

(No Model.)

3 Sheets—Sheet 1.

W. L. DAVIS.
GROOVING MACHINE.

No. 496,868.

Patented May 9, 1893.

Fig. 1.

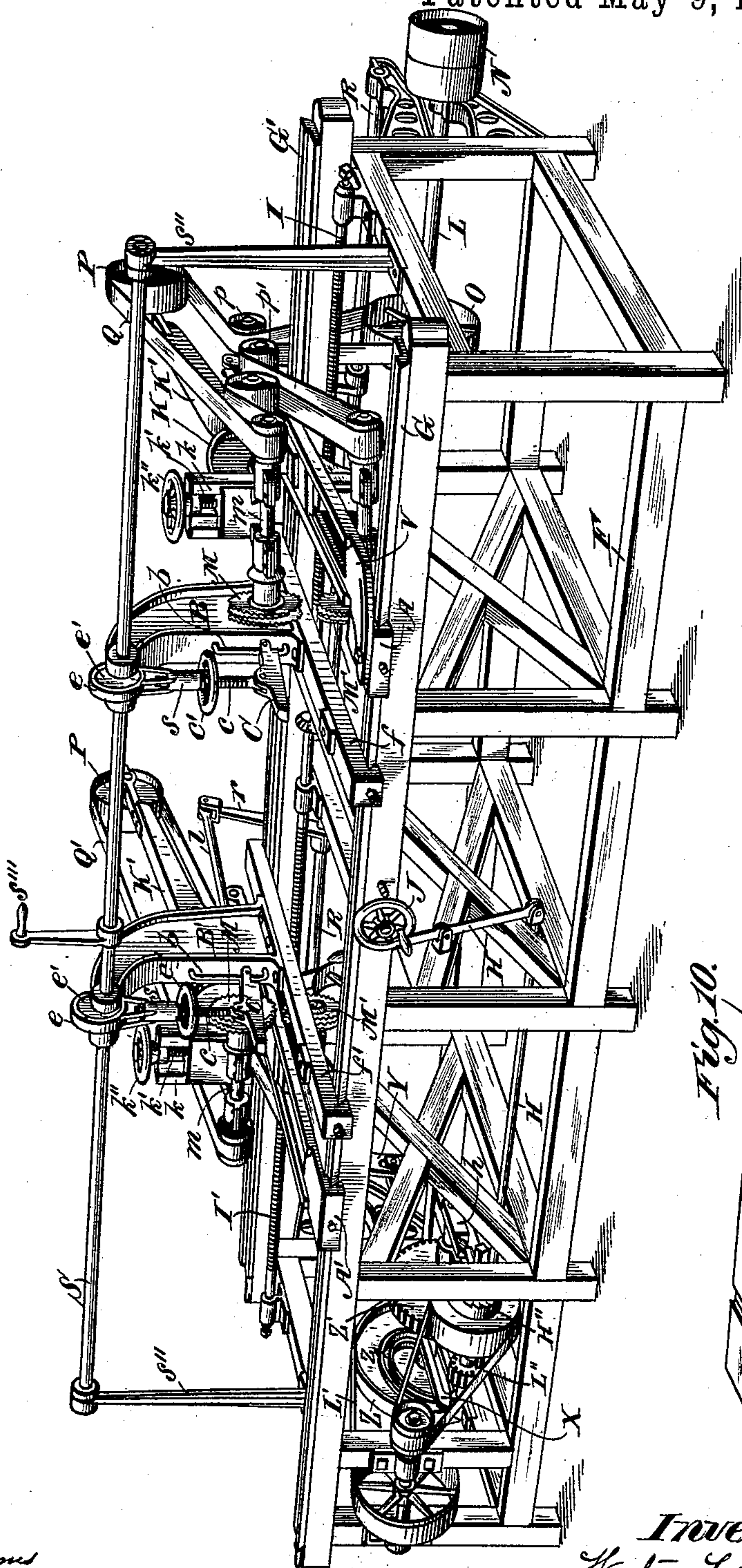


Fig. 10.



