with jaws e^3, adapted for engagement with corresponding jaws e^4 upon the clutch E′, (see Figs. 7 and 8,) and this clutch is provided with a recess in which are seated two collars e^5 e^6, the object of which will be hereinafter described.

Looking at Fig. 4 a bell-crank lever F F′ will be seen pivoted to the outer face of the bearing-way A^3, the arm F thereof normally lying in the path of the lugs b^7 upon the links *b* of the endless carrier. The arm F′ rests in the forked end of an arm F^2, pivoted to a depending lug c^{10} upon the bed-plate C, said arm being a portion of a device for throwing the clutch E′ into engagement with the pinion E^2. *f* is a link connected with the collar e^5 and extending upward, where it is connected with an arm F^3, (see Figs. 2, 5, 6, and 11,) extending around the gudgeon *d* in an approximately horizontal plane, then in a longitudinal direction a short distance, where it is pivoted upon a lug c^{11} in a line concentric with the pivot of the arm F^2. At this point the levers F^2 F^3 are connected with a cross-

bar F^4, which may be made integral therewith or secured thereto in any suitable manner, the object being to give the same amount of oscillation to the arm F^3 which the arm F^2 received upon the opposite side of the machine.

Each lug b^7 upon the link b of the endless carrier, as it passes along, comes in contact with the shaft S^2 and moves the carriage along with it, as has been heretofore described, but just before striking the shaft S^2 the lug encounters the arm F of the bell-crank lever and while passing over it rotates it slightly in the direction indicated by the arrow thereon in Figs. 4 and 5. It will be noticed in the drawings that the position of the link b is at a point where the lug b^7 has come into engagement with the shaft S^2. Hence the lever F has already been rotated in the direction of the arrow thereon in Fig. 4. This causes a corresponding rotation of the arm F′ of the bell-crank lever, thus raising the free end of the arm F^2 of the clutch-operating mechanism, swinging the cross-bar and arm F^3 in the direction indicated by the arrows thereon in the respective figures, and thus lifting the clutch into engagement with the pinion E^2 through the link f.

The collar e^6 (see Figs. 5, 6, and 11) is connected with the free ends of arms G, fast upon a rock-shaft S^7, journaled in suitable brackets d', supported from the cross-feed bed-plate D. To the outer end of the shaft S^7 is secured a lever G′, extending upward to the top of the bed-plate D, where it is provided with a pin g, (see Fig. 2,) lying in the path of a lug g' upon a plate G^2, adjustably secured upon the cross-feed block H, hereinafter described. The block H is provided with a rib g^2, one end of which has a pin g^3 extending laterally therefrom and into a slot in the plate G^2. The plate G^2 can evidently be moved along the rib g^2 to any desired point, and a bolt g^4 is provided whereby the plate can be secured in place, the purpose of this adjustment being to allow the proper amount of movement of the tool-carriage toward the stock, so that if it is desired the lug g' may be adjusted (as it is in the drawings) so that the cutting-tool passes across the entire width of the stock. It may, however, be adjusted so that the cutting-tool will only make a slight kerf or other operation which may be desired upon this stock.

As has heretofore been described and explained and shown in the drawings, the clutch is in engagement with the pinion E^2. Therefore the lever G′ will be in a position adapted to be operated upon by the lug g'.

The cross-feed bed-plate D is formed with dovetailed bearing-ways D′, in which slides the cross-feed block H, which carries the cutting-tool. As seen in Figs. 5, 6, and 10, these bearing-ways comprise the bearing-faces d^2, upon which the cross-feed block slides, and overhanging faces d^3, adapted to guide corresponding faces upon the block and prevent it from any accidental upward displacement. I have shown a strip d^4 in the ways adapted to take up any wear on the block, this strip being provided with suitable screws for adjusting it to take up such wear. Below the bearing-faces d^2 the bed-plate is provided with a longitudinal groove in which is a downwardly-projecting flange h upon the block H, and upon the face of this flange is secured a rack H′, which is in mesh with a pinion E^3, fast upon the upper end of the shaft S^6, which passes through the gudgeon d upon the bed-plate D.

