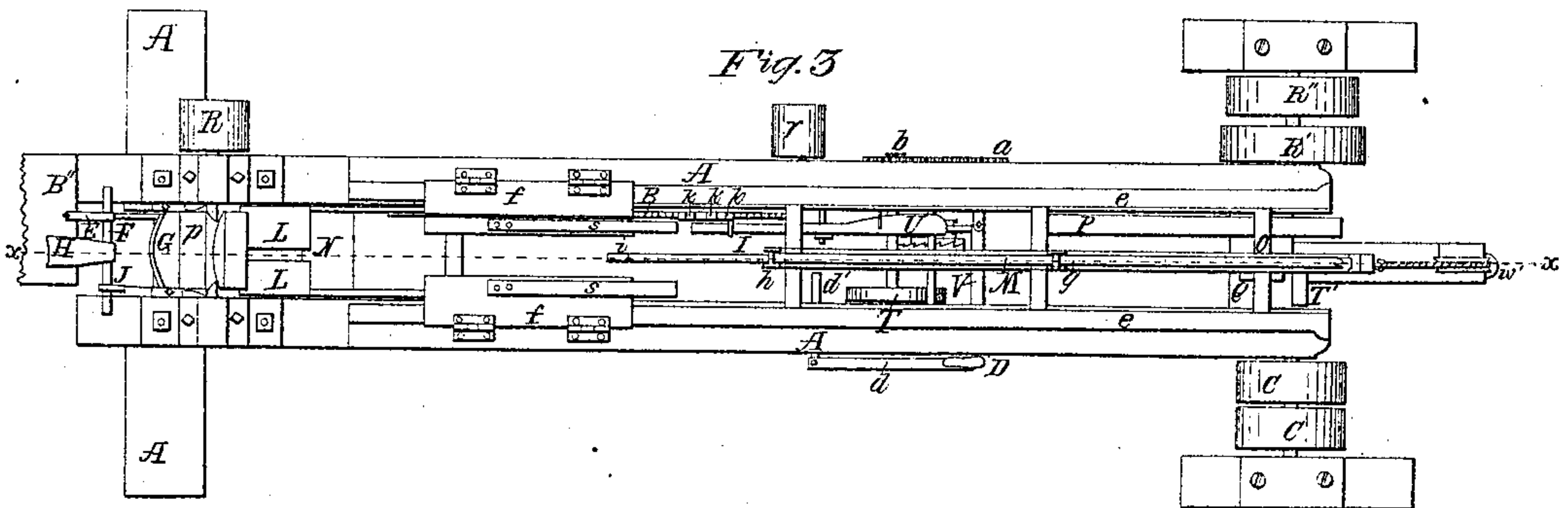
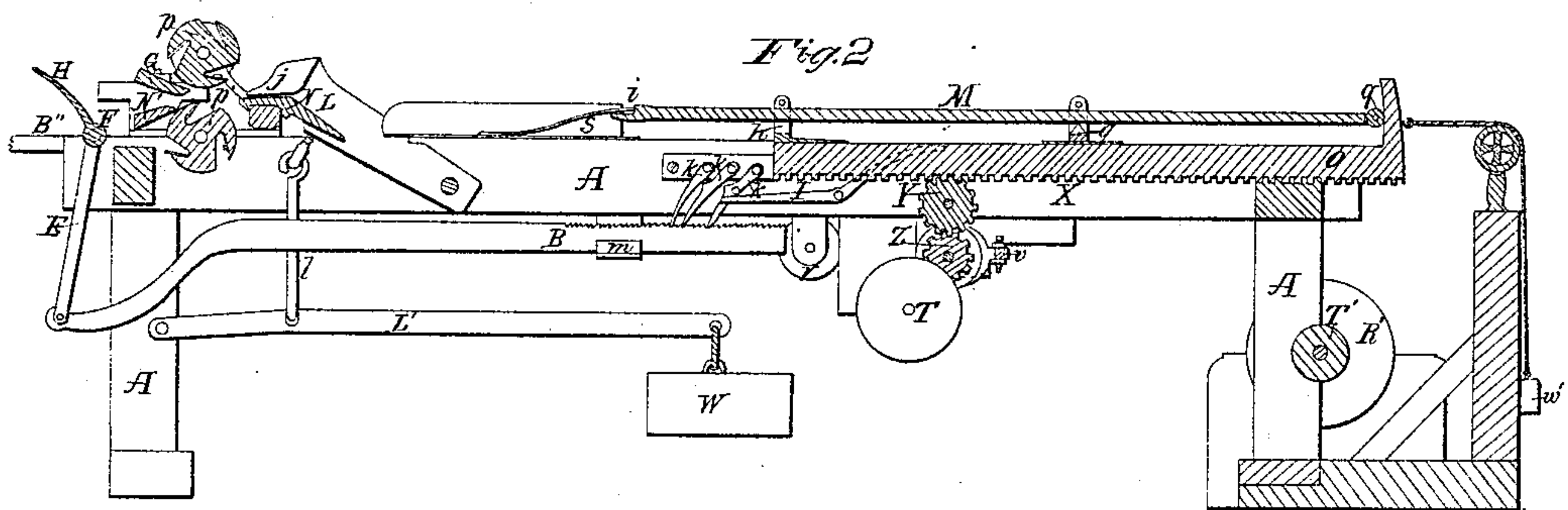