Witnesses,
Frank Williams
Henry Kopp

Inventor.
Nelson L. Davis
By William R. Baird
His Attorney

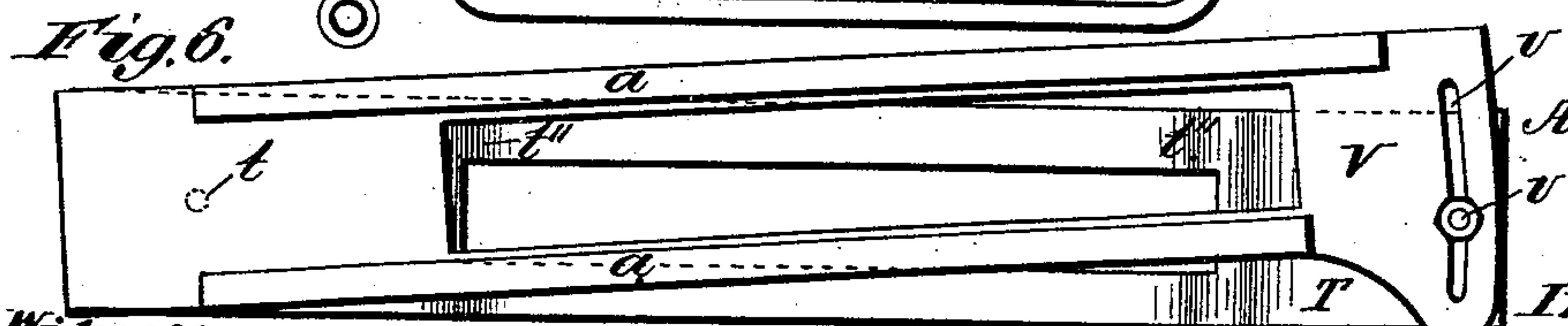