The pinion E^3 is at certain predetermined times caused to rotate, thus giving to the cross-feed block H longitudinal movement, said movement causing the cutting-tool to operate upon the stock, as will be hereinafter described. To return the block H to its normal position—namely, the one illustrated in the drawings—I have provided a device similar to the one used in returning the complete tool-carriage to its normal position, heretofore described. The lever is shown at D^2 D^3 pivoted upon a bracket d^5, secured to the rear end of the cross-feed bed-plate, the upper end of said lever being connected with a pitman D^4, which is in turn connected with ears h' upon the block H. The lower end of the arm D^3 is provided with a suitable weight, which, when swung upward by the forward movement of the block H, is in a position to draw the same back to its normal position when it is released from such forward movement through its gravity. The form and construction of these devices for returning the tool-carriage are simple and effective, but it is not essential that they be of the exact construction shown and described, as straps attached to the tool-carriage and block, respectively, and passing over suitable supporting-rollers would serve the purpose just as well.

The block H is provided at one end with an upwardly-extending neck from which projects a horizontal clamping-block H^2, in which is secured a spindle I′ of a face-plate I. The clamping-block H^2 is slit, as seen in Figs. 5 and 6, and provided with set-screws in its upper edges, by which the spindle I′ may be securely clamped therein. The face-plate I is provided with a dovetailed groove i, in which is seated a corresponding block J, which is vertically adjustable therein by means of a screw j, threaded in said block and journaled in an overhanging lug i', formed upon the upper end of the face-plate I, sleeves j' j' being provided upon the screw on each side of said overhanging lug to prevent any longitudinal movement thereof. The upper end of the screw is preferably squared, so that a wrench may be applied thereto and the screw rotated, thereby raising or lowering the block J for the purpose of making a shallow or deep cut in the stock. The block J is provided with a journal-bearing J′, in which the shaft S^8 of the cutting-tool is journaled. The tool is shown at T and secured to one end of the

shaft S^8, the other end of the shaft being provided with a suitable pulley p, geared to the drum S′ by a belt p', as seen in Fig. 1.

It is evident that the cutting-tool T may be turned in almost every direction with reference to the stock and that various shapes and operations may be made upon the stock. As shown in the drawings, the tool is placed in a vertical plane, but by loosening the set-screws in the clamping-block H^2 the spindle I′ may be rotated and adjusted in any suitable position therein, the set-screws again tightened, thus holding the cutting-tool at the angle desired. The entire cross-feed bed-plate may be swung upon its gudgeon to any desired angle with the stock for the purpose of operating thereon at different angles. I have shown a sleeve screwed upon the gudgeon and bearing against the under face of the bed-plate C, which will prevent any misplacement of the cross-feed bed-plate D with reference to the bed-plate C.

The operation of the machine is as follows: A block of wood or metal is placed on one of the links b of the endless carrier and clamped thereto by the clamping device thereon. As has heretofore been explained, the endless carrier is continuously moving and the stock is placed thereon while the same is moving, and when the lug b^7 upon the link b strikes the bell-crank lever F F′ it throws the clutch E into engagement with the pinion E^2 by means of the various levers in connection with said clutch-operating mechanism heretofore described. The pinion E^2 is now fast on the shaft S^6, and as the link continues its onward movement the lug b^7 engages the reciprocating shaft S^2 upon the tool-carriage bed-plate C and carries the same along with it, causing the pinion E^2 to travel along the stationary rack E, thus rotating the shaft S^6 and pinion E^3 at the top thereof, which engages the rack H′, carrying the tool-carriage block H forward toward the stock.

It is evident that if the piece of stock and tool-carriage travel together in an approximately parallel direction and at the same speed the cutting-tool will operate thereon when moved across the same with as perfect freedom and effectiveness as if both were stationary with reference to any longitudinal movement and the tool simply moved across the same.