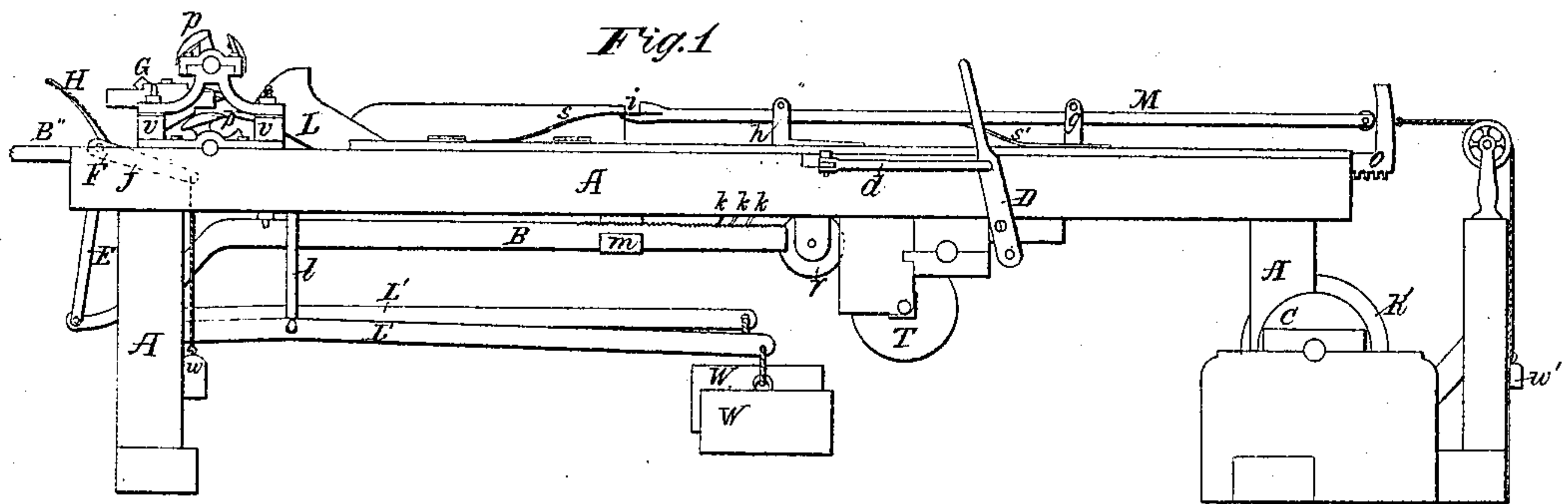


