

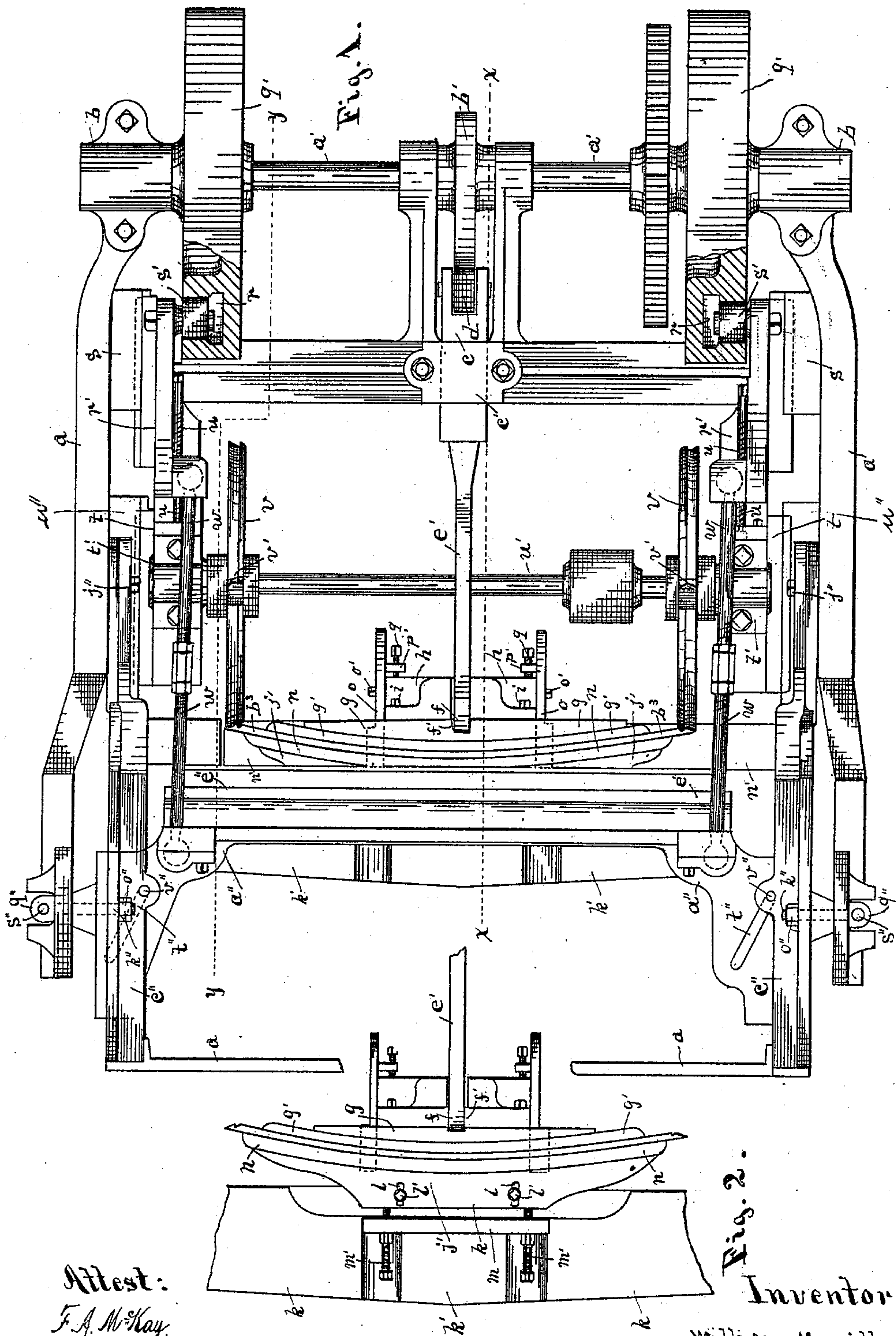
(No Model.)