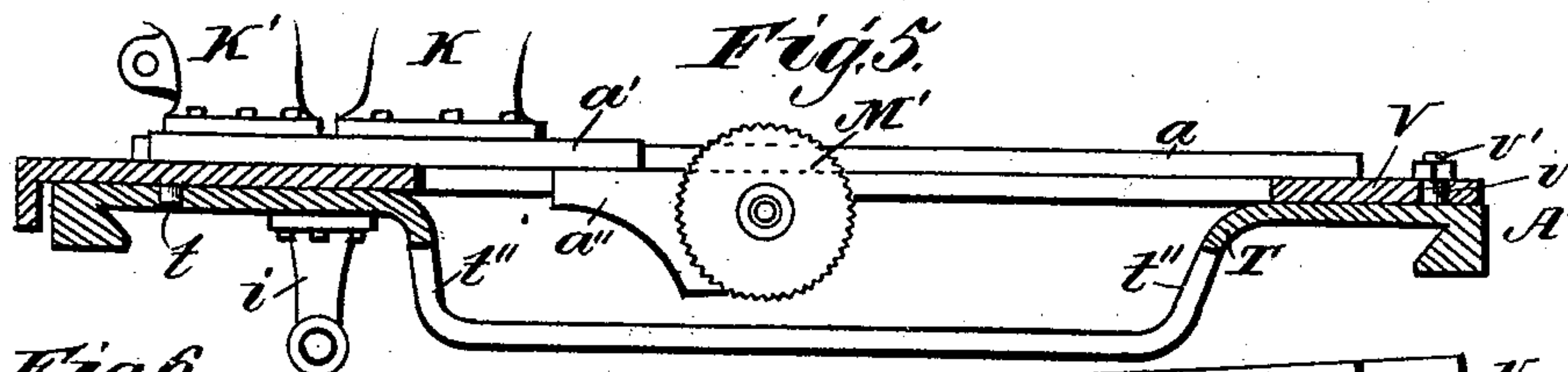
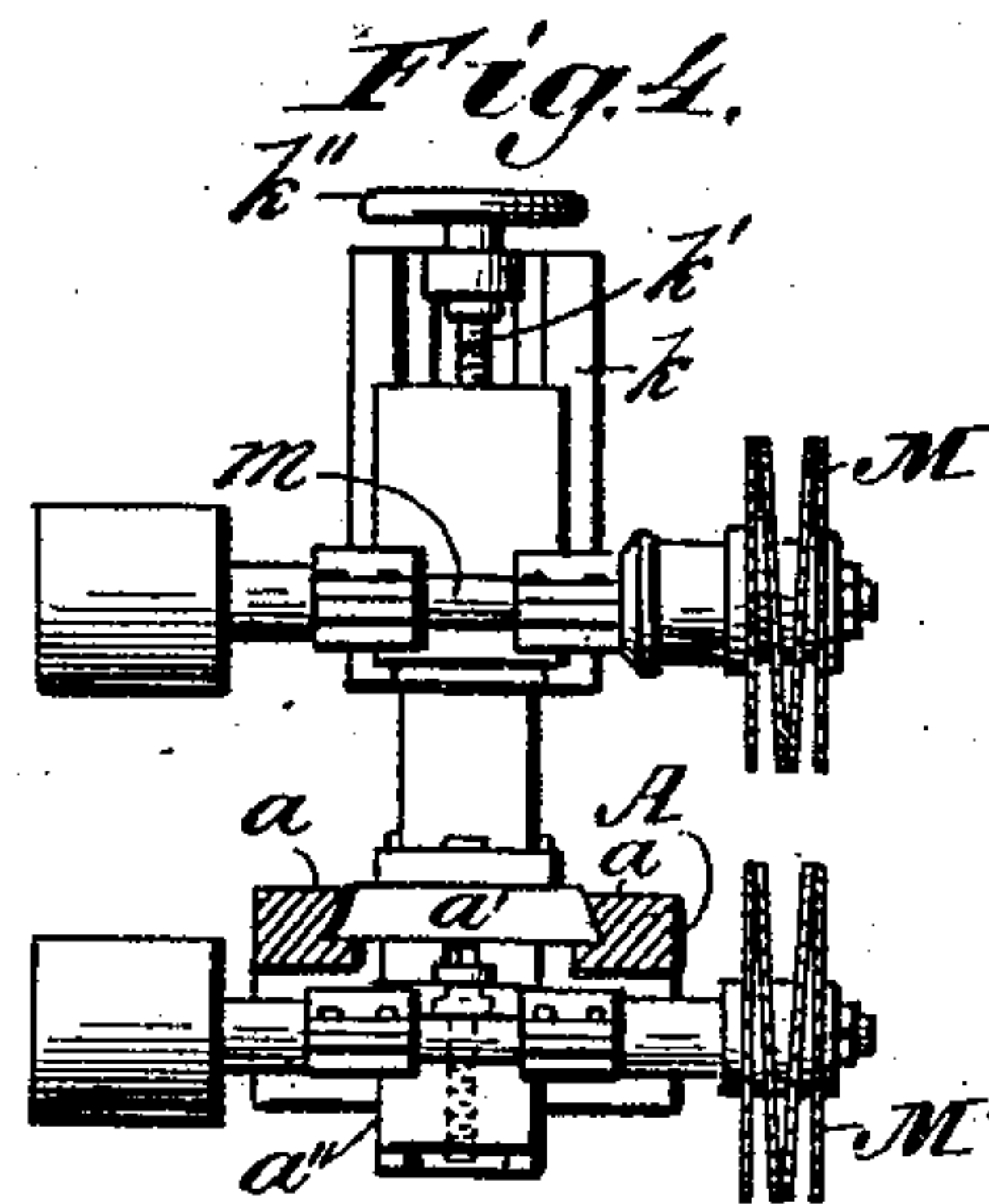
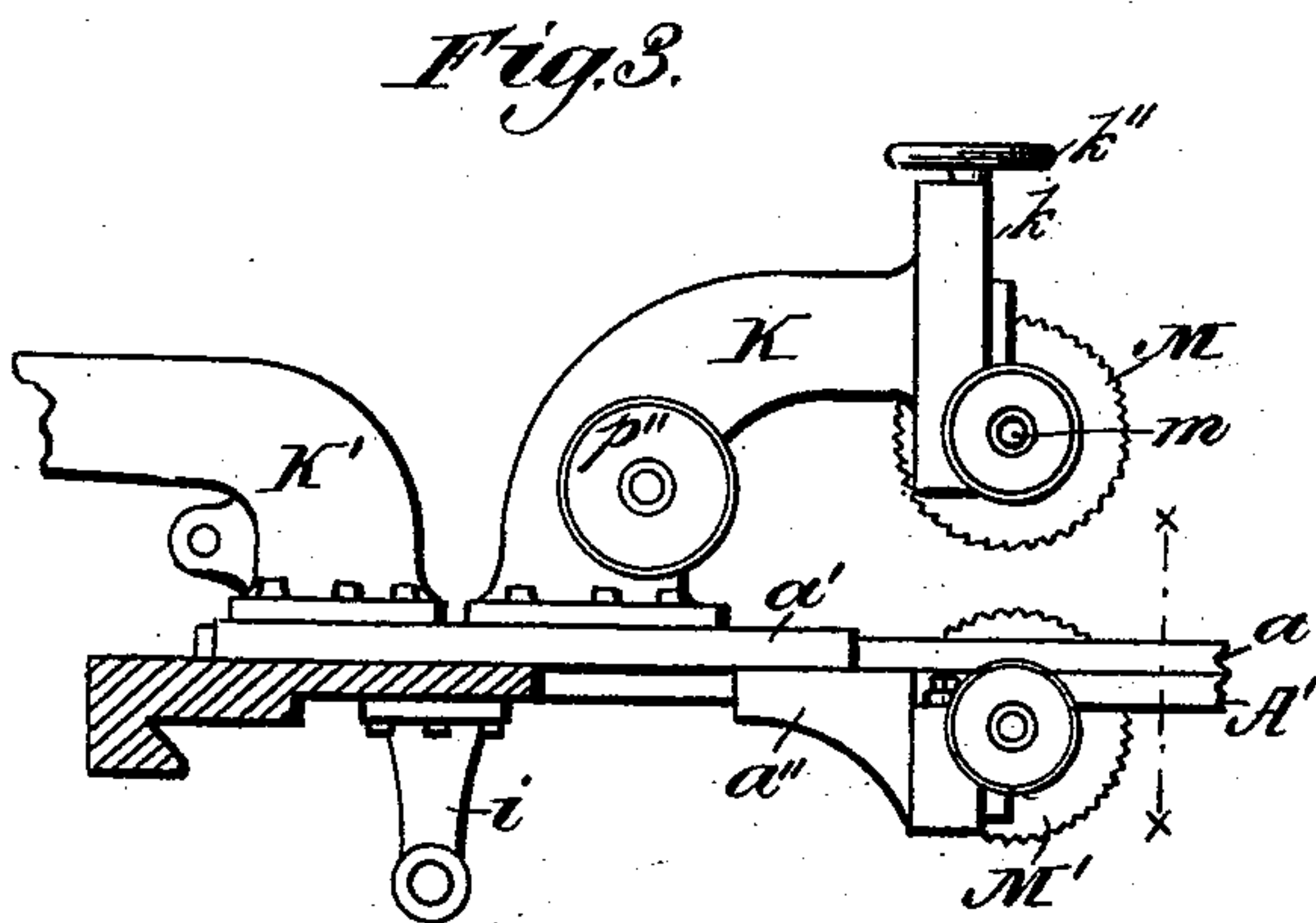
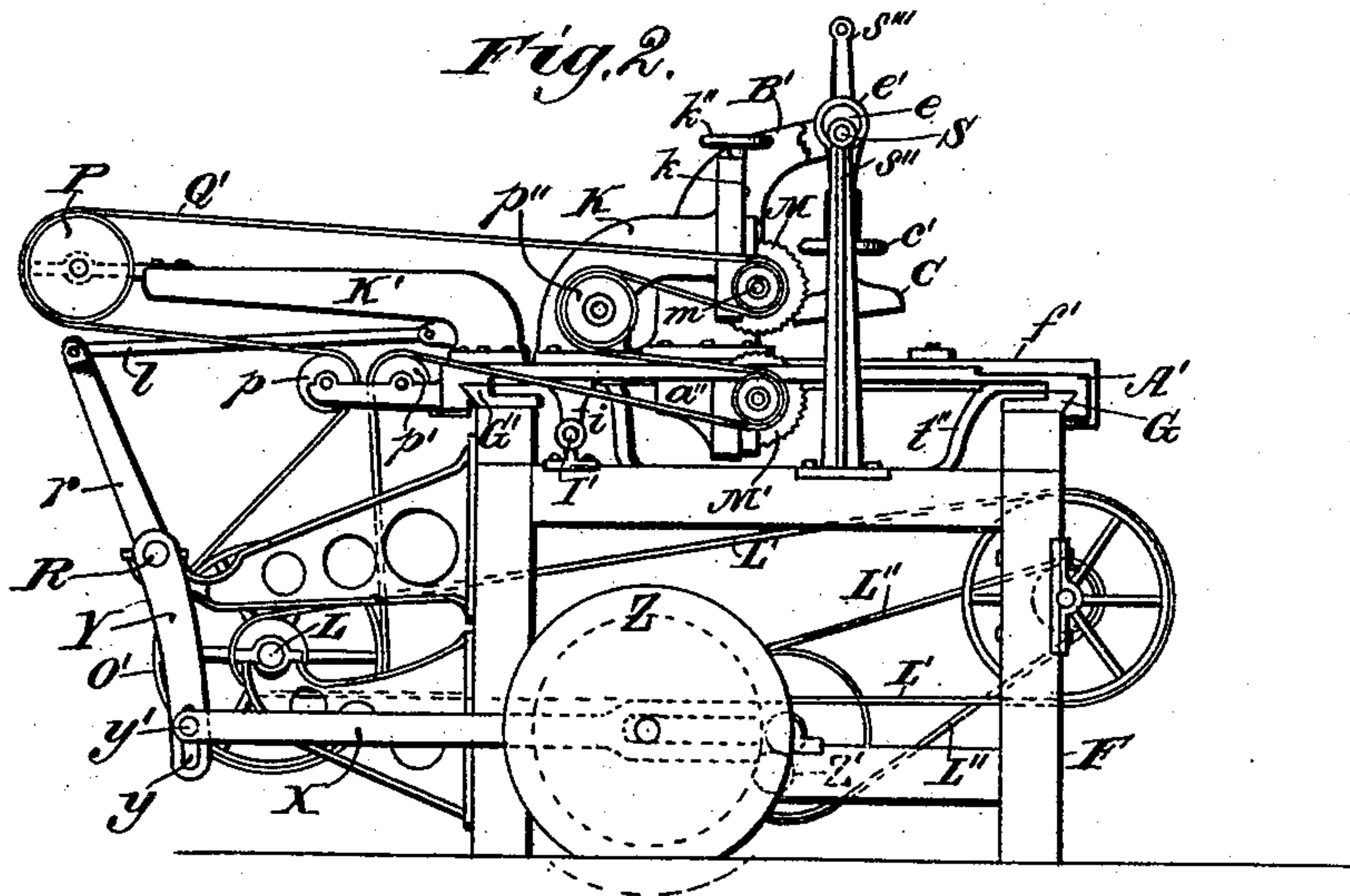
(No Model.)

