(No Model.) 4 Sheets—Sheet 1.

W. J. WRIGHT.

STAVE TRIMMING AND JOINTING MACHINE.

No. 492,702. Patented Feb. 28, 1893.

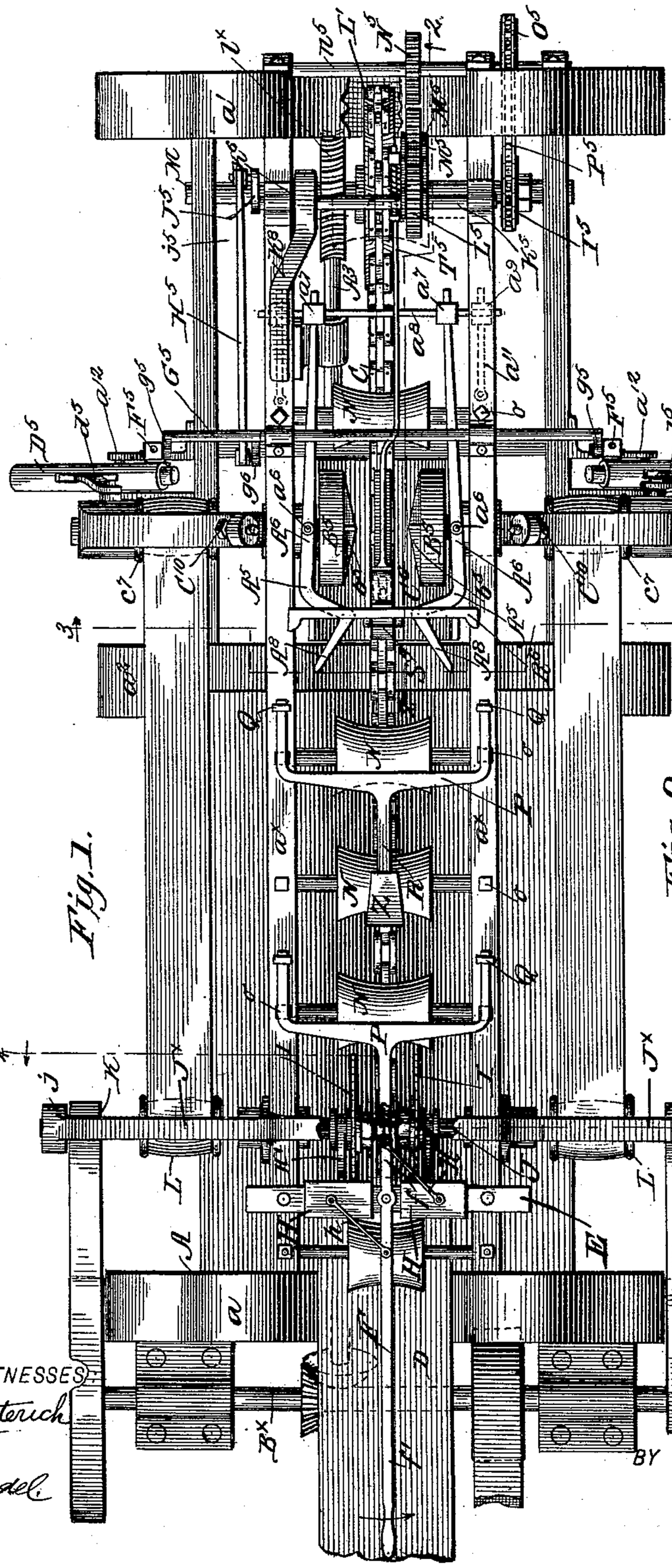

Fig. 1.

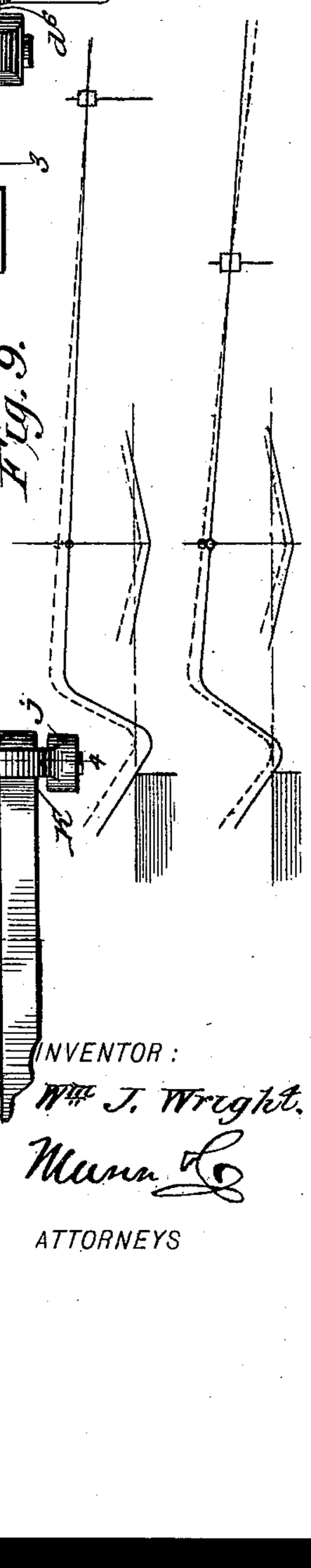

Fig. 9.