3 Sheets—Sheet 1.

W. MERRILL.  
STAVE FINISHING MACHINE.

No. 496,271.

Patented Apr. 25, 1893.



Attest:  
F. A. McKay.  
G. P. Thomas

Inventor:  
William Merrill.  
By Jas E. Thomas  
Atty.

(No Model.)

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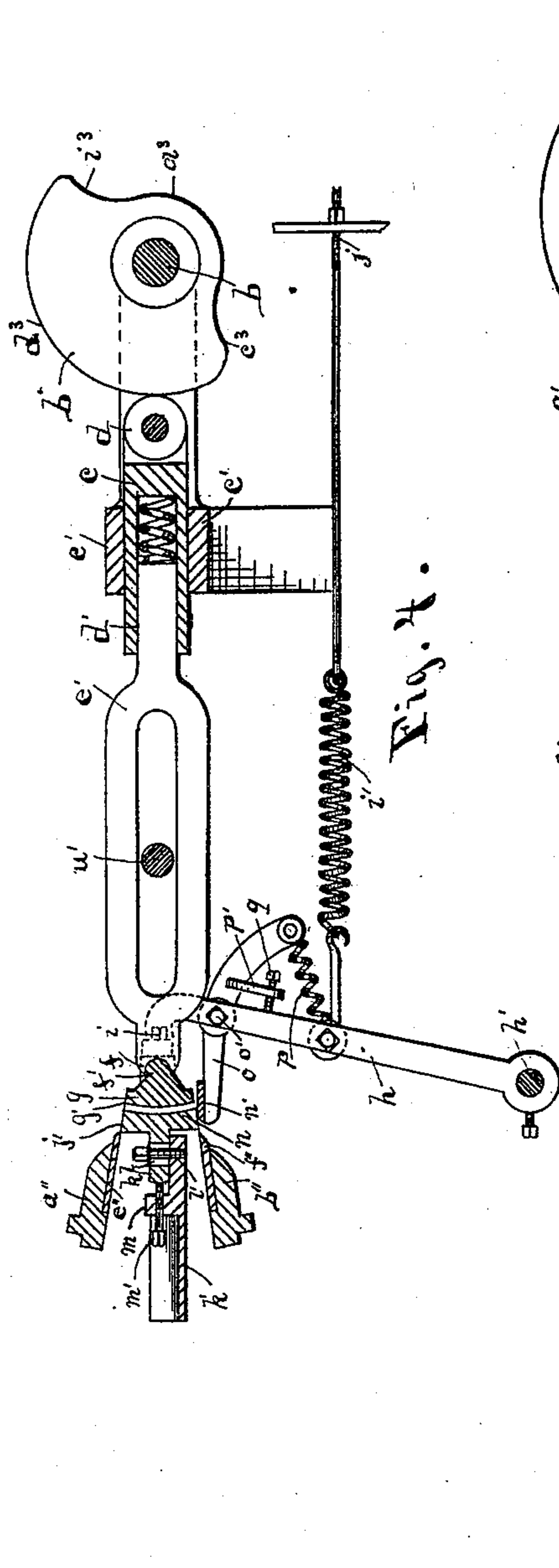


Fig. 4.