H. Law,

Dressing Stares,

No 6,443,

Patented May 8, 1849.

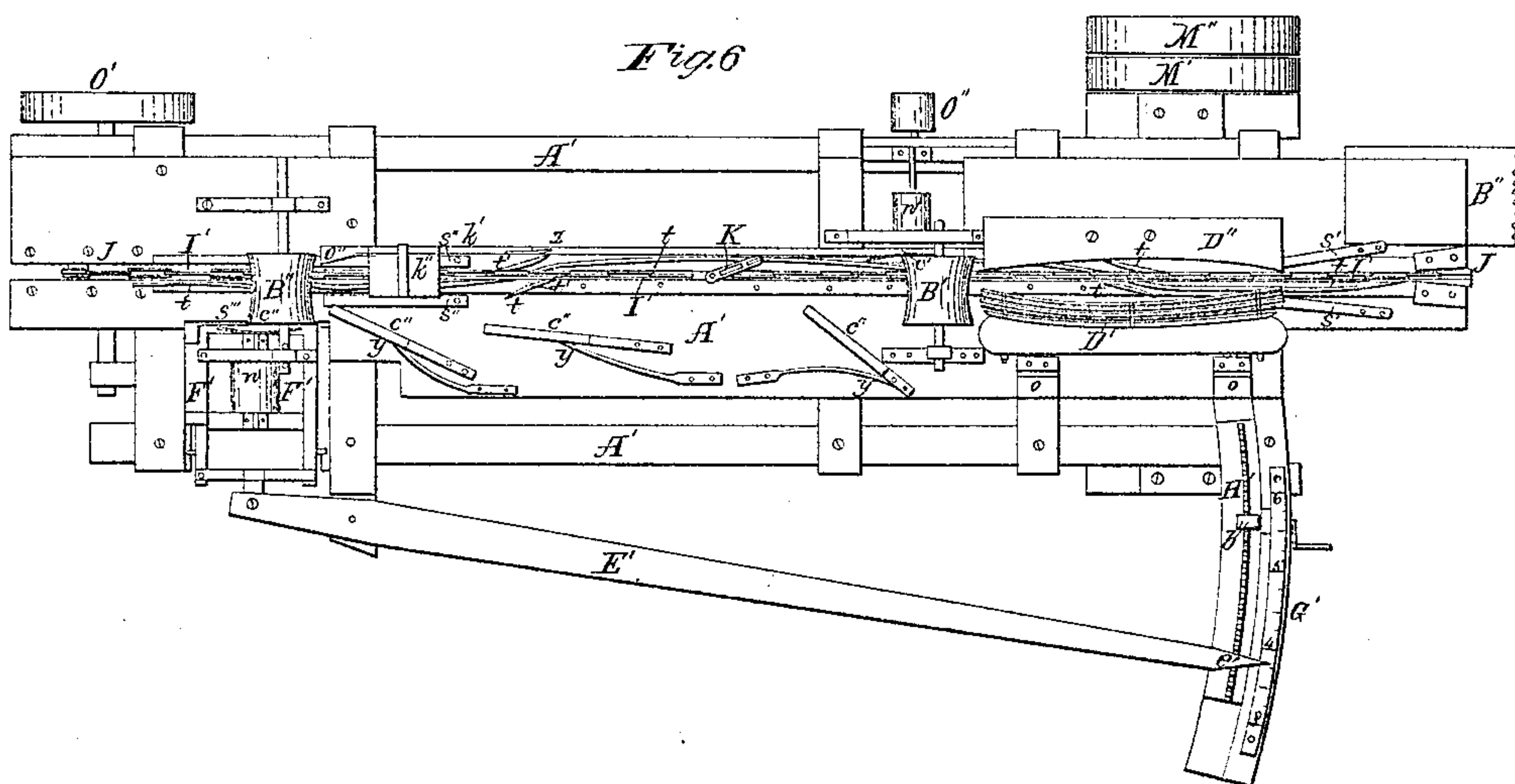
