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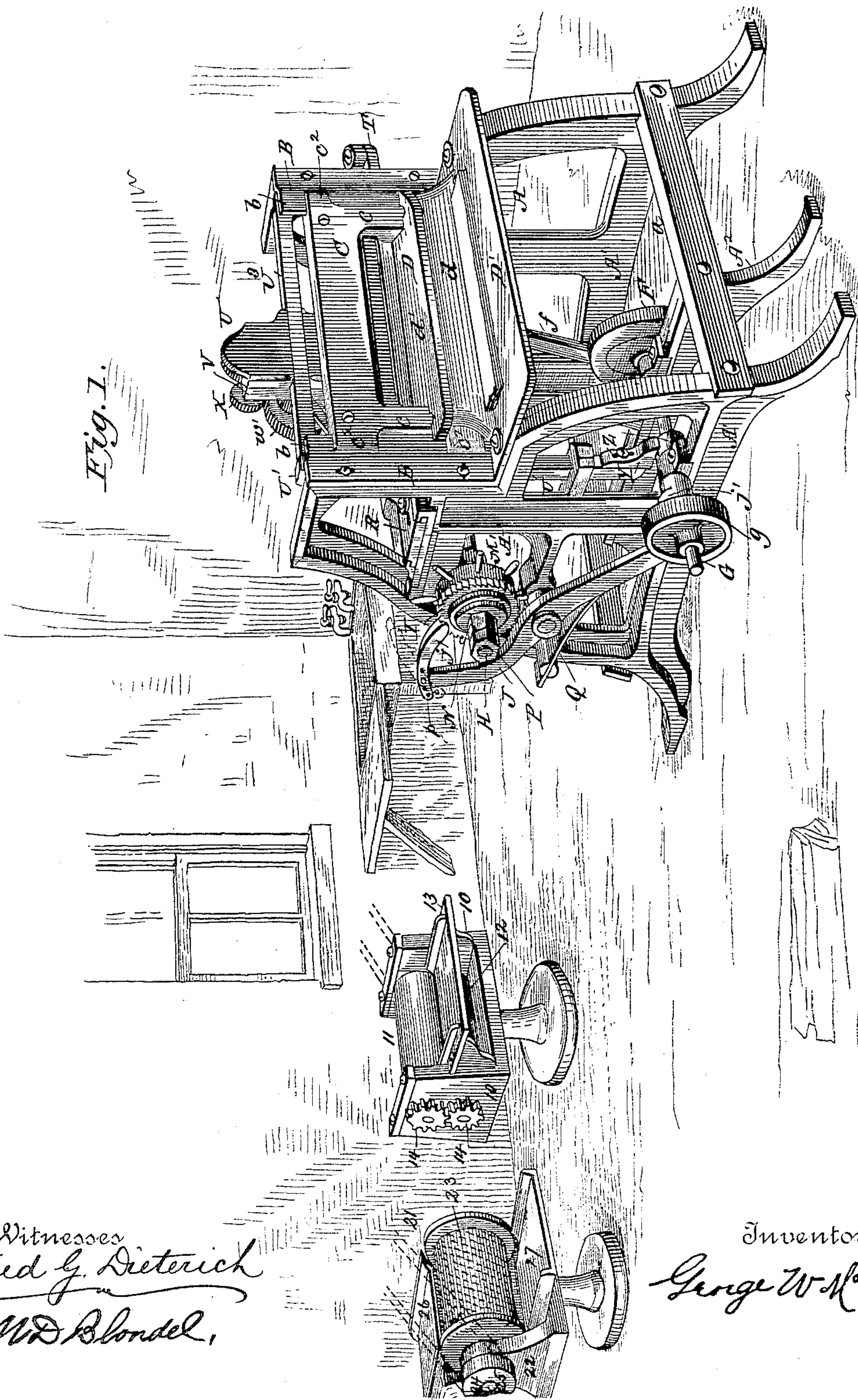
6 Sheets—Sheet 1.

G. W. McKIM.

WOOD BROOM SPLINT MAKING MACHINE.

No. 437,710.

Patented Oct. 7, 1890.



Witnesses
Fred G. Dieterich
M. D. Blondel,

Inventor
George W. McKim.

(No Model.)