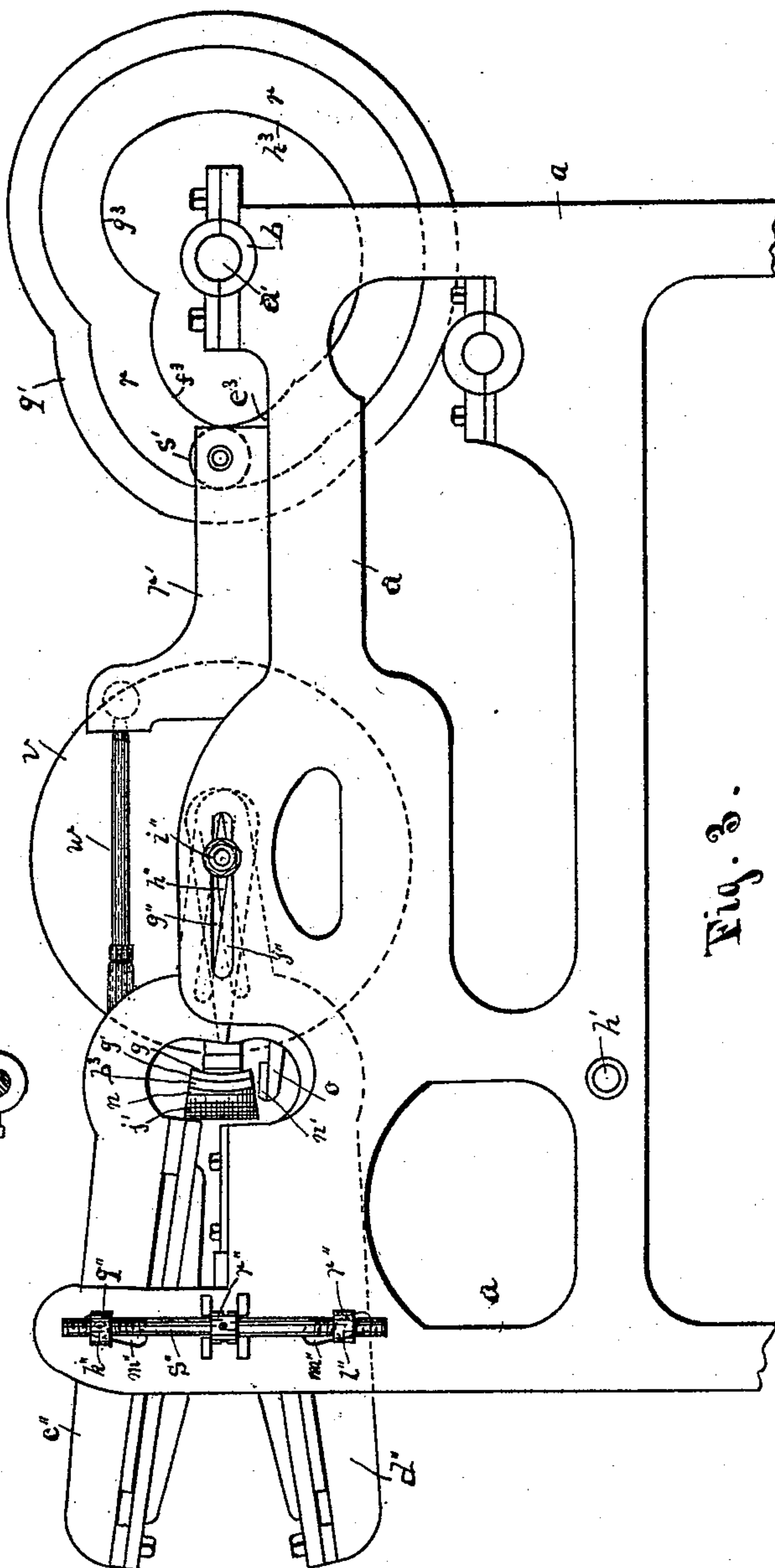


Fig. 3.

Attest :

F. A. McHay,  
G. P. Thomas

Inventor :

William Merrill.  
By Jas. C. Thomas,  
Att'y.