3 Sheets—Sheet 2.

W. L. DAVIS.
GROOVING MACHINE.

No. 496,868.

Patented May 9, 1893.



Witnesses,
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(No Model.)

3 Sheets—Sheet 3.

W. L. DAVIS.
GROOVING MACHINE.

No. 496,868.

Patented May 9, 1893.

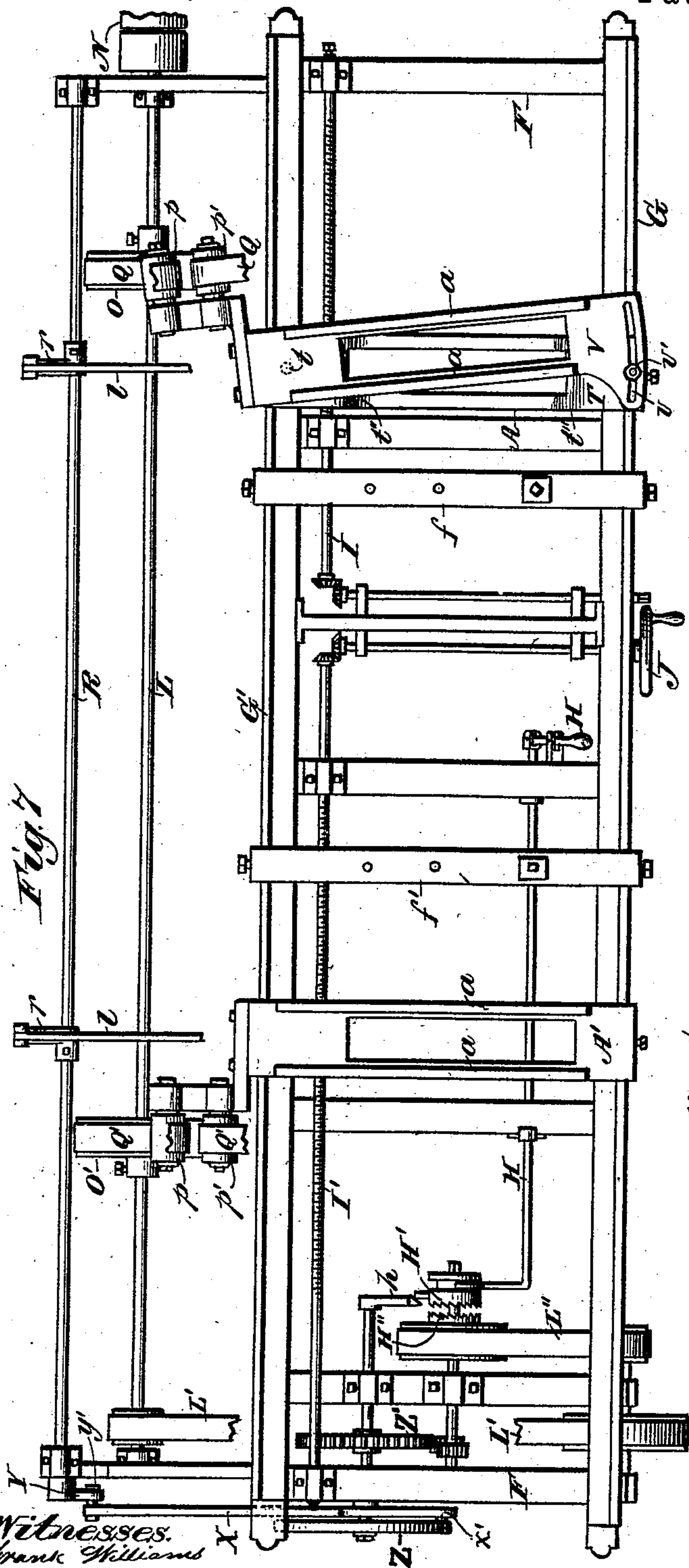


Fig. 9.

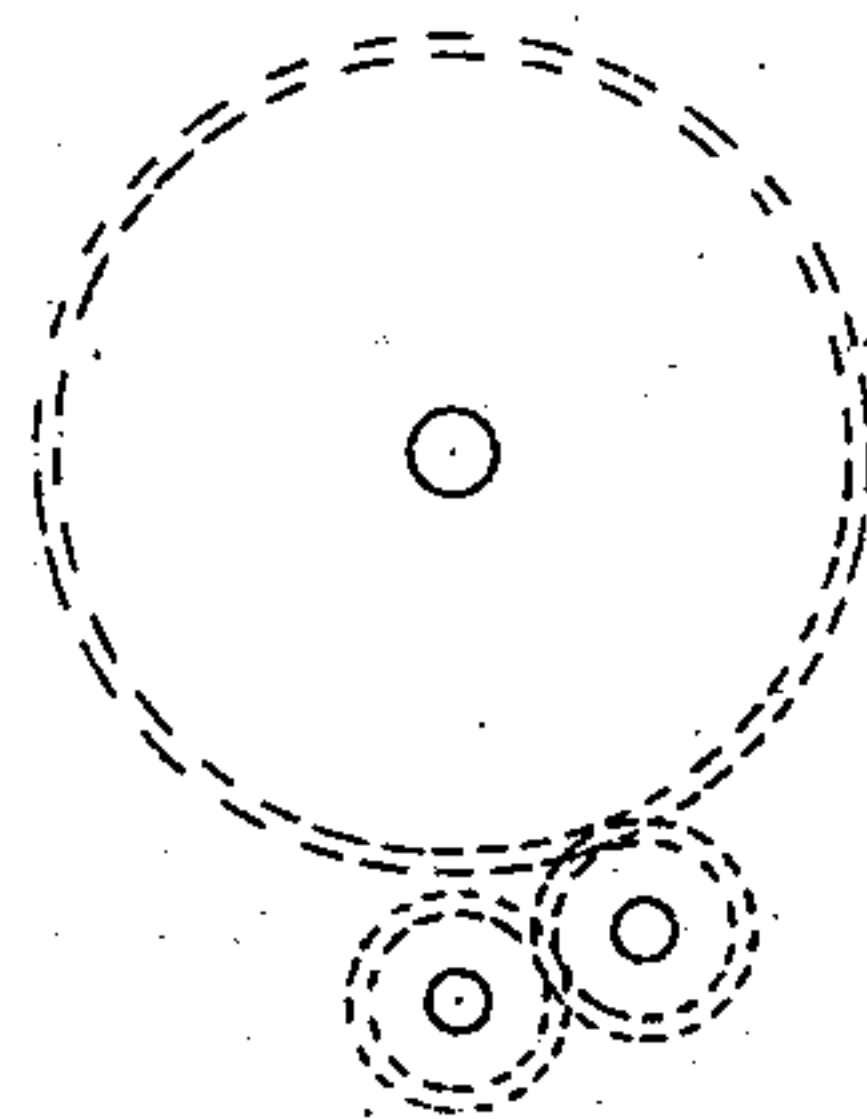
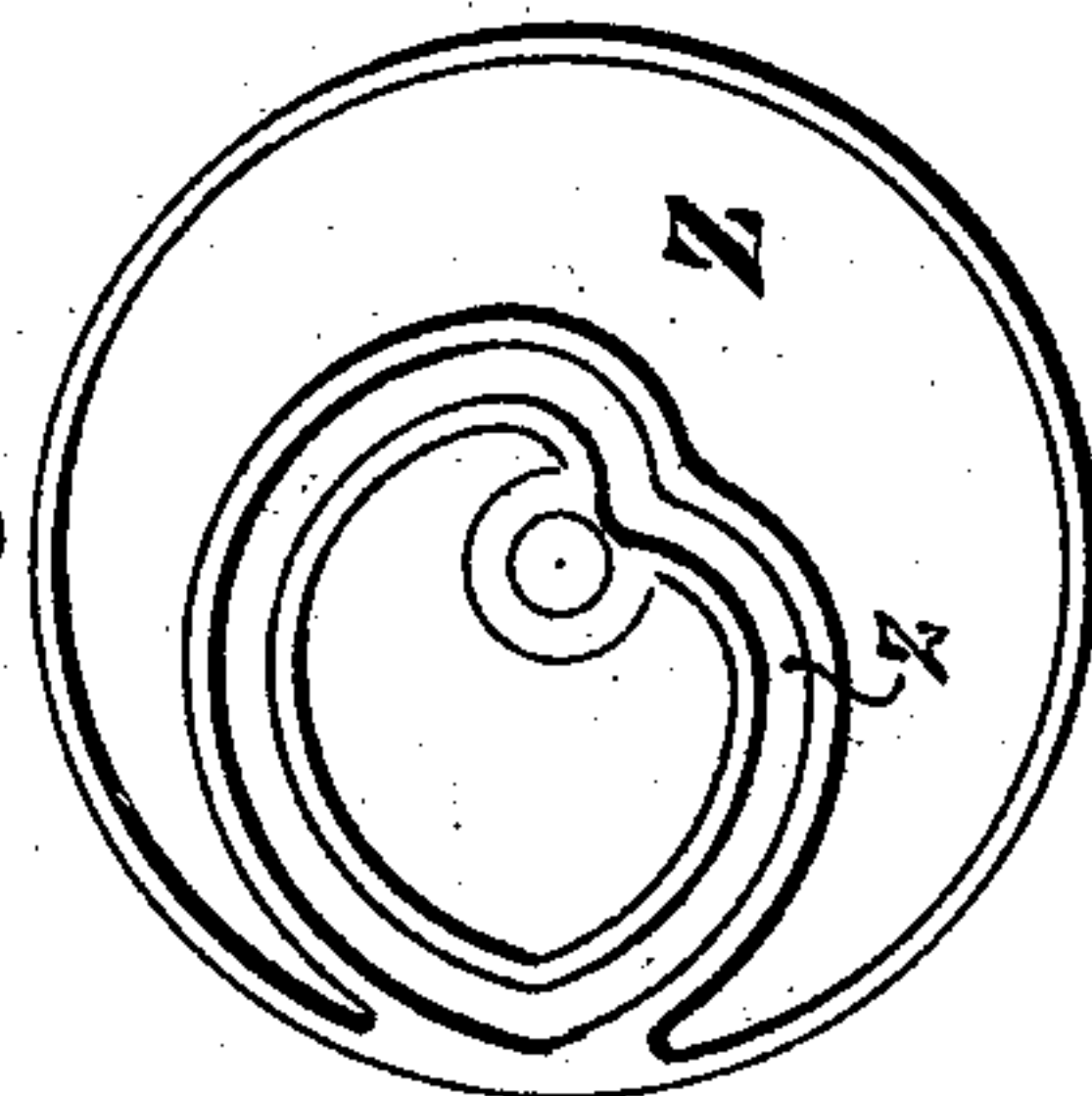