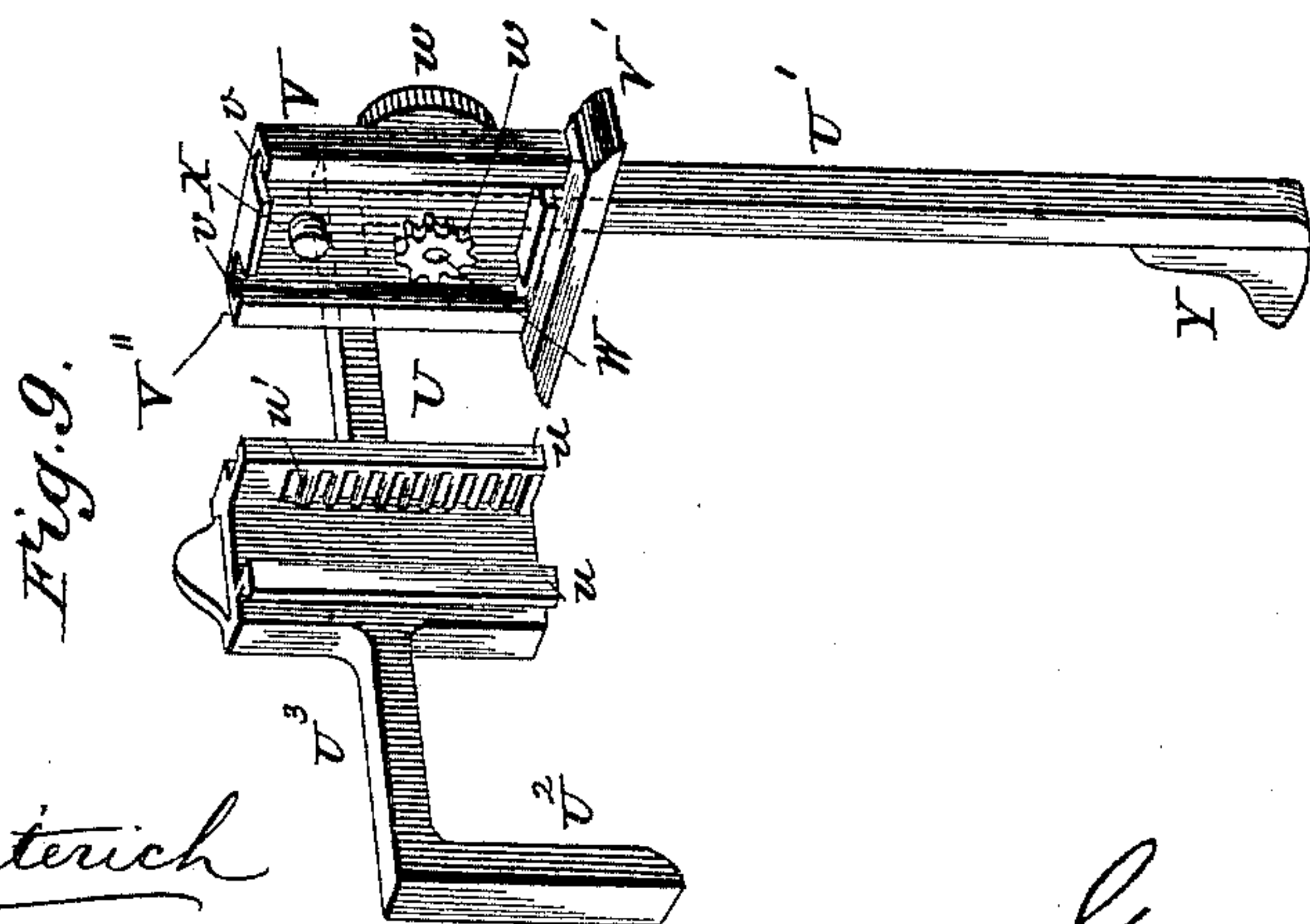
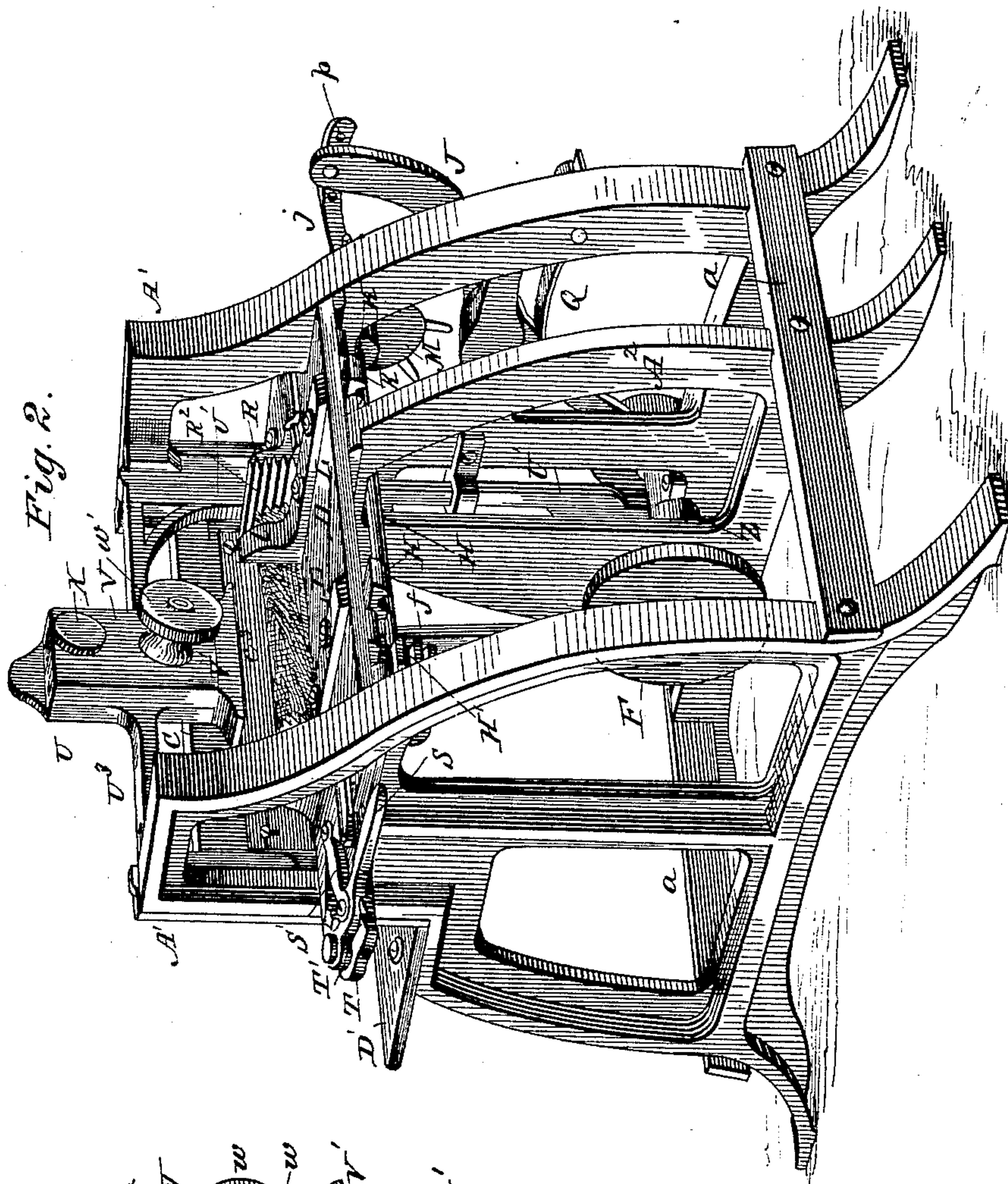
6 Sheets—Sheet 2.