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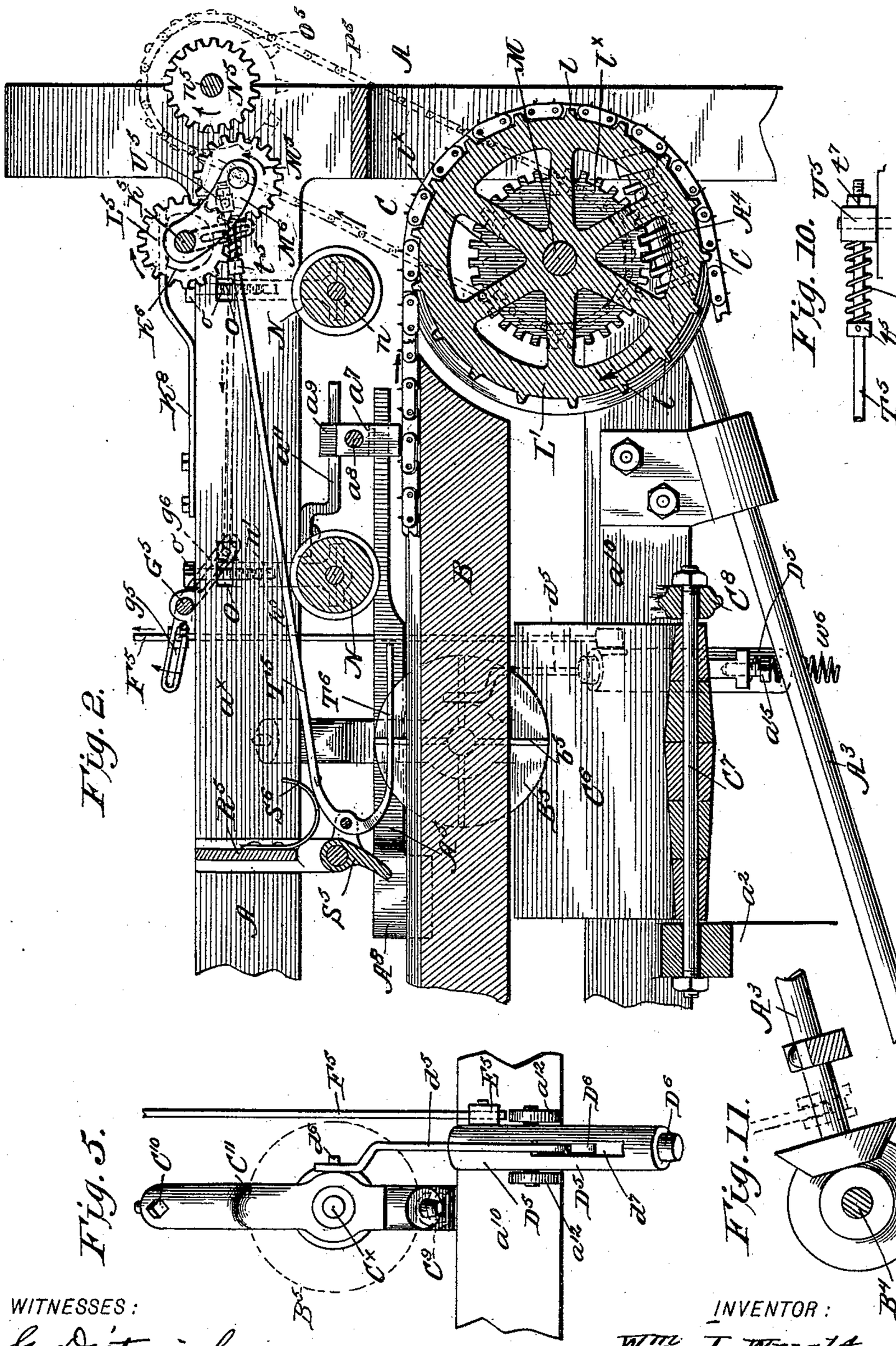

Fig. 2.

Fig. 10.

Fig. 5.

Fig. 11.

