No. 684,727. Patented Oct. 15, 1901.

A. C. SAXTON.

SAW FILING MACHINE.

(Application filed Apr. 19, 1900.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.

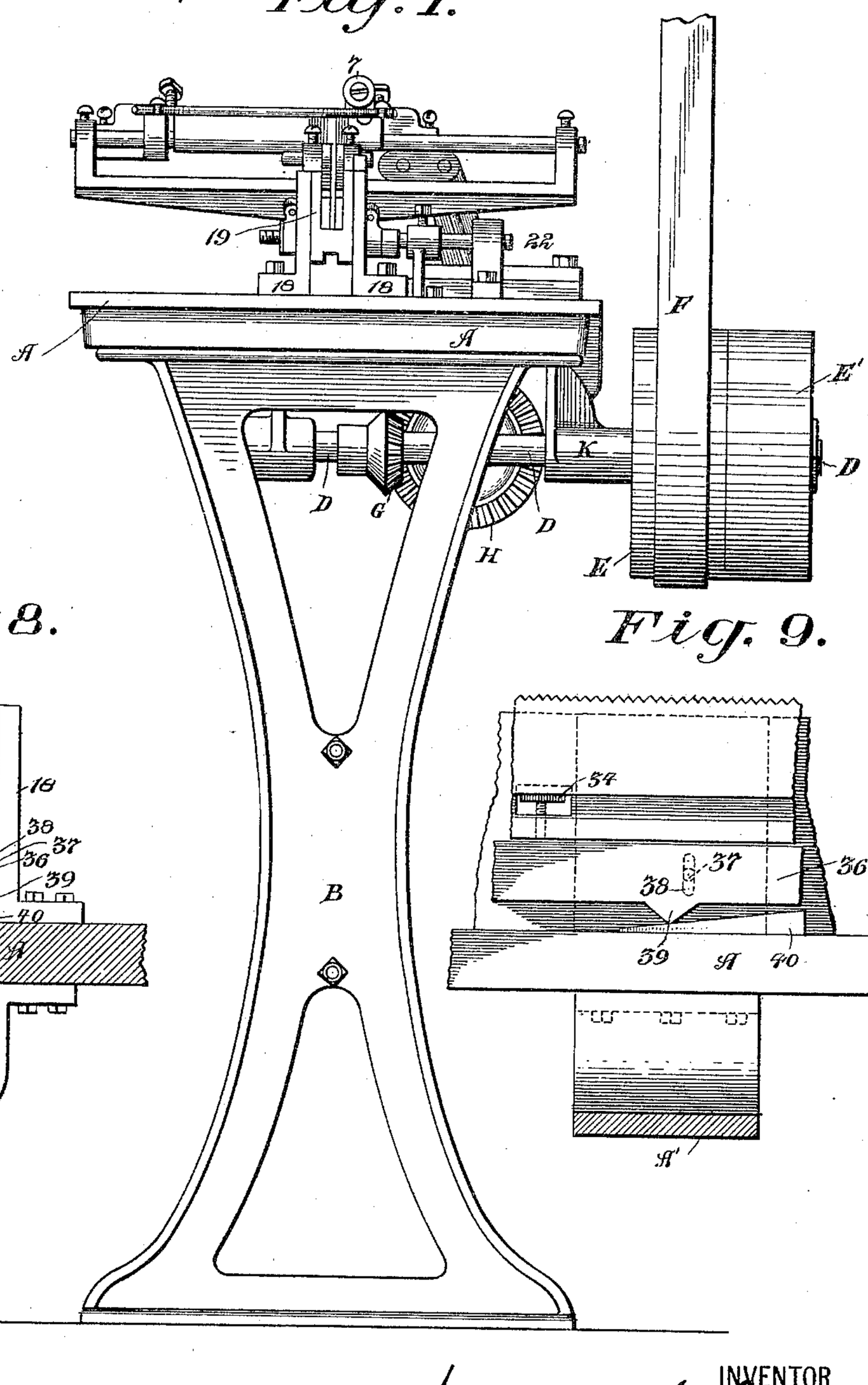

Fig. 8.