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Witnesses
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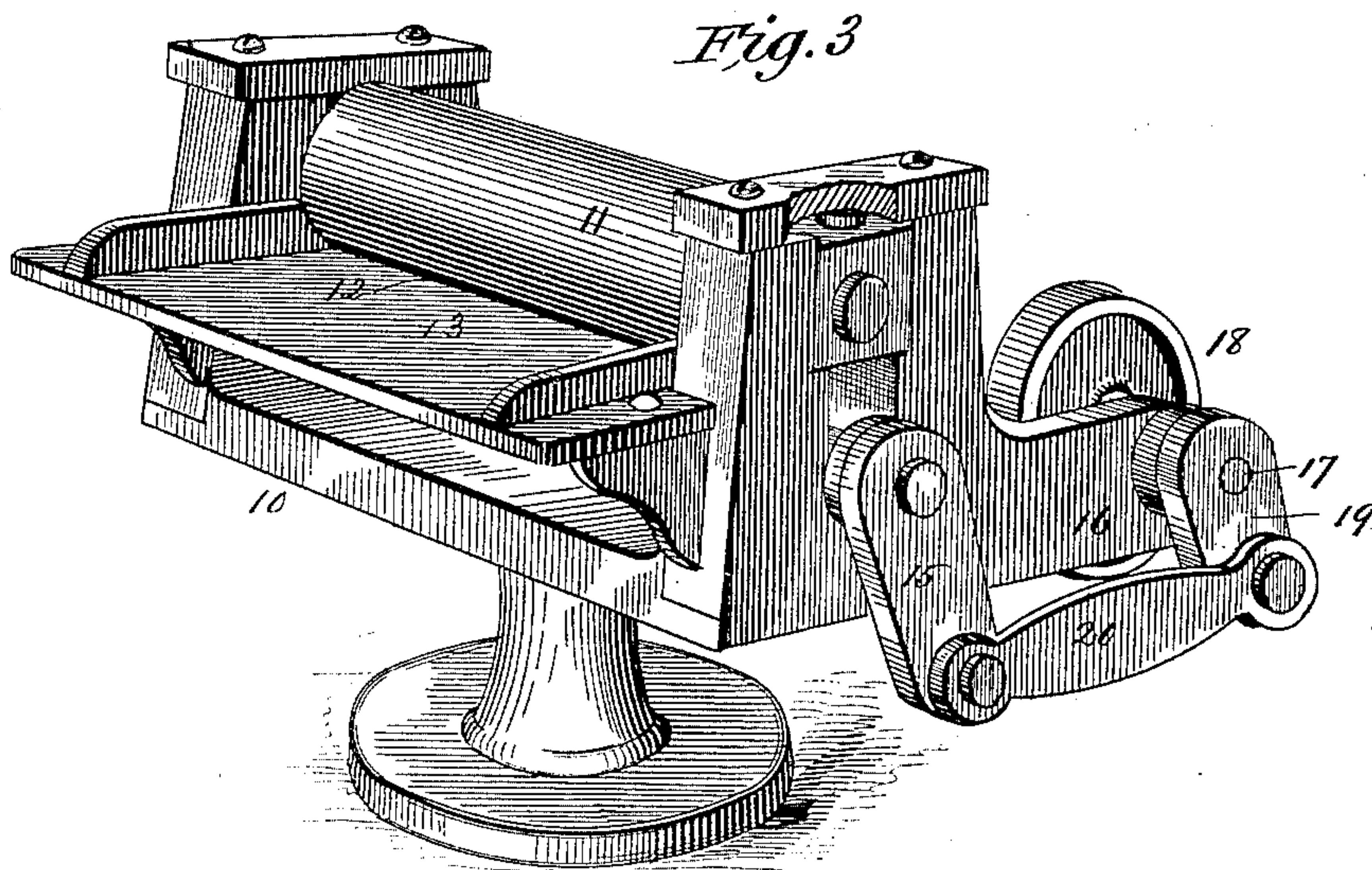
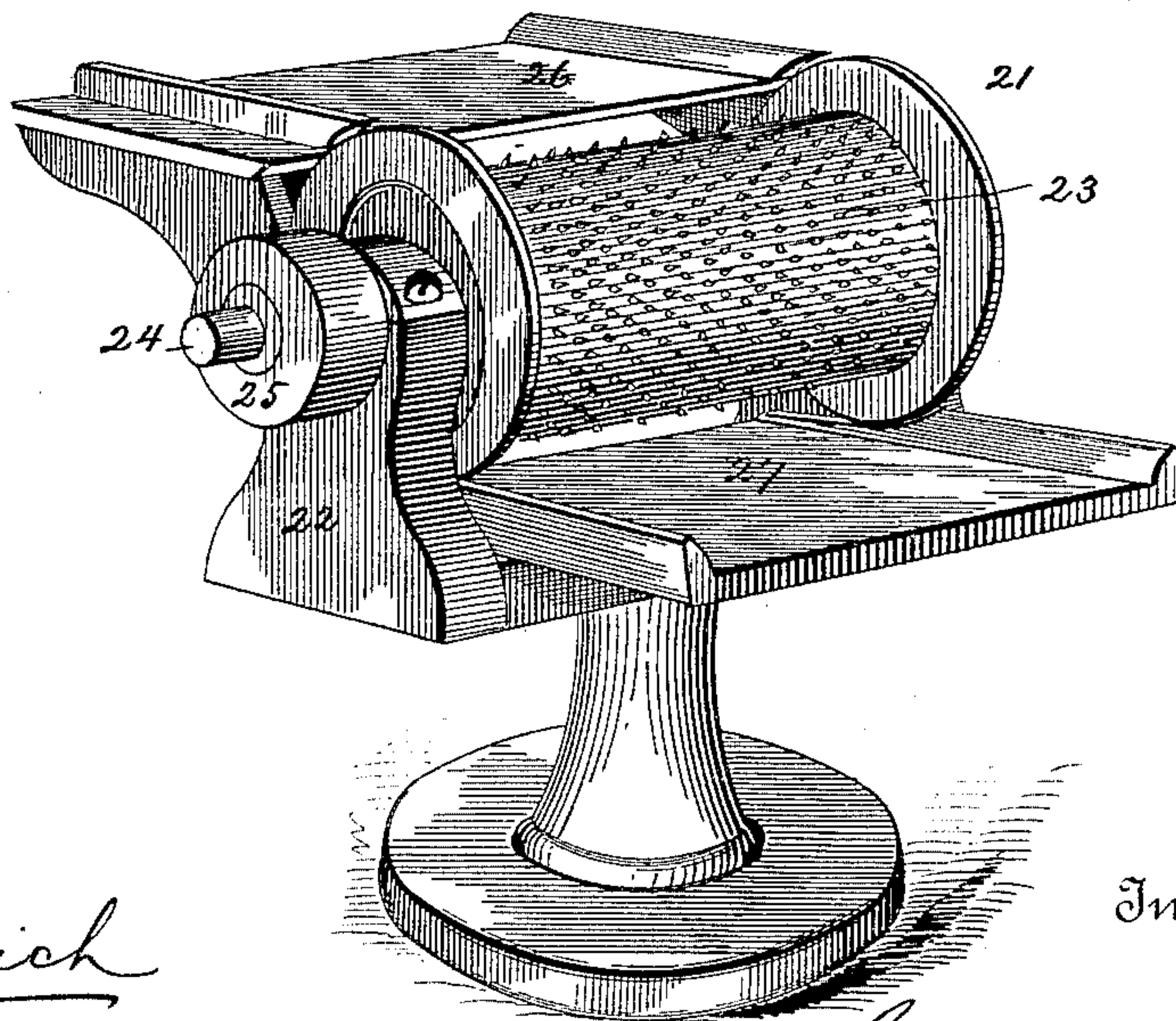


Fig. 4.



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6 Sheets—Sheet 4.