Fig. 8.



Witnesses.
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UNITED STATES PATENT OFFICE.

WESTON L. DAVIS, OF LEWISTON, MAINE.

GROOVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 496,868, dated May 9, 1893.

Application filed March 8, 1892. Serial No. 424,125. (No model.)

To all whom it may concern:

Be it known that I, WESTON L. DAVIS, a citizen of the United States, residing at Lewiston, in the county of Androscoggin and State of Maine, have invented certain new and useful Improvements in Grooving-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 marked thereon, which form part of this specification.

My invention relates to wood working machines and more particularly to that class of machines designed to cut grooves or channels in strips of wood, and its novelty consists in the construction and adaptation of the parts as will more fully hereinafter appear.

Primarily, my invention is intended to produce a mechanism whereby a series of grooves on either or both sides of a prepared strip of wood may be simultaneously cut, either at right angles or obliquely to the longitudinal axis of the said strip.

Heretofore, in the manufacture of the side pieces for window frames and similar articles, it has been customary to cut the four or more grooves required upon a saw bench and to handle the strip operated upon frequently and with considerable care. By the use of my invention, the work, when once placed in position, and the cutters adjusted, is automatically and rapidly grooved and requires no handling and no attention beyond that obtained from comparatively unskilled labor.

My invention consists, in brief, of an upright frame or table supporting two or more carriages which are made longitudinally adjustable and which each carry a pair of revolving cutters or dado heads, one of each pair being below and the other above the plane of the strip to be operated upon. The cutters are adjustable vertically and are actuated by suitable mechanism from the main driving shaft. They are capable of a transverse reciprocating motion also upon their carriages and, in the form of my invention which I have chosen to illustrate, they are so actuated that their forward motion while moving against the work is slower than their backward motion.

The work is rigidly secured in place by suitable gripping mechanism.

In the drawings of which there are three sheets, Figure 1 is a perspective view of a machine embodying my invention. Fig. 2 is an end elevation taken from the left of Fig. 1. Fig. 3 is a detail sectional side elevation of the cutters which are designed to move at right angles to the axis of the work. Fig. 4 is a sectional front elevation of the same taken on the plane of the line $x-x$ in Fig. 3. Fig. 5 is a longitudinal section of the carriage guide and cutter designed to move at an oblique angle to the work and Fig. 6 is a plan view of the same. Fig. 7 is a top plan view of the machine with the cutters and clamping mechanism removed. Fig. 8 is an elevation of the cam plate. Fig. 9 is a diagram of the gearing actuating the same and Fig. 10 is a perspective of a strip grooved by the machine.