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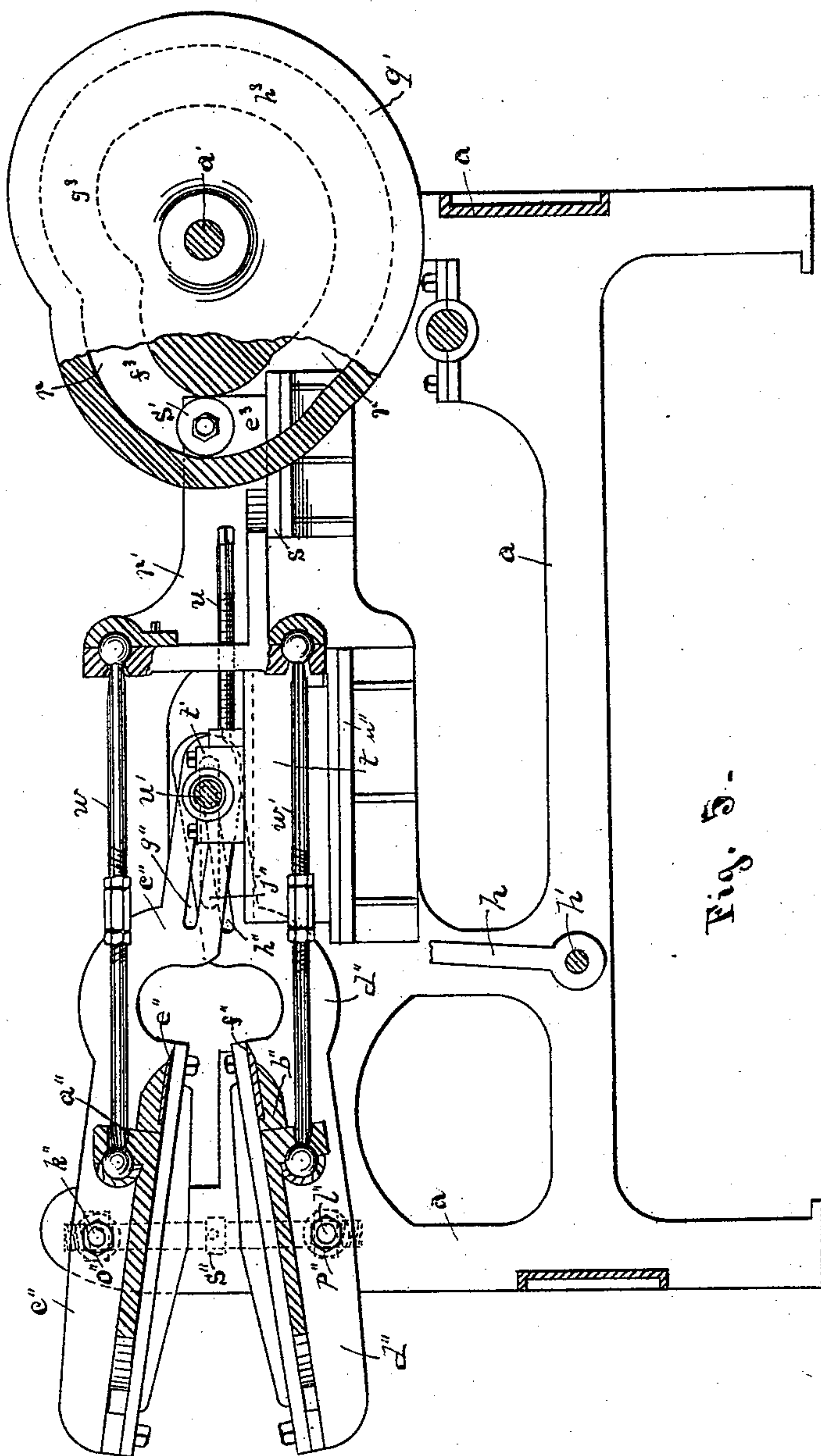


Fig. 5.

Attest:

F. A. McKay  
G. P. Thomas

Inventor:

William Merrill.  
By Jas. E. Thomas  
Atty.



# UNITED STATES PATENT OFFICE.

WILLIAM MERRILL, OF EAST SAGINAW, MICHIGAN.

## STAVE-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 496,271, dated April 25, 1893.

Application filed November 18, 1889. Serial No. 330,655. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM MERRILL, a citizen of the United States, residing at East Saginaw, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Stave-Finishing Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to machines for finishing staves, and pertains especially to machines for carrying out a process or method of finishing each stave of a barrel separately, and so that the several staves of a barrel will be of a uniform dimension and contour, whereby a specified number of staves will be required to form a barrel, and the barrels will be of a uniform shape and dimension.