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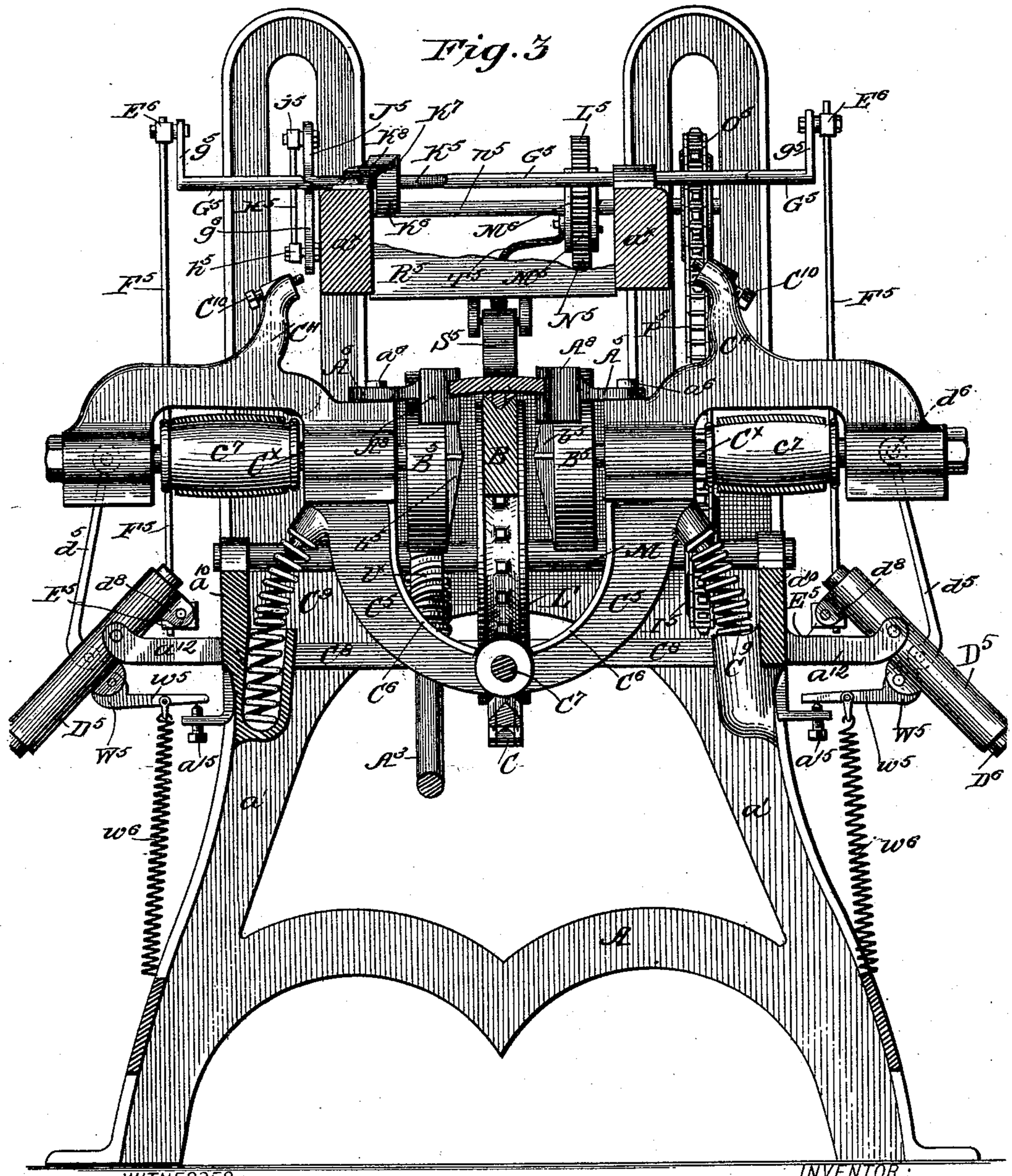
Fig. 3



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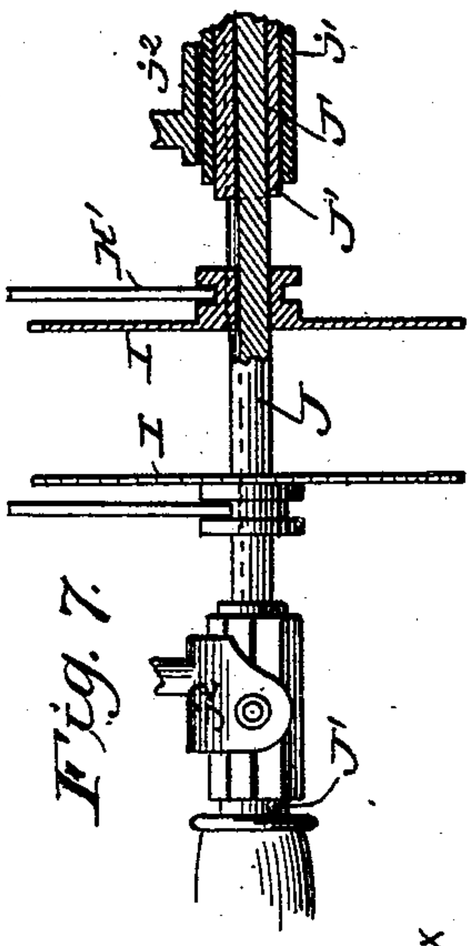

Fig. 7.