In the drawings, F is an upright frame or table constructed of wood in the usual manner, braced and secured in place where necessary and requiring no particular description. This frame F is provided with longitudinal guides or ways G, G' which support two cross pieces f and f' upon which are secured, in any suitable manner, two upright brackets B and B'. Each of these brackets is vertically slotted on its front face at b to admit of the rear end of a clamp C vertically adjustable in the said slot. The clamp C is pivotally secured to the lower end of a threaded rod c which passes upward through a hand wheel c' secured by a collar to the lower end of a sleeve s terminating at its upper extremity in a strap e encircling an eccentric e' pivoted upon and secured to a shaft S mounted upon suitable bearings supported from the frame F by standards s'' and the brackets B and B' and provided with a handle s''' by which the shaft can be turned. The clamp C and the cross piece f serve as jaws between which the work is rigidly secured in place. By means of the threaded rod c and the hand wheel c' the clamp can be raised or lowered so as to admit of the insertion underneath it of strips of different thickness while permitting permanent adjustment for strips of substantially the same thickness. After such approximate adjustment has been made the

work is rigidly secured in place by turning down the handle s''' which, acting through the eccentric strap and eccentric, forces down the sleeve s and consequently the clamp C upon the top of the strip.

Also supported upon the ways G and G' , and adapted to slide thereon, are two carriages A and A' , the former designed to carry the pair of cutters making a groove at right angles to the work and the latter to carry the pair of cutters making a groove at an oblique angle to the same. Both carriages are made horizontally adjustable by means of screws I and I' adapted to revolve in suitable bearings and passing through a threaded flange i extending from the bottom of each carriage. The screws I and I' are controlled and operated by means of a hand wheel J suitably mounted and geared thereto. Each carriage is provided on its upper side with guides a which carry a saddle a' upon which is secured a bracket K supporting the cutter and pulley shaft m of the upper one M of the pair of cutters, and an arm K' supporting a pulley P at its outer extremity. Depending from the saddle, is a lower sliding piece a'' which carries the lower one, M' , of the pair of cutters and its power connections. The pulley shaft m is made vertically adjustable in slides k provided therefor by means of the threaded rod k' and the hand wheel k'' . At the back of the carriage, and pivotally secured to the arm K , is a link l the uses of which will presently appear. The cutters and their shafts and pulleys are mounted in the usual manner and require no particular description.

The carriage A is in all respects similar to the carriage A' , except that its bed plate is divided horizontally into two sections the lower one of which T is fixed upon the ways G and G' and adapted to slide thereon and is curved downward at t'' to admit of the passage of the lower one of the pair of cutters and the upper section of which, V carries the mechanism supporting the cutters and their power connections in the manner just explained. This section V is pivoted to the bed plate T at its rear end at t and, at its front end, is provided with a curved slot v and binding screw v' by means of which it is made radially adjustable upon the said bed plate and the cutters which it carries can be held at an oblique angle to the work.

At the rear of the machine, and revolving in suitable bearings thereon, is the main driving shaft L receiving motion from a source of power not shown through the pulley N . Also mounted upon the shaft L , are the pulleys O and O' which are horizontally adjustable by means of keys, or other similar means, and which impart motion respectively to the revolving cutters through the belts Q and Q' . In each pair of cutters, the belt passes around the driving pulley, over two deflecting pulleys p and p' mounted on the rear of the cutter carriage, thence it passes forward to the pulleys of the upper and lower cutters and over

an intermediate reversing pulley p'' mounted on the upper cutter bracket and backward to the pulley P at the rear of the arm K' . This arrangement of the belt secures the rotation of the cutter shaft no matter what may be the position of the carriage, or saddle, as the length of the belt remains the same for all positions of the saddle.

A rock shaft R is mounted in suitable bearings at the rear of the machine behind the driving shaft and carries levers r adjustably mounted thereon by keys, or other suitable means, and which, through the links l pivotally secured thereto and to the arms K' and K , impart a reciprocating motion to the cutter carriages and the mechanism which they support. At the extreme left of the rock shaft R , and rigidly secured to it and depending therefrom, is a link Y slotted at y at its lower extremity to admit of the passage of a pin y' secured at the outer extremity of a horizontal link X which is itself slotted at its inner end and adapted to engage with a pin x' moving in a double cam-shaped guide z in a plate Z mounted upon a shaft supported in suitable bearings underneath the frame F and to which motion is, as required, imparted from a driving shaft L through intermediate belting L' and L'' passing over suitable pulleys and the train of gearing Z' . The belts L' and L'' are adapted to constantly revolve. A clutch H' is splined to its shaft while the pulley H'' is loose. The hand lever H , which is suitably supported in bearings, being pulled to the right, the clutch H' is thrown into engagement with the pulley H'' and the train of gearing Z' is thus set into motion. This causes the cam Z to revolve. The pin x' moving in the cam guide z carries with it the horizontal link X which, in turn, through its rigid connections, starts the rock shaft R forward. As the cam plate Z continues to revolve, the link X is finally pulled in the reverse direction and the rock shaft is pulled back. When a revolution has been completed, the trip h mounted on the shaft of the plate Z strikes a similar pin mounted on the shaft of the clutch H'' and automatically throws it out of engagement and consequently the gearing Z' stops in a manner readily understood by those skilled in the art. The double guide z is made of such a shape that the slotted link X is made to move forward more rapidly than backward and consequently through the rock shaft R and its connections has a reverse effect upon the motion of the saddles and cutters which they carry.