The first part of my invention pertains to devices for clamping and retaining the staves stationary to the form which they will assume when placed in a barrel while they are finished by crozing and chamfering the ends, and properly jointing the edges thereof.

The second part of the invention relates to devices for performing the crozing and chamfering portion of the finishing operation while the stave is held stationary by the clamping devices.

The third part of the invention relates to the devices for performing the jointing portion of the stave finishing operation while the stave is still retained stationary by the clamping devices.

The invention consists in the combination, arrangement, construction and operation of the several parts and elements which are assembled together to complete the machine and which I will here-in-after definitely explain and which will be specifically pointed out in the claims.

The objects of this invention are first to provide devices whereby staves may be automatically finished to a uniform shape and dimension, whereby a designated number of the staves will form a barrel of a stated size, and

the barrels will be of a uniform dimension and contour.

Another object is to arrange and construct a machine for finishing staves to a uniform size and contour, whereby the operations of crozing, and chamfering the ends, and jointing the edges to a proper form may be quickly and easily performed in conjunction and by one operator.

Another object of the invention is to provide a machine for finishing staves in proper form for a barrel by crozing and chamfering the ends and jointing the edges to bring the staves to a uniform dimension and contour so that the staves will be adapted for use in a machine for automatically assembling the staves and completing the barrel with heads and hoops, &c.

In the accompanying drawings, are shown the devices with which I attain these objects.

Figure 1, therein is a plan view of a stave jointing machine embodying my invention, and Fig. 2, is a view of the clamping device, detached. Fig. 3, is a side view, in elevation, of Fig. 1. Fig. 4, is a vertical longitudinal section of Fig. 1, taken at  $x-x$ . Fig. 5, is a vertical longitudinal section taken at  $y-y$ , in Fig. 1.

$a$  is the frame of the machine and  $a'$  is a shaft journaled in boxes  $b$ , on the frame and is provided with a suitable means, as a gear wheel, whereby, a rotary motion is imparted thereto.

Upon the central portion of the shaft  $a'$ , is mounted a cam wheel  $b'$ , and  $c$  is a rod or plunger, supported centrally on the machine frame by a box  $c'$ , and is provided on its rear end with a roller  $d$ , bearing against the face of the cam  $b'$ , while its opposite end is provided with a longitudinal opening  $d'$ , carrying on its inner portion a heavy coiled spring  $e$ , and  $e'$  is an extension of the plunger  $c$ , with its rear end within the opening  $d'$ , and against the spring  $e$ , while its outer end is arranged with a bearing  $f$ , fitted to rest against the projection  $f'$ , of the movable clamp jaw  $g$ . This jaw  $g$ , is placed across the machine frame and is provided on its front side with a form  $g'$ , which is secured thereto in any convenient manner and is arranged to conform both longitudinally and transversely to the form which



the inner side of a barrel or keg stave would have when placed in position in the barrel; and the jaw *g*, is supported by the vertical piece *h*, which is pivotally secured to the frame by the transverse shaft *h'*, while the upper or opposite end thereof is bolted at *i*, to the rear side of the jaw.

*i'*, is a coiled spring with one end secured to the central portion of the piece *h*, and with its opposite end secured to the rear portion of the frame, at *j*, and is arranged to draw backwardly on the piece *h*, and jaw *g*, and to hold the roller *d*, in contact with the cam.

*j'*, is a stationary or opposing jaw having the forwardly projecting portion *k*, resting upon the plate *k'*, which is placed across the machine and is secured by its opposite ends to the sides of the frame. This portion *k*, is provided with the transverse slots *l*, and *l'*, are bolts passed through the slots and into the plate *k'*, to allow an adjustment of the jaw to be made, and *m*, is a rib projecting upwardly from the surface of the plate *k'*, and *m'*, are adjusting screws passed through the rib and with their inner ends projecting against the outer edge of the projecting portion *k*, whereby a proper adjustment of the jaw can be made in relation to the jaw *g*.