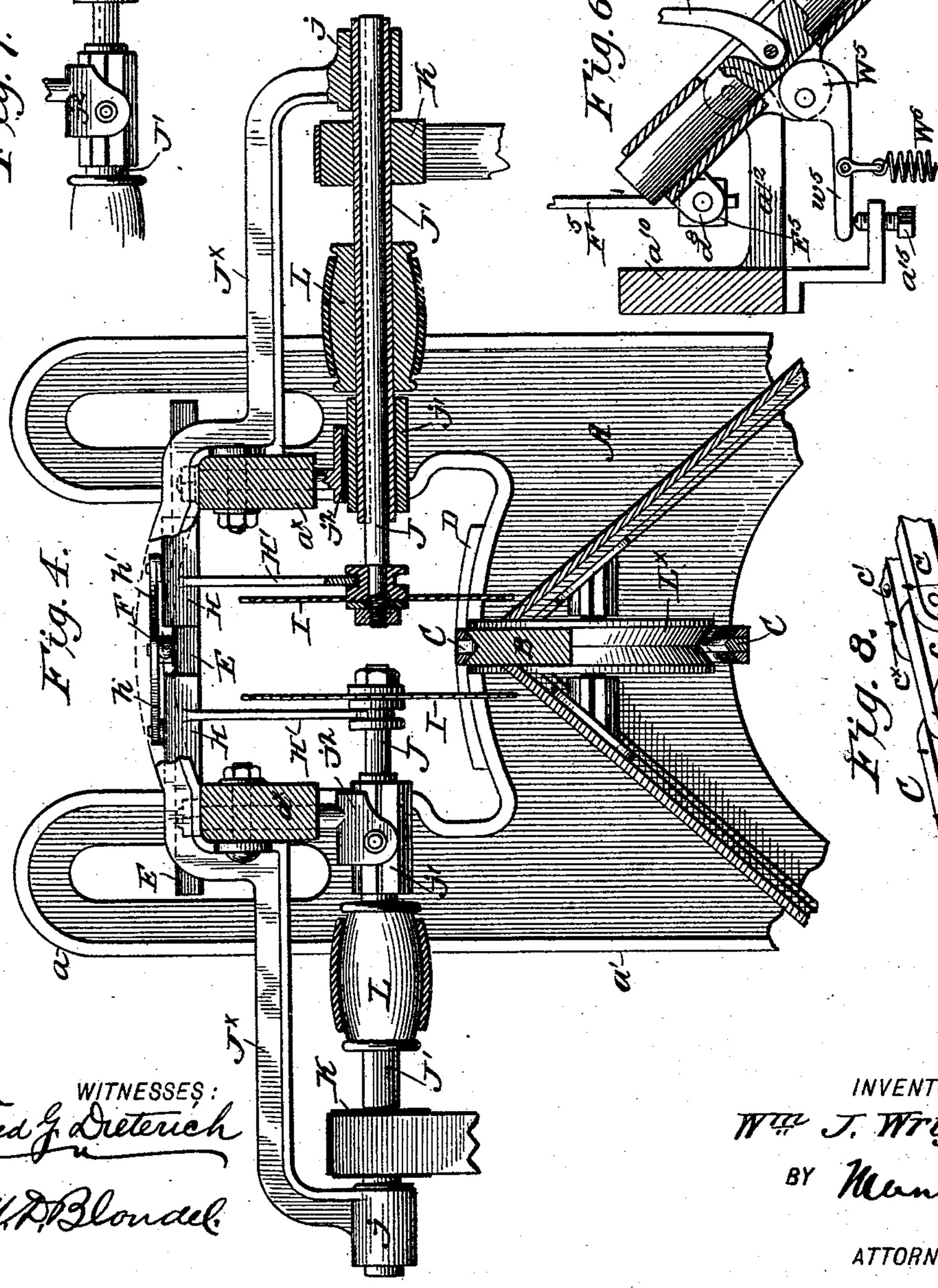

Fig. 4.

Fig. 6.

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM JAMES WRIGHT, OF COOPERSTOWN, PENNSYLVANIA.

STAVE TRIMMING AND JOINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 492,702, dated February 28, 1893.

Application filed June 2, 1892. Serial No. 435,332. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES WRIGHT, residing at Cooperstown, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Stave Trimming and Jointing Machines, of which the following is a specification.

My invention relates more particularly to that class of stave making machines, in which the billet is first trimmed to a proper width, after which it is automatically fed into the machine; such billet in its course through the machine serving to automatically control and set the bevel cutting, and the bilge forming devices, whereby such devices will be operated to cut the bevel and form the bilge in exact proportions, relative to the different widths of the billet.

My invention has for its object to provide a machine of this character, simple and durable in its construction, of great capacity, positive and effectual in its operation and easy to manipulate; and to these ends it consists in the peculiar and novel combination of parts, and details of construction all of which will hereinafter be fully described in the specification and pointed out in the claims reference being had to the accompanying drawings in which

Figure 1 is a top plan view of my improved stave machine. Fig. 2 is a vertical longitudinal section of one end thereof, on the line 2—2 Fig. 1. Fig. 3 is a transverse section of the machine taken on the line 3—3 Fig. 1 looking in the direction indicated by the arrow. Fig. 4 is a detail transverse section on the line 4—4 Fig. 1. Fig. 5 is a detail side view and Fig. 6 is a detail sectional view of one of the head blocks hereinafter referred to. Fig. 7 is a sectional view of a modified way of supporting the trimmer saw shafts. Fig. 8 is a detail view of a portion of the carrier link chain. Fig. 9 is a diagrammatic view hereinafter referred to. Figs. 10 and 11 are detail views hereinafter referred to.