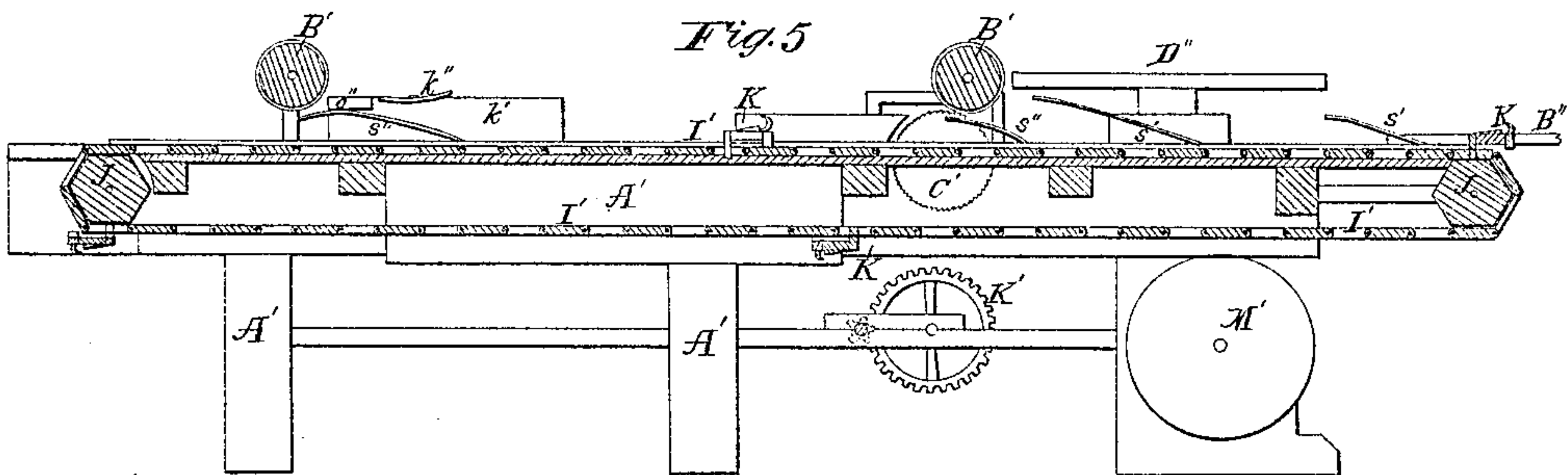
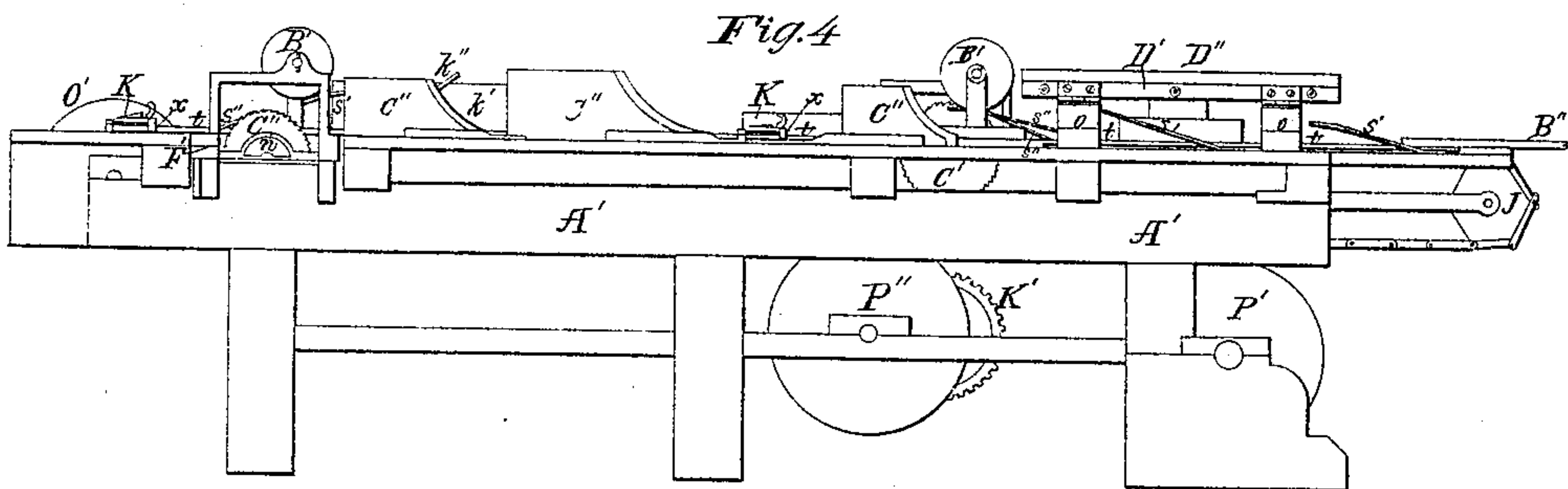