The inner side or face of the jaw *j'*, is provided with a form *n*, secured thereto in any convenient manner, and the face of the form is arranged to conform to the transverse and longitudinal curvature of the outer side of a barrel stave when placed in position in the barrel.

*n'*, is a bed piece placed across the machine beneath the jaws *g*, and *j'*, and is supported by the outer ends of the arms *o*, which are pivoted to the opposite lateral edges of the piece *h*, at *o'*, and *p*, are springs with one end secured to the opposite or inner ends of the arms *o*, and with their opposite ends secured to the piece *h*, and operating to raise the bed piece *n'*, to a proper position beneath the jaws, but to allow it to recede slightly if required for the purpose which I shall presently explain.

*p'*, are lugs projecting from the inner sides of the arms *o*, and through these lugs are passed the adjusting screws *q*, with their inner ends bearing against the side of the piece *h*, and operate to regulate the position of the bed piece in relation to the jaws.

Upon the shaft *a'*, and in proximity to the boxes *b*, are mounted the cam wheels *q'*, provided on their outer side faces with the cam grooves *r*; and *r'* are sliding heads suitably supported in slides *s*, secured to the frame and are provided on their rear portions with a roller *s'*, projecting into the cam grooves *r*, while *t* is a portion of the head projecting forwardly and resting upon the slides *u*<sup>2</sup>, and upon the upper side of this portion *t*, are adjustably secured the boxes *t'*; and *u* are adjusting screws passing through threaded openings in the heads *r'*, and are arranged with their ends secured to the ends of the boxes *t'*,

for adjusting the position thereof, upon the portion *t*.

*u'* is a shaft journaled in the boxes *t'*, and provided with a suitable pulley for imparting rotary motion thereto, and *v* are disks mounted upon the shaft near the ends thereof and are of a diameter nearly coincident with the diameter of the head of the barrel to be made, and are provided on their peripheries with suitable cutters *v'*, having edges arranged to form the necessary croze and chamfer on the ends of the stave, the disks being located on the shaft in accordance with the length of the stave.

To the upper and lower portions of the heads *r'*, are secured, by suitable variable joint connections, one end of the connecting rods *w*, and *w'*, and the opposite ends of these rods extending beyond the clamping jaws are secured by variable connections to the knife heads *a''*, and *b''*. These knife heads extend across the machine and are supported by their ends resting in the upper inclined slides *c''*, and the lower inclined slides *d''*, while to the front portion of the heads and projecting forwardly therefrom are secured the jointing knives *e''*, and *f''*. These inclined slides *c''*, and *d''*, are arranged in relation to each other to conform to the radial lines of the barrel to be made, and extend rearwardly beyond the shaft *u'*, and are provided on their rear end portions with the slots *g''*, and *h''*, and *i''*, are bolts passed through the slots *g''*, and *h''*, and also through a horizontal slot *j''*, formed in the sides of the machine frame, the several slots allowing the bolt *i''*, to be properly adjusted to coincide with the center of the barrel to be made, while the outer ends of the slides are held in position by the bolts *k''*, and *l''*, passed through slots *m''*, and *n''*, in the frame *a*, and through the slides, and with the nuts *o''*, and *p''*, on their inner ends, while the outer ends of these bolts are provided with head portions *q''*, and *r''*, provided with vertical screw threaded openings through which are passed the right and left threaded end portions of the adjusting rod *s''*, which, when the nuts on the inner sides of the slides are loosened, allows an adjustment of the slide to be made to or from each other to regulate the width of the stave to be cut.

The knife heads *a''*, and *b''*, are provided in the portions resting in the slides *c''*, and *d''*, with slots *t''*, inclined in the same direction, and *v''*, are bolts or pins passed vertically through the upper and lower portions of the slides and through the inclined slots, so that as the knife heads are reciprocated they will be guided by the slots and pins in a diagonal direction so as to operate in the wood with a sliding or shearing cut.