Referring to the accompanying drawings A indicates the main frame formed with the end legs or supports a, a' and a center leg a^2, such legs being of a form shown most clearly in Figs. 3 and 4.

B indicates a central longitudinal bed rail, extending from the front to the back leg, and such bed has a longitudinal V groove in its top to receive the endless chain carrier C presently referred to.

On the front end of the machine is an extension D, which I term the billet bed, as it forms a rest for the billet before it is pushed into the machine.

E indicates a dovetail guide rail mounted transversely on the upper side beams $a^\times$ of the main frame upon which are mounted movable boxes H, which are adapted to be set toward or from each other by a lever F pivoted centrally on the rail E between the inner ends of the boxes H, the inner end of such lever being extended as at f, while the outer end f' is extended over the billet bed D and formed with a handle portion as shown.

By referring to Fig. 1, of the drawings it will be noticed that to each of the sliding boxes H is pivotally connected a link arm, one of which h' is pivotally connected to the inner end of the lever F, while the other h is connected to such lever at a point forward of its fulcrum; and such construction it will be seen provides simple means for moving the slide boxes H inward or outward by the different movements of the lever F. Thus, should the lever be swung in the direction indicated by the arrow, the boxes H will be drawn inward while an opposite movement of such lever will spread them outward. Each of the boxes H has a downwardly and forwardly extending clutch arm H′ which engages the clutch and collar of a laterally movable saw I, mounted on the main frame in a manner most clearly shown in Fig. 4 of the drawings, by reference to which it will be seen, that each saw is fixedly mounted upon a shaft J, held for longitudinal movement in a hollow shaft J′ and to turn therewith. The shafts J′ are mounted at their outer ends in fixed bearings j formed on the outer ends of the transverse supporting yoke $j^\times$ while their inner ends are journaled in bearings j' hung in boxes j^2 secured to the side beams $a^\times$ as shown.

K indicates drive pulleys on the shafts J′ belted with any of the main drive shafts in the usual manner and L are pulleys held on such shafts which are connected with the drive pulleys of the cutters hereinafter referred to.

By arranging the trimmer saw mechanism as shown and described, the operator by ad-

justing the lever F will move the slide boxes H laterally, which in turn moves the saw carrying shafts and the saws to the desired positions.

In some kinds of work and especially when great speed is desired, a single shaft J is inserted into the hollow shafts J′ which extends entirely across the machine, and on such shaft the saws are held for lateral movement they being formed with the clutch hubs, keyed to the shaft in a manner clearly shown in Fig, 7.

The endless carrier C before referred to is formed of a series of links *c* connected in the ordinary manner, but having their bottom faces tapered as shown most clearly in Fig. 8, whereby such bottoms will fit the triangular or V groove in the top of the bed B and the V groove in the front bearing wheel $L^{\times}$ and also over the drive wheel L′ mounted on the shaft M in the rear end of the machine, such wheel having an annular V groove formed with sprocket teeth *l*, over which the parallel links *c′* fit and engage, and by which it is driven.

In operation the stave before reaching the trimmer saws, will engage the upper faces of the endless carrier links, which faces have prongs $c^{\times}$, and it will be carried along by such carrier over the bed B and under a series of yielding pressure rolls N N, the shafts of which are journaled in boxes *n n*, each having vertical extensions *n′ n′* fitting in sockets O O in the side beams $a^{\times}$ of the frame, such extensions being held in such sockets for vertical movement therein by means of adjusting screws *o o*, which pass through apertures in the upper part of the beams $a^{\times}$, the heads of such screws serving to limit the downward movement of the extensions.

To hold the stave down in tight frictional contact with the carrier C, some of the rolls N are held down by means of yoke arms P arranged to bear against the heads of the screws *o o*, and such yoke arms have their outer ends guided in slotted standards Q Q, the rear ends thereof being formed into a single member R upon which is secured a weight Z.

The trimmed stave as it is carried along engages a pair of arms A^5, which I term the "spreader arms" as they serve to spread the cutters apart to their proper positions respectively to the width of the stave to be beveled and bilged. These arms, which are most clearly shown in Figs. 1 and 2 are formed of members A^6 which are pivotally connected with the cutter heads at a^6, their rear ends being fitted in blocks a^7 held to slide on a transverse rod a^8, the ends of which fit in blocks a^9 longitudinally adjustable on guides a^{11} fitted upon the under side of the side beams $a^{\times}$. These arms A^5 are projected to a point in advance of the cutters B^5 and are bent inward toward each other to a point nearly in line with the cutter blades b^5 and are then flared outward and forward with flattened enlarged heads A^8 which are normally arranged in the path of the moving billet.