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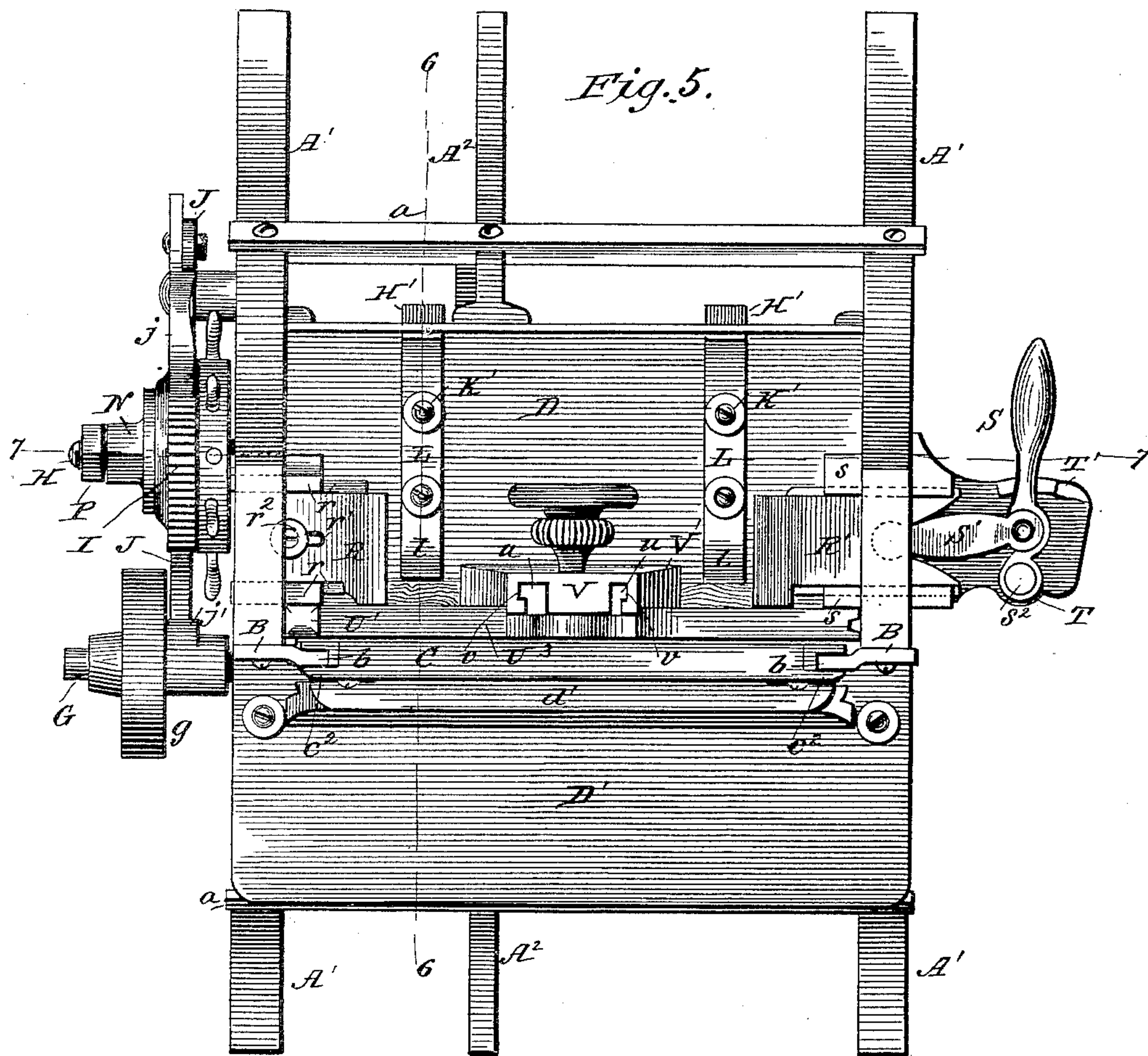
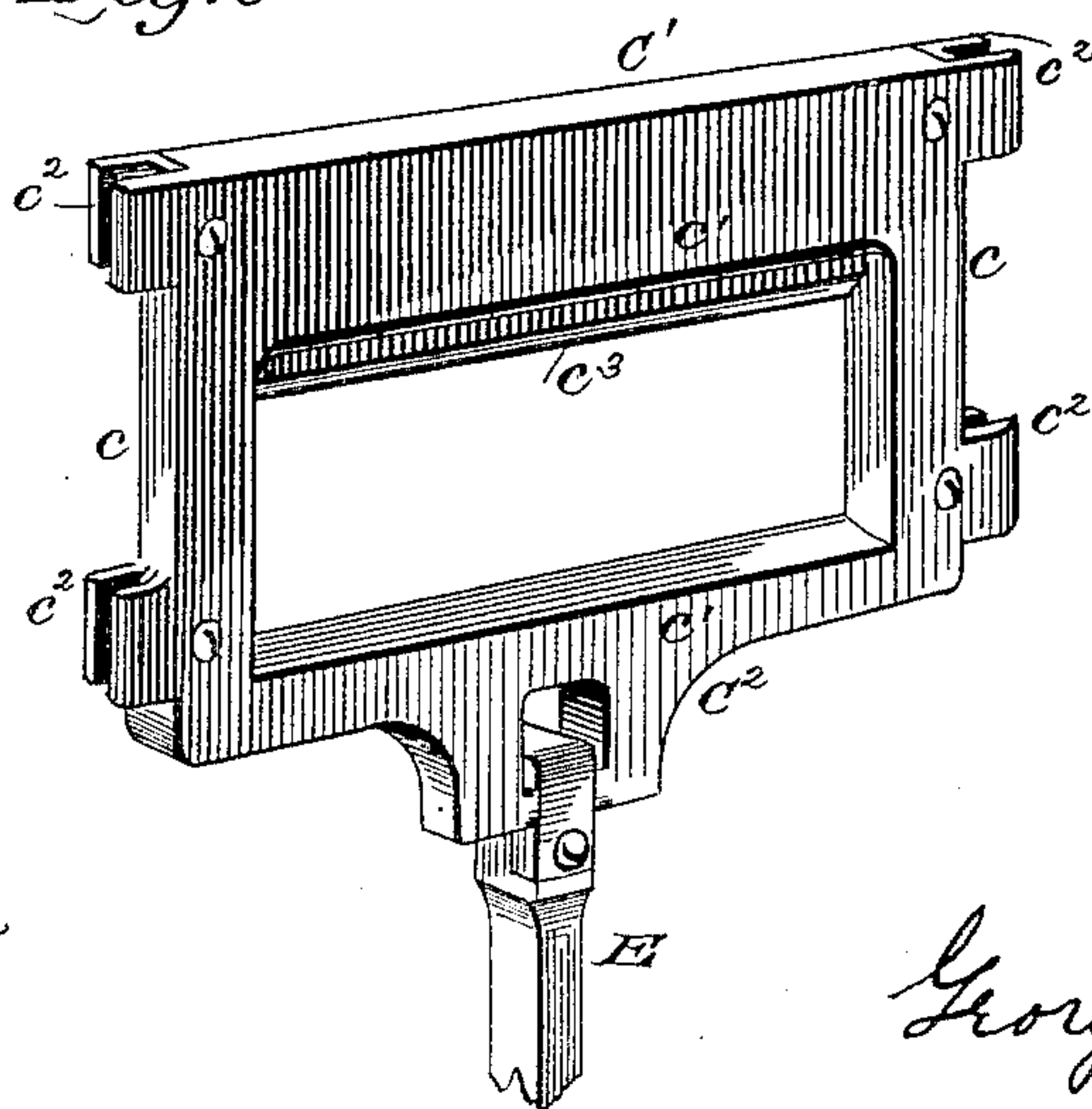