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# UNITED STATES PATENT OFFICE.

HERVEY LAW, OF WILMINGTON, NORTH CAROLINA.

## MACHINERY FOR DRESSING STAVES.

Specification of Letters Patent No. 6,443, dated May 8, 1849.

*To all whom it may concern:*

Be it known that I, HERVEY LAW, of Wilmington, county of New Hanover, and State of North Carolina, have invented a new and useful State Dressing and Jointing Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The purpose of my invention is to produce a machine, which shall dress split staves, whether straight and flat, or crooked and twisted, of equal or unequal thicknesses or widths wholly in conformity with the grain of the timber and to joint bevel and curve their edges, entirely in accordance with the convex and concave faces at every point throughout the length of the staves, so that when set up with the truss hoops, and every part sprung into place perfectly regular staves shall have been produced, and a symmetrical cask thereby formed—the staves being all of uniform thickness and without cross cutting of the grain. To accomplish this purpose the following principles have guided me in the selection and combination of the mechanical arrangements, which constitute my invention.

1. That the concave or inner side of the stave should be dressed by a convex revolving cutter, and the convex or outside by a concave revolving cutter, both arranged and acting so as to meet the advancing timber and the one placed directly opposite to the other, so that the dressing on both sides should take place, at the same time, according to the principle of Bentham the inventor of this species of "rolling cutters."

2. That while being forced between the two rolling cutters the stave should be held fast only at a single point and that as near as possible to the cutters, while at all other parts of its length it is at liberty to take such positions as the form of cross section, the curves, and windings of the timber may require.

3. That the force which urges the stave toward the cutters should leave all parts of the length except that, in the throat near the cutters at liberty to move upward or downward conformably to the windings curvatures and irregularities of thickness.

4. That the stave in quitting the dressing cutters should not be permitted to change the plane of its movement until wholly out of their reach so as to permit the extremity

to be sloped or chamfered off thinner than the rest of the stave, but that the end should be kept of uniform thickness with all the other parts.

5. That in jointing the staves those of unequal widths should be with equal accuracy, beveled and curved to suit both the circular and longitudinal forms of the cask to be produced, so as to avoid the loss of timber which would occur in reducing all staves to a uniform width.

6. That as the dressing must be conformable to the grain of the wood and to the crooks and windings of the bolt to be dressed, so the jointing must, at every point throughout its length conform to the cross section, whatever may be the curves and twists of the dressed stave.

7. That economy of time, and the necessity of having all parts of the machine work simultaneously, require the stave to be jointed on both edges, before quitting the machine, for which purpose, jointing cutters on each side must be employed, and suitable ways provided for causing the stave to pass with due inclination and with a curvilinear motion, by each cutter, and finally to pass out of its reach without changing its direction so as to render the cutting near the end irregular.

8. That as more bevel must be given to a wide stave than to a narrow one, suitable arrangements must be made, for adjusting the position of the staves when passing the cutters to make the bevelings correspondent to the breadths. The manner in which I carry these principles into effect is represented in the accompanying drawings, whereof the different figures represent in elevation section and plan the various parts both for dressing and jointing, together with the manner in which they are connected and made to act together.

Figure 1, shows a side elevation of that part of the machine which performs the operation of dressing; Fig. 2, a vertical longitudinal section through the line *x, x*, (Fig. 3) and Fig. 3, a top view of the same part. Fig. 4 is an elevation, Fig. 5, a section, and Fig. 6 a plan of parts more immediately concerned in the jointing operations, together with the connection between them and the dressing machinery.

In Figs. 1, 2 and 3 and also in Figs. 4, 5 and 6 the same letters refer to corresponding parts in each figure.

A (Figs. 1, 2 and 3) is the frame which supports the fast and loose pulleys C, C,



the driving pulleys T', R, and R'' together with the various parts of the machinery, concerned in the several operations hereinafter described.

5 O is a carriage frame sliding on ways *e e*, moved forward toward the cutter wheels *p, p'*, by the rack X (Fig. 2) and pinion Y, put in action by a train of gearing receiving motion from the pulley T' through the  
10 pulley T, pinion *b*, toothed which *a*, and pinion Z, having a clutch U, by which it is thrown in and out of gear. When thrown out of gear the carriage is drawn back by the weight *w'*, acting over a pulley in the  
15 rear of the carriage. On this carriage frame, the driving bar M is supported on a knife-edge at *g*, near its center, and, by a roller *q* at its posterior extremity, presses against a curved face of an upright part  
20 to the rear of the carriage. This affords it the requisite play to accommodate itself to the curves and twists while the guides *h* keep it in the true vertical plane.

*p* and *p'* are the two cutter wheels set in  
25 motion by a band from the pulley R' and so arranged by aid of the pulley *r* that *p* and *p'* revolve in opposite directions and that the cutters on both meet in their rotation the motion of the advancing stave as it  
30 passes between them. The distance from *p'* to *p* is adjusted to different thicknesses intended for the staves, by means of packings *v v* under the supports of the upper cutter roller *p*.

35 The staves when placed upon the springs *s, s*, at one end and upon the inclined face of the adjustable support N, at the other, is received on the notch *i* at the forward end of the driving bar or follower M, and is forced  
40 forward between the level part of N and the corresponding lower surface *j* of the offset in the pressure-lever L, which is made to hold it firmly down to the bed N, by means of the connecting link *l* the weighted lever  
45 L' and the weight W, (Fig. 2). Having been forced under the offsets of the two pressure levers L, L, one of which presses near one edge, and the other near the other edge of the stave, and thus kept firmly to its bed  
50 N, irrespective of the difference in thickness of the two sides, the stave comes between the cutters P, P, and is dressed on both sides at the same time, its concave side upward. It is then forced through the throat formed by  
55 the two plates G and N', the former of which is curved upward and the latter downward, to permit the stave, if crooked, to take its natural direction after passing the throat.