The endless carrier continues its onward movement, carrying the tool-carriage along with it, causing the cutting-tool to operate upon the stock until the lug g', which has been adjusted to limit the amount of cutting to be done upon the stock, strikes the pin g upon the lever G′ and swings the levers G downward, drawing the clutch E′ out of engagement with the pinion E^2, which, however, continues to rotate as it passes along the rack in the further movement of the carriage. The tool-carrying block H is now disengaged from the pinion E^2, with which it has until now been connected, as heretofore described, and is free to return to its normal position. The weight W^3 is now in its raised position, and immediately upon the disengagement of the clutch E′ it falls to its lowest position, thereby returning the tool-carrying block H to its normal position, where it strikes the bracket d^5, which limits its backward movement. During this return movement of the tool-carrying block the pinion E^3 is evidently rotated through its engagement with the rack upon the tool-carrying block, but as the clutch E′, which connects the shaft S^6 with the pulley E^2 at certain times, has disconnected the shaft from the pinion through the clutch-releasing mechanism above described, and the pinion E^3 and shaft S^6 are free to rotate with reference to the pinion E^2, so that as the tool-carriage continues its movement in unison with the endless carrier the pinion E^2, which meshes with the stationary rack E, may rotate upon the shaft S^6 in one direction and the shaft and pinion E^3 in the opposite direction, the tool-holder being at this moment on its return movement. The returning of the tool-carrying block is performed before the lever C^3 reaches the stop c^8, which is adjusted so that sufficient time may be allowed for the tool-carrying block to return to its normal position. When the lever C^3 strikes the stop c^8, it disengages the reciprocating shaft S^2 from the lug b^7, and the weight W^2, which has been raised to its upper limit, draws the entire tool-carriage back until the same strikes the limiting-stop c^9, while the endless carrier continues onward, causing said piece of stock to be operated upon successively by the other tools, which are arranged along the frame of the machine. The tool-carriage is now in a position to operate upon the piece of stock following the one which has just been operated upon, it being understood that a piece of stock is placed upon each of the links b by the operator. When the lever G′ is operated upon by the lug g', as has heretofore been described, it disengages the clutch from the pinion and at the same time carries the free end of the arm F^3 down with it, thus giving a corresponding movement to the arm F^2 on the opposite side of the bearing-ways A^3, bringing the bell-crank lever F F′ into position to be acted upon by the lug b^7 on the link following the link which has previously actuated the tool-carriage.

From the foregoing specification it is evident that various operations can be made upon the stock, and I have found that this machine is equally adapted for shaping metal as well as wood, and while I have shown and described only one set of tool-carriages upon one side of the endless carrier a similar arrangement may be had upon the opposite side, whereby both sides of the stock may be operated upon at the same time. In this case the device for clamping the stock to the links is arranged slightly different, so as to leave no projecting portions. The clamps can be easily arranged upon the ends of the stock so

as not to interfere with any of the working portions of the machine.

While I have described the cutting-tool as a rotating cutter, it is evident that it is not necessary to employ rotating cutters, as other cutters may be used in shaping the block.

In the above specification I have endeavored to specifically describe the invention, but I do not, therefore, desire to limit myself to the exact construction thereof, as various alterations and modifications of the different portions and combinations of the machine are numerous; but what I do claim as new and essential to the embodiment of my invention will be particularly pointed out in the following claims.

In the above the tool has been described as moving toward and away from the carrier, and the term "transversely" as used in the following claims is to be understood as such movement.

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

1. In a machine of the class described, the combination with a continuously-moving stock-carrier provided with suitable clamping devices for clamping the stock thereto, of a suitable tool-support adapted to be engaged by said carrier and intermittently moved thereby in unison therewith, coacting lugs upon said stock-carrier and tool-support respectively, one of said lugs being transversely movable with respect to the other, means adapted to disengage said transversely-movable lug from the other at predetermined moments, a cutting-tool mounted upon said tool-support and moving therewith, and suitable means operated by the movement of the tool-support in unison with the stock-carrier adapted to move said tool transversely to the line of motion of said carrier.

2. In a machine of the class described, the combination with a continuously-moving stock-carrier provided with suitable clamping devices for clamping the stock thereto, of a tool-support adapted to be engaged by said carrier and moved thereby in unison therewith, coacting lugs upon said stock-carrier and tool-support respectively, one of said lugs being transversely movable with respect to the other, means adapted to disengage said transversely-movable lug from the other at predetermined moments, means adapted to move the tool-support in an opposite direction to that in which the stock-carrier moves, a cutting-tool mounted upon and moving with the tool-support and means operated by the movement of the tool-support in unison with the carrier adapted to move the tool transversely to the line of motion of the carrier.

3. In a machine of the class described, the combination with a continuously-moving stock-carrier, provided with suitable clamping devices for clamping the stock thereto, of a tool-support adapted to be engaged by said carrier and intermittently moved thereby in unison therewith, coacting lugs upon said stock-carrier and tool-support respectively, one of said lugs being transversely movable with respect to the other, means for disengaging said transversely-movable lug from the other at predetermined moments, a cutting-tool mounted upon said tool-support and moving therewith, and means operated by the movement of the tool-support in unison with the carrier adapted to move the cutting-tool reciprocally in a limited path transversely to the line of motion of the carrier.

4. The combination with a continuously-moving stock-carrier provided with suitable means for clamping the stock thereto, of a tool-support adapted to be engaged by said carrier and intermittently moved thereby in unison therewith, coacting lugs upon said stock-carrier and tool-support respectively, one of said lugs being transversely movable with respect to the other, means adapted to disengage said movable lug from the other at certain predetermined moments, means adapted to move said tool-support in an opposite direction to that in which the stock-carrier moves, a cutting-tool mounted upon said tool-support and moving therewith, means operated by said movement of the tool-support in unison with the carrier adapted to move said cutting-tool toward the carrier, and a suitable weight adapted to move the tool away from the carrier.