Fig. 8



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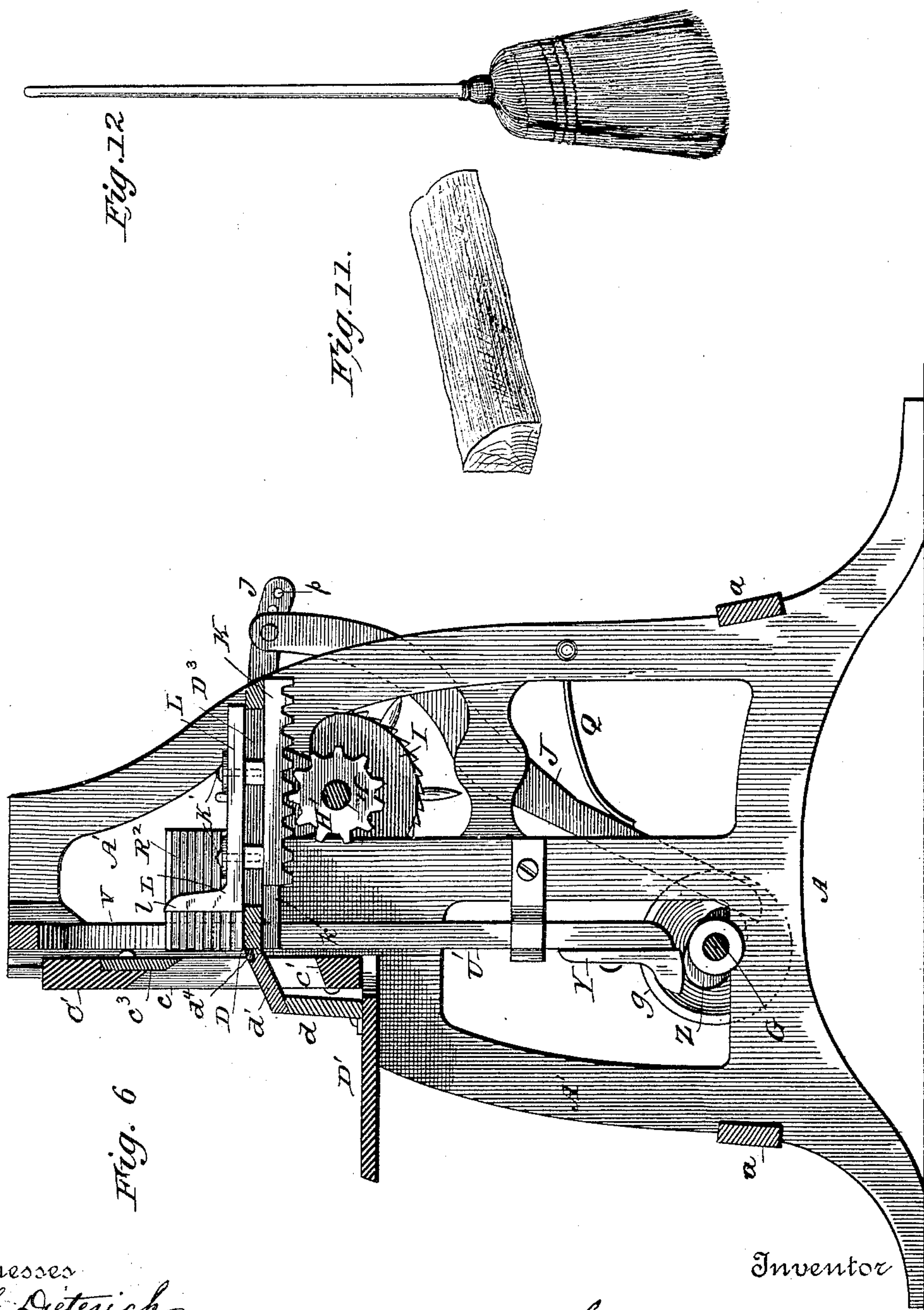
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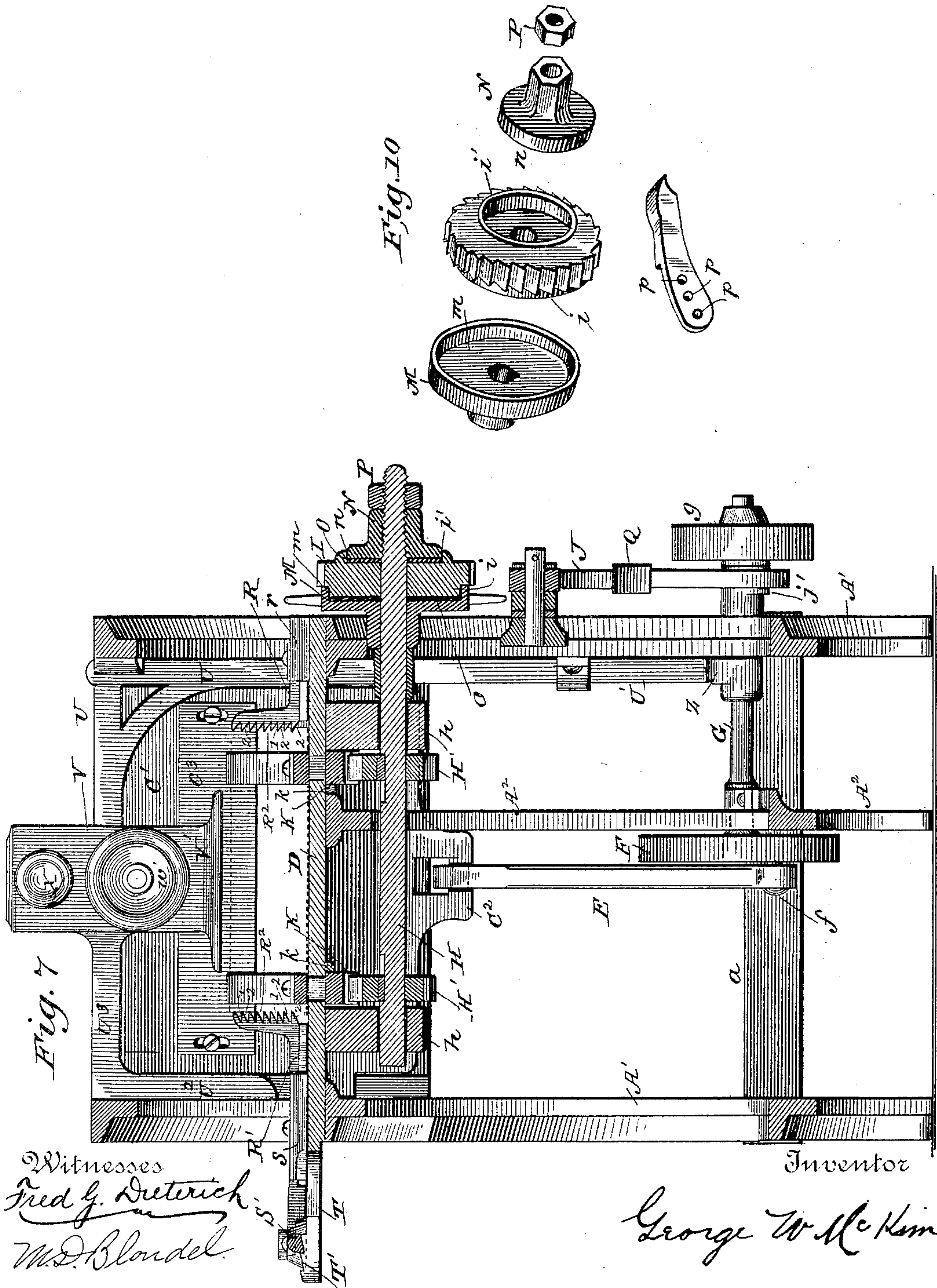
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WOOD BROOM SPLINT MAKING MACHINE.