60 The cutters are in constant revolution but the alternating movements of the carriage O and of the driving bar M are regulated by the attendant pushing forward the clutch-lever D attached to the main frame as seen  
65 in Fig. 1, so as to bring the trigger *d'* to

stand in the position seen in Fig. 3. When the carriage has advanced so far as to bring the stop bar Q on the carriage O, into action with the trigger *d'* the end of the driving bar M will have forced the posterior end of the stave about half way through the space  
70 between N and *j*, where it is left, being supported by the hand H, the throat between G and N' and the two surfaces N and *j*, until the next stave pushes it forward and carries it to the platform B'' where the jointing operations commence as hereinafter described. The hand H is kept fixed in position by the clicks *k, k, k*, so long as the bar P beneath the carriage, is out of contact  
75 with the upper part of the trigger I. This contact takes place while the front end of the stave is advancing from N to H, and the clicks *k, k, p*, are kept out of the ratchet notches on B, until the carriage is again  
80 drawn back so far that P no longer presses down the upper end of the trigger. Then the clicks *k, k, k*, drop into the notches on B as before. The use of this permanency in position of the hand H, is to prevent the  
85 stave being tilted up by its own weight while passing out of the throat formed by G and N' whereby it is prevented from being thinned away near the end. The weight *w* keeps the hand H elevated when not fastened by the clicks, but still leaves it power  
90 to yield to the bendings of the stave. The bar B rests and slides in a catch *m*, which with the arm E constitutes its only support. The hinged planes *f, f*, when turned up allow easy access to the machinery below them. The pulley R'' is fixed on the same axis  
95 with R' and gives motion to the jointing cutters and endless chain Figs. 4, 5, and 6.

The bench B'' receives the stave on leaving H, and the operator, reversing the position of its faces places it on the springs  
100 *s', s'* (Fig. 6,) and gages its breadth between the curved edge of the board D'' and the arcs D' (Fig. 6). This gaging determines the breadth to be given to the finished stave, and enables the operator to set the jointing cutters to the right distance apart. It is effected by observing to which of the parallel arcs D' the stave extends in breadth,  
105 while its opposite edge is placed over the middle of the arc on D''. The arcs D' are half an inch apart, the inner one being 3 inches from D'' and the outer one 6 inches.

A, band from R'', Fig. 3, gives motion to the pulley M', (Fig. 6,) at a rate conformable to that of the dressing cutters; the advantage of which is, that while one stave is being dressed, another is being gaged and a third jointed at the same time.  
110 115 120 125

M'' is a loose pulley on the same shaft with the fast pulley M'. A small pulley on the same shaft with M', gives motion to the pulley P'' on the axis of which is the pinion  
130 *i'* gearing into the toothed wheel K'. On



the axis of this latter wheel is the pulley O'', which drives by means of a belt, the pulley O' setting in motion the hexagonal rollers J, J, and the endless chain I'. At several points along this chain are placed the hinged or swiveled dogs K, K, K, to receive the staves from the hand H after passing the dressing cutters *p* and *p'*, and to convey them to the jointing cutters. On the under-side of each dog, near its posterior part, is a short groove, in a piece projecting downward, adapted to run on the curved ways *t*, *t*, *t*, and the switches *t'*, *t'*, guide it from one part of the curve to another, in crossing the line of the chain I'. This groove or notch is seen at *x* Fig. 4, resting on the ways *t*.

The two pulleys P' (one of which only is seen in Fig. 4, the other being directly in the rear of it, and on the same shaft,) give motion to the two small pulleys *n* and *n'* which give motion to the jointer saws C', C''. The pulley *n* with its saw C'' and the spring *s'''*, together with one end of the axis of the curved pulley B'', is borne on an auxiliary carriage F' traversing transversely to the direction of the frame of the machine. The other end of the axis of the curved roller, passes freely endwise through its support. The curvature on this roller (for which a solid bearing may be substituted at pleasure,) is greater than that on the back of the stave to be jointed. The cutter saw is slightly inclined away from a vertical position so as to lean from the end of the roller. By this arrangement a broad stave, extending from one extremity of the roller to the other, and leaving a vacant space above it between the back of the stave and the center of the curved side of the roller, will receive a bevel amounting to the whole inclination of the saw from a vertical; while a narrow stave, by applying that edge which is remote from the saw to the hollow of the roller, makes more nearly a right angle with the plane of the saw, and consequently is cut with less obliquity or a smaller amount of beveling than the wider stave receives.