By connecting the spreader arms to the cutter heads as shown most clearly in Fig. 1, the relation of the heads A^8 and the cutters is such that as the arms A^5 are spread apart the distance of the heads A^8 will be slightly greater than the distance between the cutters; this provides for the cutters beginning to cut on the end of the stave at a point inside of the outer edges, so as to get the proper bilge cut.

It should be here stated that the bilge forming devices presently specifically referred to, are adapted to be set to different adjustments, whereby they can be set to form bilges of different curvatures. It will also be understood that the greater the bilge, the farther inward from the outer edges of the stave, must the cutters begin to make the bilge cut. For this purpose I have connected the ends of the spreader arms in the manner before described. Thus by moving the blocks a^7 toward the cutters, to change the fulcrum of such arms, the proportional increase of the sweep of the front ends of the spreader arms, over that of the outward movement of the cutters will be increased, thereby setting the cutters to begin their cut nearer the center of the end of the stave, and by adjusting the said blocks a^7 outward to increase the distance between the fulcrum of the arms A^5 and their connection with the cutter heads, the proportionate increase of the sweep of the ends of the said arms and the lateral movement of the cutters will be decreased, thereby causing the cutters to engage the stave at a point nearer its outer edges, as clearly shown in the diagrammatic view Fig. 9.

The cutter head or supporting frames, are most clearly illustrated in Fig. 3 of the drawings, and consist of yoke shaped frames C^5 formed with downwardly and inwardly projecting curved arms C^6, which are pivoted at the lower end upon a central longitudinal shaft C^7, mounted on the middle leg a^2 and a cross bar C^8, and such frames are normally forced inward by means of springs C^9 interposed between them and the side beams a^{10}, of the main frame, such inward movement being however limited by the stop set screws C^{10}, on the upper extension C^{11} of the yoke frames which are adapted to engage the upper side beams $a^{\times}$ of the frame.

The cutter shafts $C^{\times}$ are mounted in the yoke frames and are provided with drive pulleys c^7 which receive motion from the belts which connect them with the trimmer saw shaft as shown.

In brackets a^{12} projected outwardly from the side beams a^{10} of the main frame, are mounted the bilge forming devices, which consist of the tubular head blocks D^5 D^5, fulcrumed near the upper ends between the brackets a^{12} in which are held to slide plunger rods D^6 to which are centrally pivoted the lower ends of connecting rods d^5, the upper ends of which are pivotally connected to studs d^6 on the outer ends of the yoke bearings, the said lower ends passing through elongated slots d^7 in the upper face of the

tubular head blocks as shown most clearly in Figs. 1 and 5. At their upper edges the tubular head blocks have ears d^8 to which are pivotally connected by approximately universal joint couplings E^5, the lower ends of pitman rods F^5, the upper ends of which are adjustably fitted in similar coupling blocks E^6, adjustably held on slotted crank arms g^5 g^5, projected from a transverse shaft G^5 journaled upon the side bars $a^\times$ of the main frame. The shaft G^5 is also formed with a slotted crank arm g^6—to which is adjustably pivoted a jointed bearing block h^5 to which is connected one end of a pitman rod H^5, the opposite end of which is connected with a block j^5 pivotally connected to a crank arm J^5 on the outer end of a transverse shaft K^5 mounted upon the upper beams $a^\times$ at the rear end of the machine.

Fixedly mounted upon the shaft K^5 is a gear wheel L^5 which meshes with an idler M^5 mounted in a swinging bearing M^6 supported on the shaft K^5, and which normally is adjacent to but out of contact with a gear N^5 mounted upon a transverse shaft n^5, the outer end of which has a sprocket wheel O^5, which is driven by the chain belt P^5 which passes over a sprocket wheel I^5 on the drive shaft M of the endless carrier drive wheel L′.

R^5 indicates a cross head, disposed above and at a point in front of the cutters, centrally of which is hung a lifting arm S^5, the lower end of which projects down in the path of the moving stave, the rear end of such arm S^5 having an apertured ear in which is pivotally connected the forward end of the pitman rod T^5, the rear end of which projects through an apertured block U^5 which is pivotally connected to the swinging frame M^6. It will be noticed by reference to Fig. 10, that the rod T^5 has a fixed collar t^5 in advance of the block U^5, and about such rod between such collar and the block U^5 is disposed a spiral spring V^5, while upon the opposite end of the block U^5 the rod T^5 has an adjustable collar t^7.