In operating the machine, suitable rotary motion is imparted to the shaft *u'*, and the disks carrying the cutters, also to the shaft *a'*, carrying the cam wheels. As the cam *b'*, is revolved with the roller *d*, resting against the lower portion *a*<sup>3</sup>, of its periphery, the



clamp jaw  $g$ , is held by the spring  $p$ , in a position away from the stationary jaw  $j'$ , to permit a stave  $b^3$ , to be placed between the jaws with its lower edge resting upon the bed piece  $n'$ , and as the inclined portion  $c^3$ , of the cam passes over the roller the plunger and clamp are pushed forward, and the stave is bent by the clamp jaws to the form it assumes when placed in a barrel, and is held in this position while the high portion  $d^3$ , is passing the roller. In the meantime the cam grooves  $r$ , are so formed and arranged in relation to the cam  $b'$ , that when the stave is clamped and held in position by the high portion  $d^3$ , the portion  $e^3$ , of the grooves operates upon the rollers  $s'$ , to propel the heads  $r'$ , forward and move the disks  $v$ , and the cutters against the inner or concave side of the stave and shape the ends thereof with the proper croze and chamfer, the knife heads, of course receding as the disks are moved forward, and as the portion  $f^3$ , of the grooves operates upon the rollers, a reverse action on the heads obtains, and the disks are drawn away from the stave while the knives  $e''$ , and  $f''$ , are drawn toward the stave and passing above and below the clamp, slice off and remove the portions of the stave which project beyond their lines of movement, the slots  $t''$ , with the pins  $v''$ , imparting to the knives a movement which provides a shearing cut as the knives pass through the stave, while the bed piece  $n'$  recedes to permit the knife  $f''$  to pass beneath the jaws, the spring  $p$ , being arranged so as to support the bed piece and stave in proper position while the stave is being clamped, and to allow the bed piece to be crowded downwardly by the knife which passes between the bed piece and clamp, or by the portion of the stave which is removed by the knife. The cut upon the stave being made, the rollers  $s'$ , have then reached the outwardly inclined portion  $g^3$ , of the cam grooves, and as this portion passes over the rollers the heads  $r'$ , are moved again in the opposite direction, which recedes the knives from the stave, until the rollers reach the portion  $h^3$ , of the grooves which being of a uniform distance from the shaft allows the heads to remain at rest during its passage over the rollers, and as this portion  $h^3$ , reaches the rollers  $s'$ , the cam  $b'$ , has then revolved till the inclined portion  $i^3$ , has reached the roller  $d$ , and the spring  $p$ , on the further revolution of the cam causes the roller to move to the low portion  $a^3$ , of the cam, and the spring  $v'$  then recedes the clamping jaw  $g$ , which then remains at rest and allows the finished stave to be removed and another placed in position on the bed, while the low portion  $a^3$ , is in contact with the roller  $d$ , and while the uniform portions  $h^3$ , of the grooves, are passing over the rollers  $s'$ .

As the staves operated upon sometimes vary in thickness, the spring  $e$ , is placed in position to compensate for any inequalities

of the staves being clamped, the spring, however, being of sufficient rigidity to properly effect the bending and clamping operation.

It will be seen, of course, that by clamping the stave in the form it will assume when placed in a barrel and then cutting the edges thereof simultaneously in a direction coincident with the radial lines of the barrel to be made, the joints between the staves when set up in a barrel will be uniform and the staves will have a bearing against each other from end to end and from side to side, and with the crozing and chamfering done while the stave is in this position has the same effect as if these operations were performed after the staves were set in a barrel; and the staves being of a uniform size and contour, the staves finished by this machine are especially fitted for use in a machine which assembles the staves into a barrel, and completes the barrel by placing in position thereon, suitable heads and hoops which are of a uniform dimension, and it is evident that while the operation of finishing the staves, requires but little manual labor when performed with the machine, a much better and more perfect barrel is produced when the machine fitted staves are used. It will also be noticed that, while the several parts of the machine are made adjustable by the slots, bolts, and adjusting screws before described, these parts could be omitted and the several adjustable portions permanently fixed and the machine adapted to making staves suitable for one size of barrel or keg only, if desired, the chamfering, crozing and jointing operations being the same. And I wish it understood that I do not confine my invention entirely to the cam  $b'$ , operating directly upon the plunger for performing the clamping operation, as other devices may be interposed between these parts and the effect would be substantially the same, but