E'', is an index-lever connected with the frame F', which is connected with an arc H' having rack teeth moved by the pinion *b'* which moves the point of E' over the graduated arc G' marked into inches and quarters to correspond to the breadth observed by the operator when placing the stave under the arcs D' and D'' as above described. Each division on the arc G' corresponds to one fourth of an inch of movement in the frame F'.

C''', C''', C''', are adjustable guide planes for keeping the stave in contact with the vertical fixed plane *k'* which vertical plane has near its front end next the roller B'', (Fig. 6,) an oblique projection or guide *o''*, fixed above the spring *s''*. The extent to which this projection reaches horizontally

measures the longitudinal beveling or curvature of the edge. When the end of the stave first comes to the roller B'', its edge presses against *o''*, but when it begins to pass under B'', and to depress *s''*, it passes also under *o''* and at the bulge or center of the stave, its edge presses against *k'* beneath *o''*, on the spring *s''*, Fig. 5. The purpose of *o''* is to press the end of the stave toward the arm C'' but to allow its middle to be sawed wider than the end which is accomplished by passing through the wider throat, under the projection *o''*. *k''* is a plane of metal with edge turned up in order to guide the advancing stave into the throat between the roller B'' and the springs *s''* and *s'''*.

All the parts coöperating as above described and represented, perform the complete jointing of a stave on both sides before quitting the machine, giving it in every part curvatures and bevels along the edges, whether originally straight, crooked or winding, which enable the cooper by means of the truss hoops to bring it at once into conformity with every other stave in the cask which he is to construct.

While the operation of bevel-jointing is performed, the stave moves forward with its convex side, (or that which is to be outward in forming the cask), upward; hence the jointer saws C', C'', Fig. 6, are inclined from the vertical position so as to produce the beveling on the two opposite sides. The two rollers B' and B'' are turned with a curvature toward the center in order to conform in part to the convexity of the stave. But the convexity of the stave is rather less than the concavity in the rollers so that when a wide stave or the wide part of the stave is passing under the rollers a greater hollow space will be left between the upper surface of the stave and the under surface of the roller than when a narrow stave or the narrow ends of a stave are passing; this will cause the amount of beveling on a narrow stave to be less than on a broad one and on the narrow parts of every stave to be less than on the broad part of same stave. The purpose of gaging the stave before jointing is to be able to adjust the position of the sliding frame F', which carries the pulley *n* and the saw C'', as also the movable roller B'' which has one end of its axis supported by the frame F'. This adjustment is effected by the lever E', put in motion by the crank and pinion *b'* moving the toothed arc H' and carrying the point *e'* along the graduated arc G', till it comes over the figure which marks the number of inches observed in the breadth of the stave bolt between the parallel arcs D' and the stationary arc D'', as already herein described.

When the stave is passing through the throat formed by the roller B'' and the



springs  $s''$ ,  $s''$ , these parts constitute a bearing opposite to the saw  $C''$  such as to allow a stave however crooked or winding to be held firmly at the point where the saw  $C''$  is acting without requiring other points of the stave to be confined rigidly to certain heights, or lateral positions except the single point held by the dog  $K$ . This conjoined action of the springs  $s''$   $s''$  with the adjustable roller  $B''$ , and saw  $C''$  enable staves varying in width, straightness and winding form, to be jointed with the true bevel at each point throughout their length.

The purpose and effect of the curved ways  $t$ ,  $t$ , is to guide the dogs  $K$ ,  $K$ , in such directions as to make the two edges of the stave pass in corresponding curved courses—first by the saw  $C'$  by which one of its edges will be jointed to the proper curve and second by the saw  $C''$  by which the other side will be jointed in a similar manner. The object and operation of the switches  $t'$   $t'$  is to guide the dogs across the track of the chain  $I'$  to which the dogs are attached, and thus to enable the direction of curvature to be reversed at the proper moment when the middle of the stave comes opposite to the saw. As the tracks,  $t$ ,  $t$ , cannot cross the path of the chain  $I'$ , it is necessary to furnish a means of directing the lower end of the rear part of the dog  $K$ , in which the notch  $x$  is situated, from one side of the chain to the other in order that when one portion of the curve  $t$  has been traversed the same notch  $x$  may take its course along the curved way on the other side of the chain.