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Patented Oct. 7, 1890.



UNITED STATES PATENT OFFICE.

GEORGE W. MCKIM, OF MARTIN'S FERRY, OHIO, ASSIGNOR TO CHARLES E. MCKIM, OF SAME PLACE.

WOOD-BROOM-SPLINT-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 437,710, dated October 7, 1890.

Application filed May 17, 1889. Serial No. 311,185. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. MCKIM, residing at Martin's Ferry, in the county of Belmont and State of Ohio, have made certain new and useful Improvements in Wood-Broom-Splint-Making Machines, of which the following is a specification.

My invention relates particularly to the construction of certain machines for the manufacture of broom-splints from woods which have certain tough but elastic qualities—such as elm, gum, hickory, and hoop or berry ash; and it has for its object to provide such machines which will reduce the wood billets to fine splints or fibers, and which will so treat the said fibrous material that they may the more readily be handled during the process of forming the broom.

To this end my invention consists in certain novel features of construction and peculiar combination of parts, as will be hereinafter fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view showing my improvements as ready for operation. Fig. 2 is a perspective view of the cutting-machine. Fig. 3 is a similar view of the crushing-rolls. Fig. 4 is a like view of the revolving hackle. Fig. 5 is a top plan view of the cutting-machine. Fig. 6 is a vertical section on the line 6 6, Fig. 5. Fig. 7 is a vertical section on the line 7 7, Fig. 5. Fig. 8 is a detail view of the knife-carrying frame. Fig. 9 is a view of the supplemental carrier-frame. Fig. 10 is a detail view of the friction-disks of the feed device. Fig. 11 is a view of a block or billet of wood from which the broom is made, and Fig. 12 is a perspective of a finished broom.

In describing this invention I wish to state that the particular process or steps by which the billet of wood and the wood splints are treated forms a basis of a separate application, Serial No. 311,186, filed even date herewith, in which said process is fully explained. It will, however, be necessary to incidentally refer to portions of the said process or steps, so as to enable me to more clearly set forth the functions and operations of the several parts of this invention.

In the accompanying drawings, A denotes the main frame, which consists, mainly, of the side frames A' A' and the intermediate frame A², said frames being connected together near their lower ends by the cross-bars *a a*. The upper extended portions of the side frames are provided with suitable vertical guides B B, preferably formed by lateral wings or extensions *b b*, secured upon the front faces of the extensions. Between these guides is arranged to slide the vertically-reciprocating cutter C, which will be presently described.

D denotes the bed-plate of the machine, secured between the side frames A' A', and D' denotes a supplemental bed or shelf, also secured to sides A' A', but a short distance below the bed-plate D and projected from the front of said side frames A' A', as clearly shown in the drawings.

The bed-plate D and the shelf D' are connected by a short vertical wall *d* and an incline *d'*, the purpose of which will hereinafter appear.

C' denotes the cutter-carrying frame, which consists of a rectangular frame composed of the vertical sides *c c* and the upper and lower cross-pieces *c' c'*. The sides *c c* are provided with lateral wings *c² c²*, which embrace the wings *b b* of the main frame and are guided thereby when said frame is operated. To the rear of the upper cross-bar *c'* is adjustably secured the knife *c³*, which extends across the cutter-frame and projects below the lower edge of the upper cross-bar *c'*, as shown.

C² denotes a depending wing secured upon the cutter-frame, to which is pivotally connected one end of a pitman E, the opposite end of which is pivoted upon a crank-pin *f*, projected from a pulley F, mounted upon the main or drive shaft G, upon the outer end of which is fixed a power-pulley *g*, driven in any desired manner. The connection between the drive-shaft and the knife-carriage is such that when said carriage shall have reached its lowest position the cutting-edge of the knife will be even with the bed D, and when in its uppermost position it will carry the knife high enough to permit of the insertion of a large sized billet of wood. An abutting plate *d⁴*, preferably of soft metal, is placed in the bed

D to protect the same from undue wear in case the knife may be improperly adjusted and pass below the top of the said bed-plate.

To the rear of the cutter-carrying frame and operating in the bed-plate are arranged the feeding devices for automatically feeding the wood billets to the knife, and which are most clearly illustrated in Figs. 2 and 6 of the drawings. These feeding devices are constructed as follows: H denotes a transverse shaft journaled in bearings *h h*, depending from the bed-plate D, which is provided upon its outer end with a suitable ratchet-disk I, which is operated by a pawl *j*, pivoted in the upper end of a lever J, centrally pivoted to one of the side frames A', the lower end of which is arranged in contact with a cam projection *j'* on the drive-shaft. The cam *j'* is so constructed that at each complete revolution of the drive-shaft it will operate to throw the lower end of the lever outward and thereby force the upper end with the pawl *j* inward and turn the ratchet and shaft H a certain degree. H' denotes toothed wheels secured upon the drive-shaft H, which mesh with rack-bars K K, arranged to slide between guides *k k* on the under side of the bed-plate. These bars K are connected by means of the screws K' K', which pass through elongated slots D³ D³ in the bed-plate D, with push-bars L, provided at their front ends with vertical arms *l l*, which bear against the billet of wood being cut and feed the same forward. Thus it will be seen that by the construction specified the billet is automatically fed forward by means of the drive-shaft.

To permit of the adjustment of the feed so that the wood splints may be cut into various degrees of fineness, and also to permit of the shaft H to be quickly turned by hand, I construct the pawl-and-ratchet wheel and its connection with said shaft H in the manner more clearly illustrated in Fig. 10 of the drawings. By reference to said figure it will be seen that near the outer end of the shaft H, I provide a disk M, keyed or otherwise fixed thereto, which is provided with a circular recess *m*. The ratchet-wheel I, previously referred to, is loosely fitted upon the shaft H, and is provided with a hub or annular projection *i* on one side, which fits in the recess *m*, and with a circular recess *i'* in its opposite face, in which is fitted the circular flange *n* of the securing-nut N.