5. The combination with a continuously-moving stock-carrier provided with suitable means for clamping the stock thereto, of a tool-carriage adapted to be engaged by said carrier and intermittently moved thereby in unison therewith, coacting lugs upon said stock-carrier and tool-carriage respectively, one of said lugs being transversely movable with respect to the other, means adapted to disengage said transversely-movable lug from the other at certain predetermined moments, means adapted to impart return movement to said tool-carriage, a cutting-tool, means operated by the movement of the tool-carriage in unison with the carrier adapted to move the tool reciprocally in the carriage, and suitable stops limiting the path of motion of the tool in said tool-carriage.

6. In a machine of the class described, the combination with a continuously-moving stock-carrier provided with suitable means for clamping the stock thereto, of a tool-carriage provided with a suitably-driven tool and movable both parallel with the carrier movement and in a direction transverse to the same, coacting lugs upon the stock-carrier and tool-carriage respectively, the lug upon the tool-carriage being transversely movable, an adjustable stop c^8, a bell-crank lever connected with said lug and adapted to strike the stop c^8, and thereby disengage the transversely-movable lug from the other, a device operated by the movement of the tool-carriage in unison with the stock-carrier for moving the tool transversely to the line of motion of

the carrier, and a device for automatically moving said tool transversely to the line of motion of the carrier and in the opposite direction to the first transverse movement; substantially as described.

7. The combination with a continuously-moving carrier, of a tool-carriage adapted to move reciprocally in a limited path approximately parallel to the line of motion of the carrier, a tool-holder mounted in said tool-carriage and moving therewith and adapted to be moved transversely to the line of motion of the carrier and toward the same, a stop upon said tool-holder, a suitable clutch mechanism adapted to be actuated by said stop, and thereby limit said transverse movement toward the carrier, and a suitable weight adapted to return said tool-holder, the movement of the tool-carriage in one direction being in unison with the carrier and said transverse movements of the tool-holder during said movement of the tool-carriage in unison with the carrier.

8. The combination with a continuously-moving carrier, of a suitably-supported tool-carriage bed-plate adapted to be engaged with said carrier and intermittently moved in unison therewith, a tool-holder mounted on said bed-plate and moving therewith, a stationary rack, a pinion moving with said bed-plate and in mesh with the rack, a second pinion, a rack upon said tool-holder in mesh with the second-named pinion, and means adapted to connect the first-named pinion with the second-named pinion during a portion of the movement of the bed-plate in unison with said carrier, thereby imparting transverse motion to the tool-holder.

9. The combination with a continuously-moving carrier, of a suitably-supported tool-carriage bed-plate adapted for engagement with said carrier, and be intermittently moved in unison therewith, a tool-holder mounted upon said bed-plate, a stationary rack, a shaft journaled in the bed-plate, a pinion fast upon one end of said shaft, a rack upon the tool-holder in mesh with said pinion, a second pinion loosely mounted upon the other end of said shaft and in mesh with the stationary rack, and a suitable clutch mechanism adapted to throw the second-named pinion into engagement with the shaft during the movement of the bed-plate in unison with the carrier, thereby giving to the tool-holder a transverse motion.

10. The combination with a continuously-moving carrier, of a tool-carriage bed-plate adapted for engagement with said carrier and be intermittently moved in unison therewith, a tool-holder mounted upon said bed-plate and moving therewith, a stationary rack, a second rack upon the tool-holder, a shaft, S^6, journaled in the bed-plate, a pinion fast upon one end of said shaft and in mesh with a second-named rack, a pinion, E^2, loosely mounted upon the other end of said shaft, a clutch adapted to throw said pinion into engagement with the shaft, a link, *f*, connected with said clutch, a rocking lever, F^2, F^3, F^4, connected with said link, a bell-crank lever, F, F′, one arm of which engages the rocking lever, the other arm lying in the path of the carrier and adapted to be actuated thereby at predetermined intervals, thereby throwing said pinion into engagement with the shaft, S^6, and imparting transverse movement to the tool-holder during said movement of the tool-carriage in unison with the carrier.

11. The combination with a carrier, B, of the tool-carriage bed-plate, C, the reciprocating shaft, S^2, adjustably mounted upon the bed-plate and normally held in a position to be intermittently engaged with the carrier, B, the rocking levers, C^2, C^3, rock-shaft, S^4, the adjustable stop, c^8, adapted to swing said rocking levers and thereby disengage the shaft, S^2, from the carrier, and a cutting-tool mounted upon said bed-plate and adapted to be moved transversely to the line of motion of said carrier when the reciprocating shaft, S^2, is in engagement therewith.