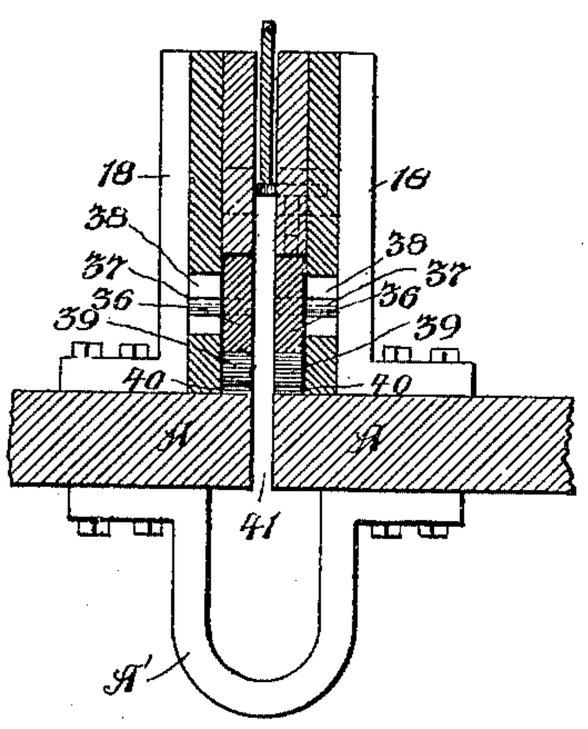

Fig. 9.

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Fig. 2.