O denotes washers, formed of leather or rubber, which are fitted in the recesses *m* and *i'* to more readily adapt the several parts for frictional contact.

P is a jam-nut, which is adjusted against the nut N.

The pawl previously referred to is adjustably pivoted at its rear end in a series of apertures *p p*, formed in the upper end of the operating-lever, said apertures being arranged in the arc of a circle struck from the pivot of said lever. By this arrangement it will be readily seen that the pawl may be pivoted so

as to give a longer or shorter revolution to the ratchet-disk and the shaft H, thereby permitting feeding the block or billet so as to cut splints of various width. By arranging the feed devices as described splints of but a sixty-second of an inch in thickness may readily be cut by using ratchets with more or less teeth.

The object of arranging the several disks for frictional contact, as described, is to prevent any accident or breakage thereto.

Should the feed-arms be at their outer limit, and thereby be prevented from further feed forward, the ratchet-disk would turn on the shaft. The disk M is provided with a series of radial hand-holds to permit of turning the feed devices back by hand, the pawl during this operation being thrown back, as shown in dotted lines in Fig. 1 of the drawings.

Q denotes a leaf-spring for normally holding the lever in contact with the operating-shaft.

R R' denote gripper-jaws or guides, arranged on the bed-plate, the one to the outer side of each of the feed-arms L and which form the longitudinal guides for the wood billet as the same is fed forward. The jaw R is adapted for transverse adjustment on said bed-plate by means of the guides *r r* and elongated slot *r'* in the plate R and the retaining-screw *r²*. The jaw *r'* is also transversely adjustable and slides between the guides *s s*. This jaw, however, is connected by means of a toggle-link S' to a pivoted hand-lever S, by means of which the operator may readily adjust said jaw in relation to wood billets of different lengths. The lever S is pivoted, as at *s''*, to a projecting flange T of the bed-plate, and is arranged to engage a notched projection T' on said flange, by means of which the said lever may be held in its desired adjustment.

The inner faces of the jaws R and R' are provided with a series of teeth R², which are formed, preferably, of a horizontal upper portion 1 and a downwardly-inclined portion 2. By forming the teeth as described it will be seen that when the jaws are forced in against the ends of the billet the teeth will force the billet down against the bed of the machine, thereby preventing the billet lying loosely thereon when it is being fed to the reciprocating knife.

V denotes a supplemental or presser carriage arranged to be reciprocated vertically by means of the operating-shaft, as will be presently described.

The carriage V, which is shown in detail in Fig. 9, consists of a long vertical arm U¹, a short vertical arm U², adapted to guide the same, and the cross-bar U³. This carriage is arranged to slide between vertical guides formed on the inner face of the side frames A' A' just in the rear of the cutter-carriage. Mounted centrally upon the cross-bar U³ is a vertical guide provided with rearwardly-projecting flanges *u u*, one of which is formed

with an internal rack-bar u' . Upon this guide is adjusted a housing V'' , provided with suitable grooves v , which engage the flanges $u u$ and travel thereon. Upon the inner end of a short horizontal stub-shaft W is mounted a toothed wheel w , which engages the rack u' , the outer end of said shaft being provided with a thumb-piece w' , as shown, by the turning of which the housing may be adjusted up or down upon the guide U . To hold the same in any desired position, a thumb-screw X is provided, which passes through the said housing and bears with its inner end against the wall of the guide U . The housing V'' is made of heavy metal, and is provided at its lower end with a presser-foot V' .

Y denotes an adjustable foot-piece, which is secured to the lower end of the arm U' , and which is adapted to be engaged by a cam projection Z on the power-shaft.

The function and operation of the supplemental carriage will be fully explained in the annexed description of the operation of the machine.

10 denotes the frame of the crushing-machine, in which are mounted the crushing-rollers 11 12, the upper one 11 of which is adjustably journaled in the sides of the frame, as shown.

13 denotes a chute or bed-plate, which leads to the meeting faces of the rollers. These rollers are arranged to revolve in opposite directions and to have a partial inward and outward motion—i. e., when the material to be crushed is fed into the rolls the same will be pulled in a short distance. The rolls will then reverse their motion and feed the material out again. To accomplish this movement by a continuously-running power, I provide the rolls at one end with cog-gears 14 14, which mesh, and the lower roll 12 at its opposite end with a long crank-arm 15.

In a rearward projection 16 of the frame I mount a stub-axle 17, which is provided upon its inner end with a drive-pulley 18, and upon its outer end with a short crank-arm 19, which is connected to the crank 15 by the pitman 20, as shown. The relation of the crank-arms 50 and the pitman is such as to cause the rolls to have the backward and forward movement described by a continuous revolution of the drive-pulley.

21 denotes the revolving hackle, which consists of the main frame 22, the revolving cylinder or hackle proper 23, which is mounted upon the shaft 24, journaled in the frame, and which is provided with a driving-pulley 25, as shown, and the upper and lower feed-tables 26 and 27. The cylinder 23 is provided with a series of fine teeth or projections arranged in alternate circles about the same, as shown. The billet, after having its end crushed between the rolls 11 and 12, is then carried to the hackling-machine, where the crushed end is frayed by the hackle 23, the billet being placed upon the table and

the crushed end only being subjected to the action of the hackle. Two feed-tables 26 and 27 are used—one at each side of the hackle proper—and arranged as shown, and by means of such construction two operators are enabled to work simultaneously at the same hackling-machine.

As before stated, to clearly set forth the operation of the machinery described it will be necessary to some extent to refer to the method, it being understood, however, that the method or process described forms no part of this invention, the same being claimed in the application above referred to.

The operation is as follows: The wood billet, after it has been suitably treated to render it more pliable, is placed by the operator on the bed-plate of the machine, and has one of its edges faced by the knife. It is then placed with its faced edge on the bed, and another of its edges is also faced, thereby providing said billet with two sides formed at a perfect right angle to each other. The billet is then securely held and forced against the bed by means of the toothed adjustable jaws $R R'$. The power-shaft is then set in motion, causing the knife to reciprocate, and at the same time causing the automatic feeding devices to feed the billet to the knife. The knife in descending will at each downward movement cut off a slice or leaf of the billet, which will fall on the incline and rest on the table or shelf D' in front of the machine, said operation continuing until the entire billet has been cut into thin leaves. During this the first step of cutting the billet the presser-foot and the housing are adjusted up out of operative position. After the billet has been entirely cut up in leaves the operator throws the feed-pawl back and turns the disk and sets the feed-arms in the back position and readjusts the pawl. The leaves are then folded together as near as possible to the original billet shape and again placed upon the bed of the machine, but with their flat side down. The presser-foot and the housing are then adjusted so as to press the said leaves into a solid mass. The power-shaft is again started, and the said leaves are automatically fed forward, the knife cutting them up into small splints approximately square in cross-section. During the operation of feeding the leaves of wood forward the presser-foot is slightly elevated by means of its connection with the vertically-movable carriage, said carriage being operated by the cam on the power-shaft, as before stated. The wood splints which are formed by the last cutting after being dried are then ready to be worked into broom shape. After said splints have been formed into the proper broom shape the lower ends (say one-third their length) are immersed into a suitably-prepared liquid in a manner referred to in my application for process of broom-making, Serial No. 311,186, filed even date herewith, which gives the said lower end an increased

elasticity. The broom is then taken and its end is then drawn between the crushing-rollers to the extent of one inch, more or less, which crushes the cross-grain of the wood, the said crushing-rollers being so adjusted as not to mash the said end, but merely to break the grain. The broom ends are then passed to the revolving hackle, the teeth of which engage and tear out longitudinally the crushed ends of the broom, thereby rendering the ends into a fine thread-like condition.