The operation of the machine will be readily understood by one who has closely followed the foregoing description. The strip of wood to be operated upon is first placed upon the transverse pieces f and f' , the clamps C are then brought down into a proper position to grip it approximately and it is rigidly forced down upon the strip by pulling forward the handle s''' , by this means turning the eccentric shaft S and eccentric e' and so

forcing downward the sleeve and the clamp to which it is attached. The strip having thus been rigidly secured in position, the movable section V of the carriage A is adjusted in position by means of the set screw v' so that the groove to be cut by the pair of cutters mounted on this carriage shall be at the desired angle. Motion is then imparted from the main driving shaft, through the pulleys O and O' and their connections, to the two pairs of revolving cutters. The hand lever H is then pulled to the right, the actuating mechanism of the cam plate Z thus thrown into gear and the plate turned, thus carrying with it the pin x' , which acting upon the links X and Y, through them upon the rock shaft R, upon the levers r , pushes the saddles of the carriages upon which the cutters are mounted forward against the work and then with a quicker motion pulls them backward. When this operation is completed, it will be found that each pair of cutters has simultaneously cut upon the opposite sides of the strip parallel grooves, those made by the left hand pair at right angles to the longitudinal axis of the strip, and those made by the right hand pair at an oblique angle thereto.

In the drawings, I have shown the cutters of the kind known in the art as "dado heads" but they may be of any practical shape and style. In fact, wide modifications may be made in the details of my invention without departing from its essential principles. More carriages and cutters may be used and they may all be radially adjustable and capable of cutting grooves at a variety of angles. The differential motions of the forward and backward motion of the saddles may be accomplished by mechanical equivalents of the links and cam plate by combinations of cams and levers, and mechanical equivalents of other details will occur more or less spontaneously to those skilled in the art.

Having described my invention, what I claim as new is—

1. In a grooving machine, the combination with means for securing the work in place, of a plurality of pairs of rotary cutters provided with suitable actuating mechanism, the cutters of each pair adapted to operate on opposite sides of the work and one pair of which is radially adjustable, and all of which are adapted to move simultaneously against the work while the said cutters are in operation, as and for the purposes described.

2. In a grooving machine, the combination with a plurality of pairs of revolving cutters and suitable actuating mechanism therefor, of carriages carrying said cutters in pairs and one or more of said carriages provided with a radially adjustable section whereby the said cutters when in operation are moved against the work to cut pairs of grooves on opposite sides thereof at different angles to the axis of the work, as and for the purposes described.

3. In a grooving machine, the combination

with means for securing the work in place, of a plurality of pairs of revolving cutters, each pair of cutters being horizontally and vertically adjustable and actuated by suitable mechanism, whereby their motion against the work is slower than their motion away therefrom, substantially as described.

4. In a grooving machine provided with horizontal ways adapted to receive the same, a cutter carriage consisting of (1) a bed plate supported on said ways and horizontally adjustable thereon, (2) a saddle adapted to move transversely on said bed plate and carrying the cutters cutter shafts and their power connections, and (3) means for reciprocating said saddle, as and for the purposes set forth.

5. In a grooving machine, the combination with adjustable cutter carriages carrying reciprocating saddles supporting the shafts of said cutters and their pulleys, of the said cutters mounted upon said shafts, one of each pair below and the other above the plane of the work and either, or both, vertically adjustable, as and for the purposes set forth.

6. In a grooving machine, the combination with means for securing the work in place and a cutter carriage having a bed plate resting on ways and horizontally adjustable thereon, of a movable section and radially adjustable thereon and adapted to support a pair of revolving cutters and their power connections secured above said bed plate, as and for the purposes described.

7. In a grooving machine provided with cutter carriages carrying reciprocating saddles each supporting a pair of cutters, one below and one above the plane of the work, means for actuating the said cutters consisting of a belt passing around a pulley to which motion is imparted from a source of power, thence over deflecting pulleys forward to a pulley mounted on the shaft of each cutter and a reversing pulley placed between them and backward to a pulley supported from said saddle in suitable bearings.

8. In a grooving machine provided with cutter carriages each carrying reciprocating saddles and supporting a pair of cutters one below and the other above the plane of the work, means for actuating the said cutters whereby they are each kept in rotation independently of the position of the said saddles on their respective carriages.

9. In a grooving machine, the combination with revolving cutters mounted in pairs on reciprocating saddles supported on adjustable carriages, of means for reciprocating said saddles whereby the motion of the cutters against the work is slower than the motion away therefrom.

10. In a grooving machine, the combination with revolving cutters mounted in pairs on reciprocating saddles, of levers pivoted to said saddles and operated from a rock shaft mounted in suitable bearings, and to which motion is imparted from the driving shaft through intermediate links and gearing,

whereby the forward motion imparted to the said saddles is slower than the backward motion thereof.

11. In a grooving machine, the combination
5 with the moving cutter saddles and the intermediate levers and rock shaft acting thereon, of the link X slotted as described and the cam plate Z and pin x' , whereby the motion

of the said link is made more rapid in one direction than the other.

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

WESTON L. DAVIS.

Witnesses:

ARTHUR C. SPRAGUE,
ALBERT E. TINGEOY.