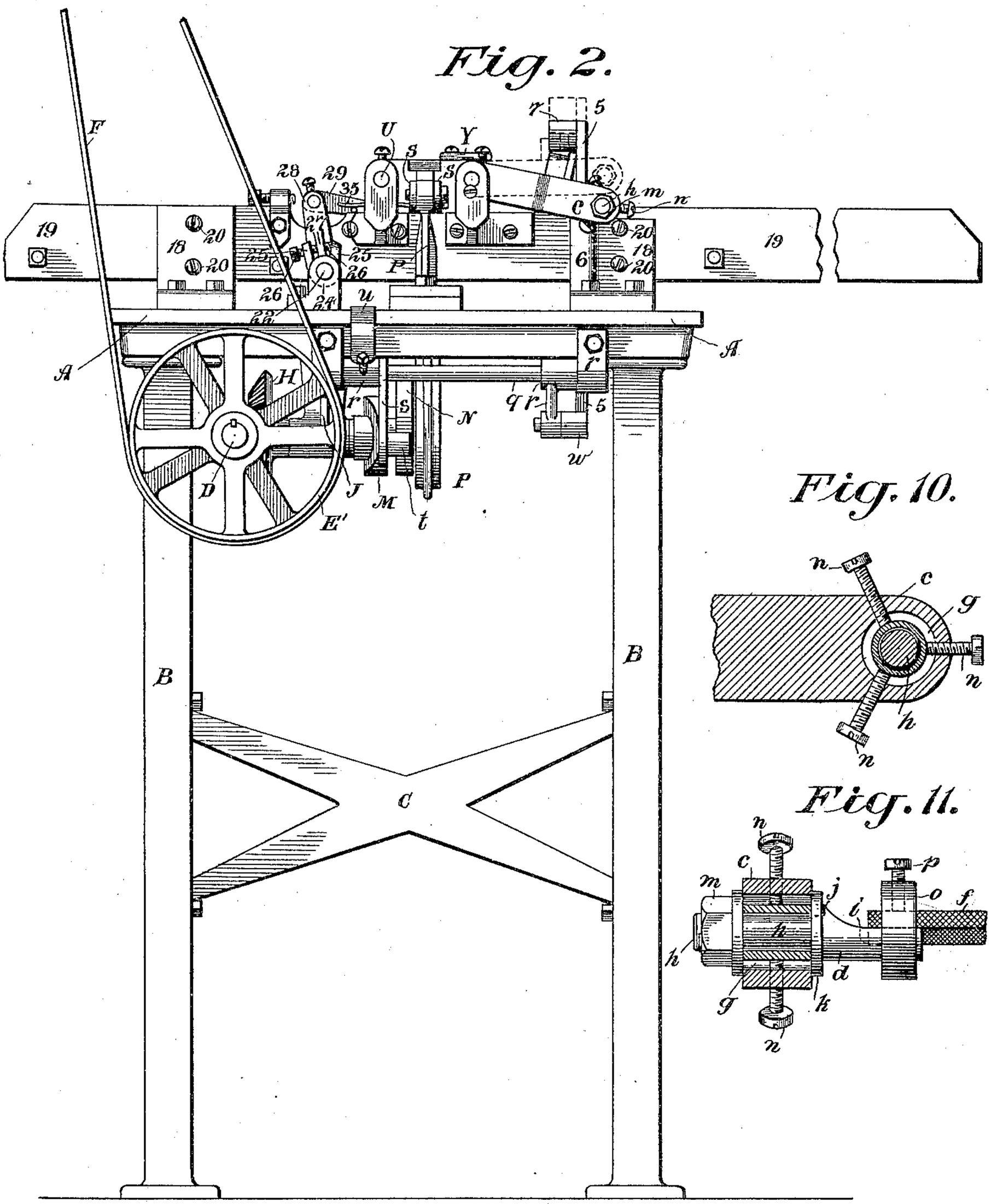

Fig. 10.

Fig. 11.

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5 Sheets—Sheet 3.

Fig. 3.

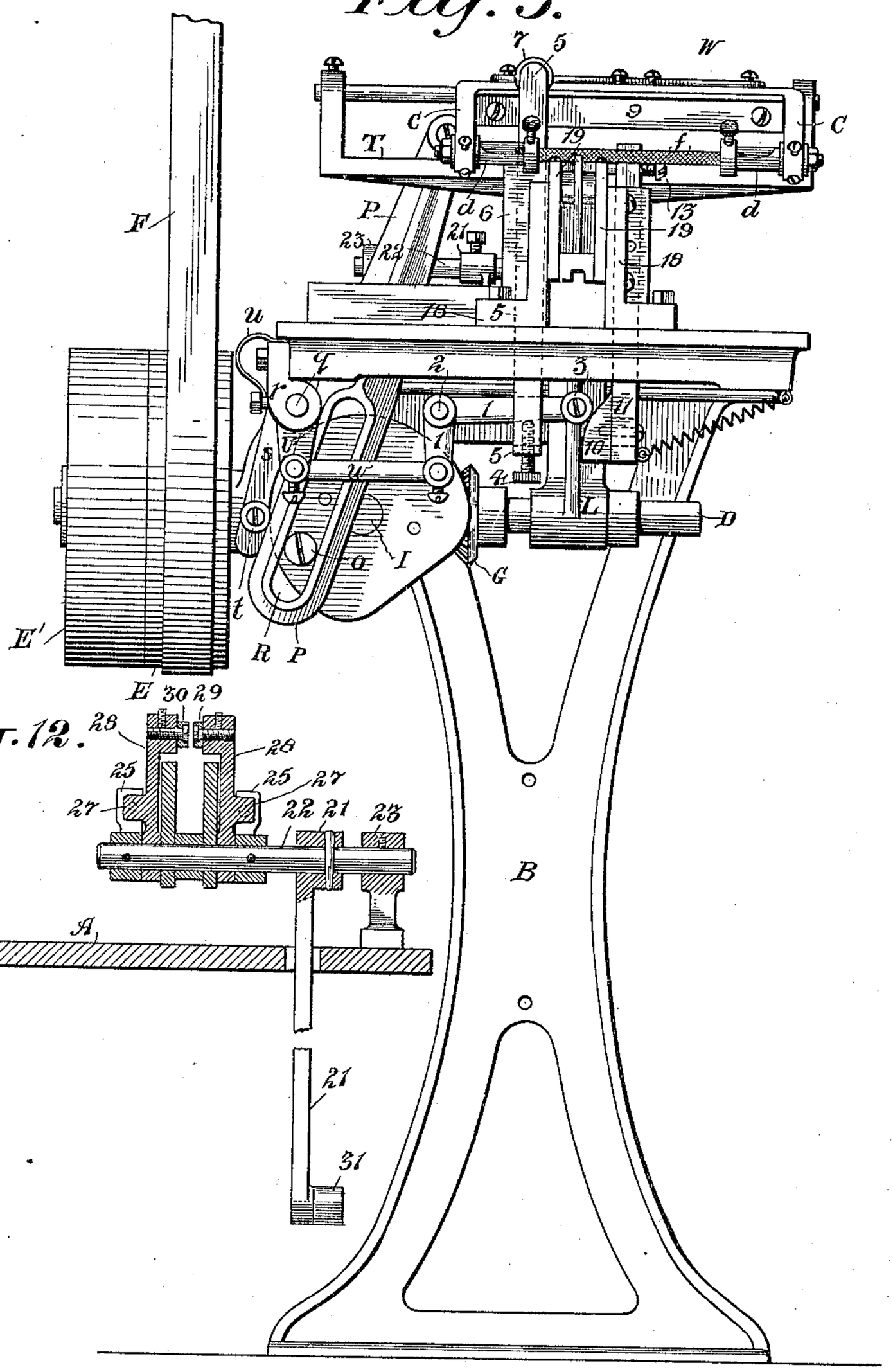

Fig. 12.