The plane  $k'$  is the guide for one side of the stave against which it is kept closely pressed while driven forward by the dog  $K$ , by the planes  $C'''$ ,  $C'''$ ,  $C'''$ , and the springs operating at  $y$ ,  $y$ ,  $y'$ . The object of the projection  $o''$  is to make the forward end of the stave recede from the plane  $k'$  and come in contact with the saw  $C''$ , forming the advance end of the stave narrow as required than the middle or bulge part, without this appendage to  $k'$  the forward end would be cut of the same width as the middle.

The springs  $s''$  keep the two edges of the stave firmly pressed upward against the corresponding part of the roller  $B''$ , in order that whether the stave be broad or narrow both its edges may be in contact with the corresponding and appropriate parts of the roller  $B''$ . When the forward end by coming under the roller  $B''$  has been so far depressed as to be beneath the level of the projection  $o''$  it will have come in contact with the saw  $C''$ , and the direction of its advance will be temporarily regulated by the pressure of the springs  $s''$  beneath and the roller  $B''$  above, which does not allow the stave to be thrust aside by the weaker spring  $y'$ . This effect is immediately after sustained by the bulge of the stave already formed com-

ing against the sloped off end  $z$  of the plane  $k'$ , in combination with the curvature of  $t$  on which the dog  $K$  is at the same time traveling.

What I claim as new and desire to secure by Letters Patent is—

1. The vibrating feeder bar  $M$  in combination with the carriage frame  $O$ , which permits either the elevation or the depression of the rear end of the stave when passing under weighted levers  $L$ ,  $L$ , as herein set forth.

2. I also claim in combination, the pressure levers ( $L$ ,  $L$ ,) acting independently of each other, but each in connection with a weighted lever ( $L'$ ,  $L'$ ), with the elevated plain support ( $N$ ), with convex and concave revolving cutters ( $P$  and  $P'$ ) with the adjustable bevel-edged plate ( $G$ ) and curved support ( $N'$ ) forming a throat whereby a stave, while being pushed forward substantially as described and undergoing the process of dressing, is held in positions constantly adapted to the various thicknesses crooks and windings of the timber, without liability to be cut across the grain, substantially as herein set forth.

3. I also claim in combination, the ratchet bar ( $B$ ) the lever ( $E$ ) tumbling shaft ( $F$ ), supporting hand ( $H$ ) weighted lever ( $J$ ) with the trigger or bent lever ( $I$ ) the pawls ( $K$ ,  $K$ ,  $K$ ,) the tripping bar ( $P$ ) and disengaging check  $Q$ , on the carriage frame ( $O$ ), arranged and acting temporarily to sustain the stave while its rear end remains between the cutters ( $p$ ,  $p'$ ,) and after it has passed from under the weighted pressure levers  $L$ ,  $L$ , whereby the undue thinning away of the stave near the end is prevented, in the manner herein set forth.

4. I also claim the auxiliary saw carriage ( $F'$ ) in combination with a movable curved controller ( $B''$ ) and springs  $S''$  and  $S'''$ , for regulating the breadth of the jointed stave to that of the bolt, as ascertained by gaging and adapting the amount of beveling to the breadth, whereby staves of unequal breadths may be so jointed as to be used in setting up the same cask, as herein set forth.

5. I also claim the combination of the reversed curved ways  $t$ ,  $t$ , and the endless chain working over angular or toothed rollers with the swivel jointed dogs  $K$ ,  $K$ ,  $K$ , arranged and acting to receive the dressed stave and carry it forward, first in contact with one saw jointer and then with the other, whereby I am enabled to joint successively both edges of the stave before it leaves the machine and avoid handling the staves after the jointing has been commenced, substantially as herein set forth, but I do not claim or use the manner of making an endless chain rim in a curve for that purpose.



6. I also claim the manner of arranging  
the adjustable jointing saw (C''), curved  
roller (B'') and supporting springs (S'')  
projection O'' and spring bar C''' whereby  
5 the true jointing of straight, crooked or  
twisted staves is effected, the roller consti-  
tuting with the springs a throat through  
which the dressed stave is made to pass in  
contact with the jointing saw, thereby en-  
10 abling the bevel in every part of the length,

to correspond to the cross section of the  
stave, substantially as herein set forth; not  
intending in these claims to limit myself to  
the exact arrangements described but to vary  
the same at pleasure while I accomplish the 15  
same ends by means substantially the same.

HERVEY LAW.

Witnesses:

WALTER R. JOHNSON,  
A. STEINWEHR.