12. The combination with the continuously-moving carrier B, of the bed-plate, C, adapted to move reciprocally in a limited path approximately parallel to the line of motion of the carrier, one of said movements being in unison with the carrier, the cross-feed bed-plate, D, pivoted upon the bed-plate, C, and the tool-holder, H, mounted on said cross-feed bed-plate, D, and adapted to be reciprocally moved transversely to the line of motion of the carrier during the movement of the bed-plate, C, in unison therewith.

13. The combination with a continuously-moving carrier, adapted to move reciprocally in a limited path approximately parallel therewith, one of said movements being in unison therewith, the cross-feed bed-plate, D, pivotally mounted thereon, the tool-holder, H, mounted on said cross-feed bed-plate and adapted to be moved reciprocally in a line transverse to the line of motion of the carrier during its movement in unison therewith, and the face-plate, I, pivotally mounted in the tool-holder, H, whereby the tool-holder may assume any angle toward said carrier.

14. The combination with a continuously-moving carrier, of a tool-support adapted to be intermittently moved in unison with said carrier, the block, J, adjustably mounted on said tool-support and adapted to support the tool, said tool-support being adapted to be moved transversely to the line of motion of said carrier during its movement in unison therewith.

15. The combination with the carrier B, of the bed-plate, C, adapted to be intermittently engaged with said carrier, the cross-feed bed-plate, D, pivotally mounted on the bed-plate, C, the rack, E, the shaft, S^6, the clutch, E′, the levers, G, G′, the pinion, E^2, loosely mounted on the shaft, S^6, the pinion, E^3, fast upon one end of said shaft, the tool-holder, H, mounted on the cross-feed bed-plate, D,

the rack, H′, in mesh with the pinion, E^3, the adjustable stop, G^2, having the lug, g', adapted to strike the lever, G′, the weighted bell-crank lever, D^2, D^3, pivoted to the cross-feed bed-plate, D, and the pitman, D^4, connecting the free end of the bell-crank lever with the tool-holder, H.

16. In a device of the class described, the combination with a suitable stock-carrier provided with suitable clamping devices for clamping the stock thereto and having the lugs, b^7, of the tool-carriage bed-plate, C, an engaging device upon said bed-plate lying in the path of the lugs, b^7, and adapted to be engaged by said lugs, a stop adapted to disengage said engaging device from the lugs, suitable means adapted to impart return movement to the bed-plate, and a tool-holder suitably mounted upon said bed-plate and adapted to be moved transversely to the line of motion of the carrier during the movement of the bed-plate in unison therewith by means operated by the movement of the tool-support in unison with the carrier.

17. The combination with the continuously-moving carrier B, of the tool-carriage bed-plate, C, adapted to be intermittently engaged therewith and moved in unison therewith, a stop limiting such movement, a suitable weight adapted to return the bed-plate to its normal position when released from the carrier, a cross-feed bed-plate pivotally mounted on the bed-plate, C, a stationary rack, E, a shaft, S^6, journaled in said cross-feed bed-plate, a pinion, E^2, loosely mounted on the shaft, S^2, a pinion, E^3, fast thereon, a tool-holder mounted upon said cross-feed bed-plate and adapted to slide therein, a rack, H′, secured upon the tool-holder and in mesh with the pinion, E^3, the clutch-operating levers, f, F, F′, F^2, F^3, F^4, adapted to be actuated by the carrier B, at certain predetermined moments, the levers, G, G′, stop, G^2, having the lug, g', adapted to strike the lever, G′, and the weighted bell-crank lever, D^2, D^3, journaled upon the cross-feed bed-plate and connected with the tool-holder.

18. The combination with the guiding-rail, A^2, and bearing-ways, A^3, of the endless carrier, B, comprising substantially the links, b, adapted to support the stock, and links, b', connecting the links, b, the clamping devices comprising substantially the links, b^2, bell-crank levers, b^3, b^4, and horizontal members, b^5, pivoted to the links, b, and adapted to impinge upon the stock when the bell-crank levers are swung in one direction, a tripping device, b^6, lying in the path of the bell-crank levers and a suitably-supported cutting-tool adapted to be engaged with said carrier and intermittently moved thereby in unison therewith, and means operated by said movement of the cutting-tool in unison with the carrier adapted to move the cutting-tool transversely to the movement of the carrier.

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