What I claim as my invention is—

1. In a machine for finishing staves, the combination of the jaws for clamping and retaining the stave in a fixed position, the rotary cutters located on one side of the said jaws for crozing and chamfering the ends of the stave, the knives located on the opposite side of the said jaws for jointing the edges of the stave, and mechanism for moving the said cutters and knives to and from the said jaws for finishing the stave without moving the blank, substantially as set forth.

2. In a machine for finishing staves, the combination of the clamp for bending and retaining the stave stationary in the form it will assume when in a barrel, and mechanism for operating the clamp, with the revolving cutters for crozing and chamfering the ends of the bent stave, the knives moving on the radial lines of a barrel for simultaneously jointing the opposite edges of the stave while it is held stationary by the clamps, and the devices operating in conjunction with each



other for imparting a reciprocating motion to the cutters and knives in unison, substantially as set forth.

3. In a machine for finishing staves, the combination with the clamping jaws for bending and retaining the stave stationary in the form it will assume when in a barrel, the rotary cutters for crozing and finishing the ends of the stave ready for a barrel, the jointing knives supported in slides for guiding the knives in converging lines on opposite sides of and transversely with the clamping jaws, with the reciprocating heads supporting the said cutters, the rods for connecting the heads with the jointing knives, and devices for imparting a reciprocating motion to the heads whereby the stave is finished complete while held stationary in the jaws, substantially as set forth.

4. In a machine for finishing staves, the combination with the frame and the clamping jaws for bending, shaping and holding the stave, the disks carrying cutters and provided with a rotary motion, of the jointing knives supported in guide ways lying coincident with the radial lines of the barrel and transversely with the jaws, and devices substantially as described for simultaneously imparting a to and fro motion to the knives and rotary cutters, substantially as set forth.

5. In a stave finishing machine, the combination with the frame supporting clamping jaws for bending and holding the stave, of the slides  $c''$ , and  $d''$ , carrying jointing knives, and provided with the slots  $g''$ , and  $h''$ , on their inner end portions and crossing each other, the bolt  $i''$ , passed through the said slots and through the sides of the frame, the bolts  $k''$ , and  $s''$ , passed through the frame

and outer end portions of the slides, and provided with the heads  $q''$ , and  $r''$ , having screw threaded vertical openings, and the adjusting rod  $s''$ , with its threaded end portions passed through the said bolt heads, substantially as set forth.

6. In a machine for finishing staves, the combination with the frame, the knives supported on slides secured to the frame for guiding the knives in convergent lines coinciding with the radial lines of the barrel and devices for imparting a reciprocating motion to the knives, of the stationary clamping jaw supported by the machine frame, a vertical standard pivotally secured by its lower end to the frame and carrying on its upper end a movable jaw opposing the said stationary jaw, a cam wheel and plunger for moving the jaw to clamp the stave and a spring for moving the jaw to release the stave, substantially as set forth.

7. In a stave finishing machine, the combination with the machine frame carrying devices for clamping the stave, the knife heads carrying knives and supported by inclined guides secured to the frame, of the heads  $r'$ , resting in slides upon the frame, the connecting rods secured by one end to upper and lower portions of the heads  $r'$ , and secured by their opposite ends to the upper and lower portions of the said knife heads, and devices for imparting a reciprocating motion to the said heads  $r'$ , substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM MERRILL.

Witnesses:

G. P. THOMAS,

JAS. E. THOMAS.