The manner in which the bilge forming devices are operated is as follows. So soon as the trimmed billet passes forward and engages the spreader arms, the cutter frames and cutters will be rocked outward, and such movement of the cutter frames will through the pivoted rods (d^5) move the plunger rods D^6 in the tubular head blocks D^5 out to a degree proportionate to the outward movement of the cutter frames. Immediately after the billet sets the spreader arms and before it reaches the cutters it engages the lifting arm S^5 and swings it rearward, which movement through the rod T^5 swings the frame M^6 so the gear M^5 will be brought into mesh with the gear N^5, from which it then receives motion, which is then imparted to the gear L^5 and the shaft K^5 revolved thereby. In practice the several gear wheels are of such a size that one revolution is imparted to the shaft K^5 during the time it takes the stave to pass between the cutters, and to bring such shaft to a complete and accurate revolution even in case such a stave be of a fraction less, or more, in length, such shaft has a collar K^6 formed with a flat face K^7 upon which a flat spring K^8 normally bears and which will act to always bring the shaft to its proper normal position (see Fig. 2). It will be readily seen by referring to the aforesaid Fig. 2, that as a rotary motion is imparted to the shaft K^5 a reciprocating or rocking motion will be immediately imparted to the shaft G^5, and as the parts are arranged to travel in the direction indicated by the several arrows in Fig. 2 the shaft G^5 as it is rocked will serve by its first movement to elevate the rods F^5 and thereby cause the head blocks to be rocked upon their pivots, their front ends being as it were gradually elevated and the rear ends depressed, such movements through the rods (d^5) serving to gradually pull the cutter frames outward, until the center of the billet, shall have passed between cutters. At this time the shaft K^5 will have made one half of a revolution and the shaft G^5 reciprocated in a forward direction; a further movement of such shaft K^5 then imparts a rearward reciprocation to the shaft G^5 which in turn through its end crank arms, causes the rods F^5 to move downward and depress the inner ends of the head blocks and consequently elevate their outer ends which in turn then swings the cutter frames gradually inward to their place of beginning.

As a simple means for holding the plunger rods D^6 to their adjusted positions so soon as the billet sets the spreader arms, I provide cams W^5 which are pivoted to ears on the under face of the tubular head blocks, and such cams have their bearing faces projected up through slots in the head blocks as clearly shown in Fig. 6. Normally such cams are held so as to allow for a free movement of the plunger rods, such position being maintained by means of adjusting screws a^{13} on the side beams a^{10} against which inwardly projecting arms w^5 on such cams W^5 are held to rest, springs w^6 secured thereto and to the lower beams of the main frame being provided to hold these clamps against the screw stops; although they may be held thereagainst by gravity. It will be readily understood from Fig. 2, that so soon as the plunger rods have been set, and the front end of the head blocks are elevated, the springs will draw against the cams and cause them to bite against the plunger rods and hold them to their adjusted positions.

By constructing the head blocks, pivotally supporting them, and arranging the plunger rods in the manner shown and described, it will at once be apparent, that as such plunger rods are set by the different width staves, so its pivotal axis will be moved to or from the head block axis, a greater or less bilge movement will be imparted to the cutter frames, such movement being governed entirely by the set of the plunger rods.

By connecting the lifting rods F^5 to the slotted cranks g^5, as shown, such connections can be quickly adjusted toward or from the shaft G^5, and thereby increase or diminish the lifting of such arms, which adjustment provides for differential rocking motions to the head blocks, such adjustment thereby providing a simple and effective means for setting the entire bilge forming devices to form bilges of different curvatures.

As it is necessary that the shaft K^5 remain geared with the shaft n^5 during the entire operation of cutting the stave, I form the rods T^5 at a point below its connection with a rearwardly extending arm T^6 which projects to a point in line with the rear edge of the cutters. It will thus be seen that after the rear end of the billet passes the lifter S^5 it will engage the arm T^6 and hold the rod T^5 up, but so soon as the billet passes the arm T^6 the lifter S^5 will be forced down by the spring S^6, to its lowermost position, thereby pulling the idler M^5 out of contact with the gear N^5.

As some of the billets are thicker than others, and too great a lifting pressure is imparted to the arm S^5 and the rod T^5 such arm after the gears M^5 and N^5 have been moved into mesh will have a limited movement in the block U^5 see Fig. 10.

A^3 indicates a drive shaft journaled on the main frame upon the upper end of which is a worm A^4 which meshes with a worm wheel $l^\times$ on the shaft, see Fig. 2. I would state that in practice I prefer to arrange such shaft A^3 for frictional contact with a frictional pulley on the main drive shaft B^4 as shown in Fig. 11 and while I have not so shown it, it is manifest, suitably arranged shifting levers can be connected therewith for shifting them into or out of contact.

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

1. In a stave trimming and jointing machine, the combination with the main frame and the transverse yoke $j^\times$ formed with bearings j at its outer ends, and the boxes and bearings $j' j^2$ supported on the side beams $a^\times$ of the main frame, of the hollow shafts J' mounted in the bearings $j\, j^2$, the shafts J longitudinally movable in and held to turn with the hollow shafts J', the saws I mounted on the inner ends of the shafts J, lever mechanism for simultaneously adjusting the saw shafts J inward or outward and means for rotating the shafts J' all substantially as shown and for the purpose described.

2. In a stave jointing machine, in combination the endless carrier, the cutter frames and cutters, held to be rocked laterally to such carrier, bilge forming devices connected therewith, spreader arms connected with the cutter frames, projected in advance thereof to be engaged by the passing stave, such arms having adjustable fulcrums on the main frame at the rear of the cutter frames, all arranged substantially as shown whereby the front contact faces of the arms can be adjusted to set the cutters to cut a greater or less bilge, by adjusting the fulcrums of such arms to or from the cutters as and for the purpose described.