While I have shown and described the crushing-rolls and the revolving-hackle as separate machines, it is manifest that the same may all be adjusted on the main or cutting machine and be operated by the same drive-shaft. I have, however, shown them separate, as this will be the most convenient way of operating them. It will also be understood that while I have shown the supplemental carriage and its adjuncts connected with the cutting-machine proper the same may be arranged in connection with a cutter on another machine, so that one machine may cut the wood billets while the second machine may be cutting the wood leaves.

From the foregoing description, taken in connection with the drawings, the advantages of my improvement will be readily understood. It will be seen that they produce a practical means whereby the wood billets can be reduced to fine splints, which may be placed upon the market as a substitute for broom-corn.

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

1. As an improvement in machines for making wood splints for brooms, the combination, with the main frame, the power-shaft mounted therein, a bed-plate formed thereon, and vertically-reciprocating knife operating in said frame, said knife connected with and operated by the power-shaft, of automatic feed-arms adapted to slide longitudinally upon said plate toward the knife, a lever centrally pivoted to the frame, the lower end thereof engaging and adapted to be oscillated by the power-shaft, and intermediate gearing connecting said feed-arms with the upper end of said lever, whereby the arms may be fed forward at each movement of said lever, substantially as and for the purpose described.

2. In a machine for making wood splints for broom-making, the combination, with the main frame, the power-shaft journaled therein provided with a cam projection, a vertically-reciprocating knife or cutter mounted thereon, said knife connected with and operated by the power-shaft, and a bed mounted on the main frame, of a vertically-reciprocating supplemental carriage operating in the frame to the rear of the knife-carriage, said carriage provided with a depending presser-foot, and a long depending arm adapted to engage the cam projection on the power-shaft, substantially as and for the purpose described.

3. In a machine for making wood splints for broom-making, the combination, with the main frame provided with a bed-plate, a power-shaft journaled in said frame, provided with cam projections, and a vertically-reciprocating knife connected with and operated by the said shaft, of the vertically-reciprocating supplemental carriage operating in the frame to the rear of the knife, having a long arm adapted to engage the cam on the shaft, and an adjustable presser-foot adapted to hold the cut leaves of wood in place, substantially as and for the purpose described.

4. The combination, with the main frame, a power-shaft journaled therein provided with a cam projection, a bed-plate mounted thereon, a supplemental carriage adapted for vertical reciprocation in said frame, provided with a depending arm adapted to engage the cam projection, and a central guide-plate mounted thereon, of a presser provided with a housing adapted to fit upon the guide-plate and be vertically adjustable thereon, and means for holding same in its desired adjustment, substantially as shown and described.

5. The combination, with the main frame, the vertically-reciprocating knife, and the vertically-reciprocating supplemental carriage, of means for operating said knife and carriage, said carriage consisting of vertical side bars, a cross-bar, a central portion provided with projecting flanges, one of said flanges provided with an internal rack-bar, a housing fitting said flanges, a stub-shaft mounted in said housing, provided with a cog-gear at its inner end, engaging the rack, and a thumb-disk at its outer end, whereby said housing is adapted for vertical adjustment on said central portion, said housing provided with a downwardly-extended presser-foot, and means for holding the housing in adjusted positions, substantially as and for the purpose described.

6. The combination, with the main frame, of transversely-adjustable gripper-jaws mounted on the bed thereof, adapted to grasp the ends of the wood billet, said jaws provided with horizontal teeth across their inner faces, said teeth formed of an upper horizontal portion and a lower inclined portion, substantially as and for the purpose hereinbefore described.

7. The combination, with the main frame, transversely-adjustable jaws R R', mounted on the bed thereof, adapted to engage the opposite ends of the wood billet, and a pivoted link connected to the outer end of the jaw R', of a lever pivoted at its rear end on the bed-plate and connected near said end to the aforesaid link, its outer end adapted to engage a rack or keeper, substantially as and for the purpose described.

8. In a machine for cutting wood splints for the manufacture of brooms, the combination, with the main frame, a vertically-reciprocating knife-frame mounted thereon, a power-

shaft, a pitman-connection between said shaft and the knife-frame, and the supplemental carriage and cam projections on the power-shaft, of automatic feed devices, a lever centrally pivoted upon the frame, intermediate gearing between the upper end of said lever and the feed devices, the lower end of said lever engaging one of the cam projections on the shaft, and a depending arm on the supplemental carriage, adapted to engage the other cam projection, said cams being so arranged whereby the supplemental carriage will be raised just in advance of the forward movement of the feed devices, substantially as shown and described.

9. The combination, with the main frame, the knife-carriage reciprocating vertically therein, and the power-shaft connected with and operating the said knife-frame and provided with a cam projection, of the automatic feed devices consisting of arms adapted for longitudinal movement toward the knife on the bed-plate of the frame, provided with cog-racks on their lower faces, a transverse shaft provided with cog-pinions engaging said racks, a ratchet-wheel mounted on one end of said shaft, a lever centrally pivoted on the frame, and a pawl pivoted on its upper end,

engaging the said ratchet-wheel, the lower end of said lever engaging the cam projection on the shaft, all arranged substantially as and for the purpose described.

10. The combination, with the cutting devices, the feed-arms longitudinally movable toward the cutting devices, the transverse shaft, the gear-connections between said shaft and feed-arms, a fixed disk keyed on one end of said shaft, a loose ratchet-disk mounted on said shaft adjacent to the fixed disk, and an adjusting-nut fitted to said shaft for pressing said ratchet-disk into frictional contact with the fixed disk, of a power-shaft mounted in the main frame, provided with a cam projection, a pitman-connection between the knife-frame and said shaft, a lever centrally pivoted on the frame, its lower end arranged in contact with the cam on the shaft, and an adjustable pawl connected to the upper arm of the lever and engaging the ratchet-disk, substantially as and for the purpose set forth.

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

GEORGE W. McKIM.

Witnesses:

THEO SNODGRASS,
W. M. LUPTON.