3. In a stave jointing machine the combination with the main frame, the endless carrier and the laterally swinging cutter frames, of the spreader arms A^5, pivotally connected near their front ends to the cutter frames, such front ends having contact faces adapted to be engaged by the passing stave, the longitudinally arranged guide rods a^{11} on the main frame the transverse rod a^8 adjustably held thereon, and the slide blocks a^7 longitudinally adjustable on the rear ends of the arms A^5 and transversely adjustable on the rod a^8, all substantially as and for the purpose described.

4. In a stave jointing machine, the combination with the main frame, the swinging cutter frames and cutters and the endless carrier passing between such cutter frames, bilge forming devices, including rocker head blocks and plungers operating therein, link arms, on the cutter frames pivotally connected with the plunger rods, intermittently operated gear devices, including reciprocating arms connected to the swinging head blocks, and lock cams for holding the plungers to their adjusted position all arranged to be automatically and successively operated by the moving stave, and whereby the movement of the cutter frames will set the plungers to determine the bilge movement of such cutter frames whereby such movement is rendered continuous during the passage of the stave between the cutters as set forth.

5. In a stave jointing machine, the combination with the swinging cutter frames, the rotary cutters mounted therein and mechanism for carrying the billet between such cutters, of bilge formers arranged to be set to their initial position by the lateral or swinging movement of the cutter frames, devices for holding such formers to their adjusted position, and intermittent gear mechanism arranged to be set in operation by the passing stave and adapted to impart a reciprocating motion to the formers whereby to move the cutter frames on a proper bilge curve as and for the purpose described.

6. In a stave jointing machine of the class described, the combination with the swinging cutter frames and the rotary cutters mounted therein, of a bilge forming device, comprising tubular rocker frames pivoted on the main frame, plunger rods movable therein, link arms pivotally connected to such rods and to the swinging cutter, frames whereby to move such plungers, as the cutter frames are swung on their pivotal axis, means for holding the tubular frames to their normal position, and locking devices, adapted to lock the plunger rods from movement when the tubular frames are rocked substantially as and for the purpose described.

7. In a stave jointing machine of the class described, the combination with the laterally swinging cutter frames and the revolving cutters mounted therein, of the tubular head blocks D^5, slotted on their upper and lower faces, the plunger rods D^6, operating therein the link arms d^5 pivotally connecting the plungers and the swinging cutter frames, the cams W pivoted on the head blocks D^5, adapted to be out of contact with the plungers when the head blocks are in their normal positions, and to engage the said plungers when such blocks are swung on their pivots, and means for rocking such head blocks, all substantially as and for the purpose described.

8. In a stave jointing machine of the class described the combination with the laterally swinging cutter frames and the revolving cutters mounted therein, the swinging tubular head blocks pivoted to the sides of the main frame, the plunger rods longitudinally movable thereon, the pivoted link connections d^5 and the cam devices W^5 for engaging the plunger rods, of the drive shaft M, the shaft n^5 geared therewith, provided with a gear N^5, the rotary shaft K^5 a swinging gear connection M^6 mounted thereon, the rock shaft G^5 connected with the shaft K^5 and operated thereby, the crank arms g^5, on said shaft G^5 the rods F^5 connecting such crank arms and the head blocks, and mechanism connected to the swinging gear connection M^5 adapted to be engaged by the passing stave whereby to gear the shafts K^5 and n^5 together during the operation of cutting all substantially as and for the purpose described.

9. In a stave jointing machine of the class described the combination with the main frame A, the drive wheels L L′ the endless carrier, mounted thereon, the laterally swinging cutter carrying frames, the bilge former head blocks pivotally mounted for a rocking movement on the main frame connected with the cutter frames, the shafts G^5, formed with slotted crank arms g^5 g^5, the rods F^5 adjustably secured at their upper ends in said slotted cranks g^5, their lower ends pivotally connected with the rocking head blocks and mechanism for imparting a rocking motion to the shaft G^5 during the operation of forming the bilge cut on the billet all substantially as and for the purpose described.

10. In a stave jointing machine substantially as described, the combination with the cutter, and the bilge forming mechanism, including the head blocks adapted to be set to their initial point of operation by the passing billet, and the shaft n^5 geared with one of the drive shafts of the machine, of the shaft K^5 provided with a gear k^5, the swinging frame M^5 held on the shaft K^5, carrying an idler m^5, the lifting arm S^5 hung in the path of the moving billet in advance of the cutters the rod T^5 connecting the frame M^6 and the arm S^5 and formed with a rearward extension t^5, and connections between the shaft K^5 and the head blocks for imparting a rocking motion thereto all as and for the purpose described.

11. In a stave jointing machine substantially as described the combination with the shaft K^5, the drive shaft n^5, the swinging gear carrying frame M^6 and the pivotal lifter arm S^5 of the rod T^5 pivotally connected with the arm S^5 at its front end, a block U^5 pivotally connected to the swinging frame M^6, such rod T^5 having a yielding connection in the block U^5 at its rear end as and for the purpose described.

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