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Fig. 4.

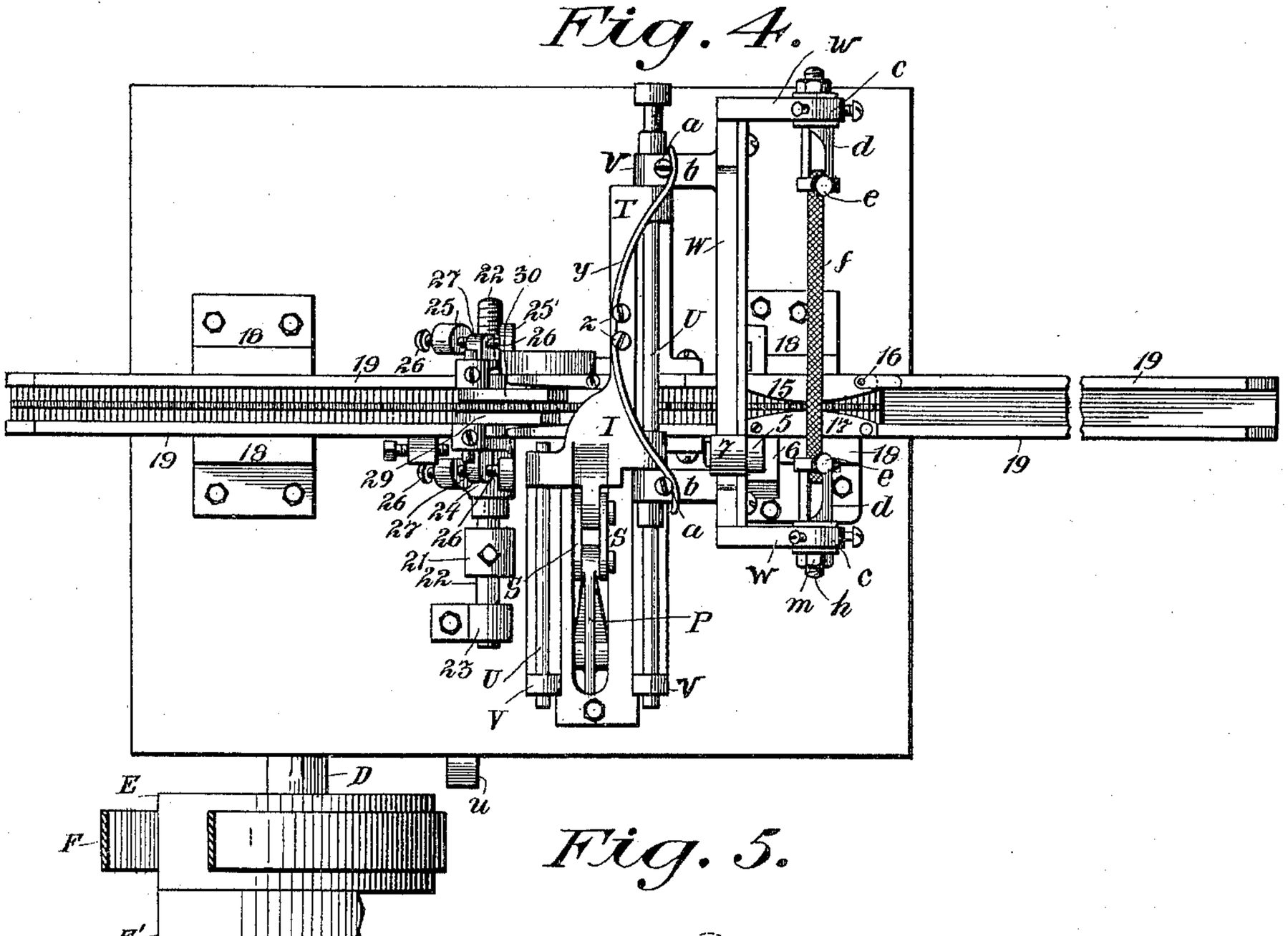
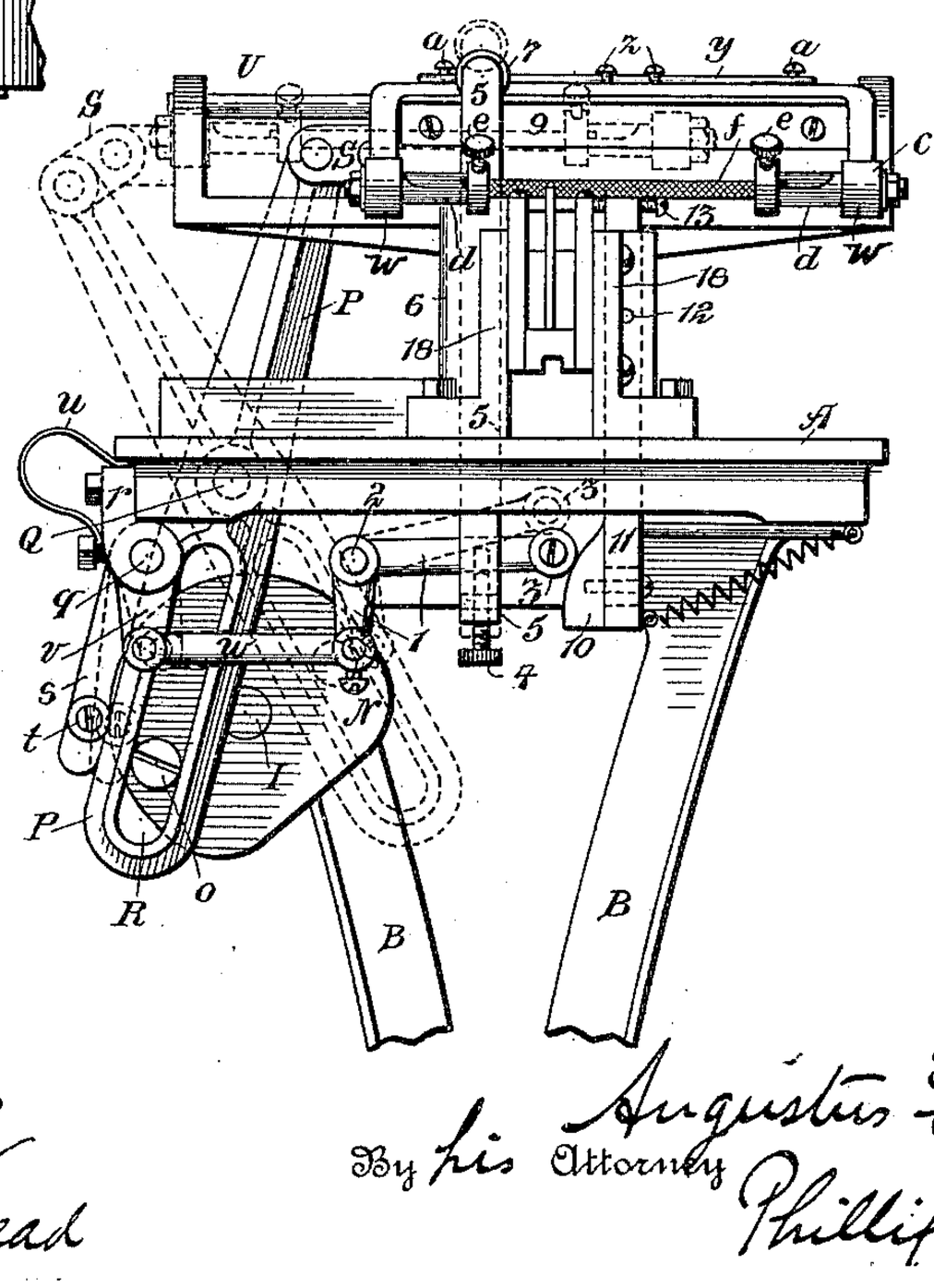


Fig. 5.



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(No Model.) 5 Sheets—Sheet 5.

Fig. 6.

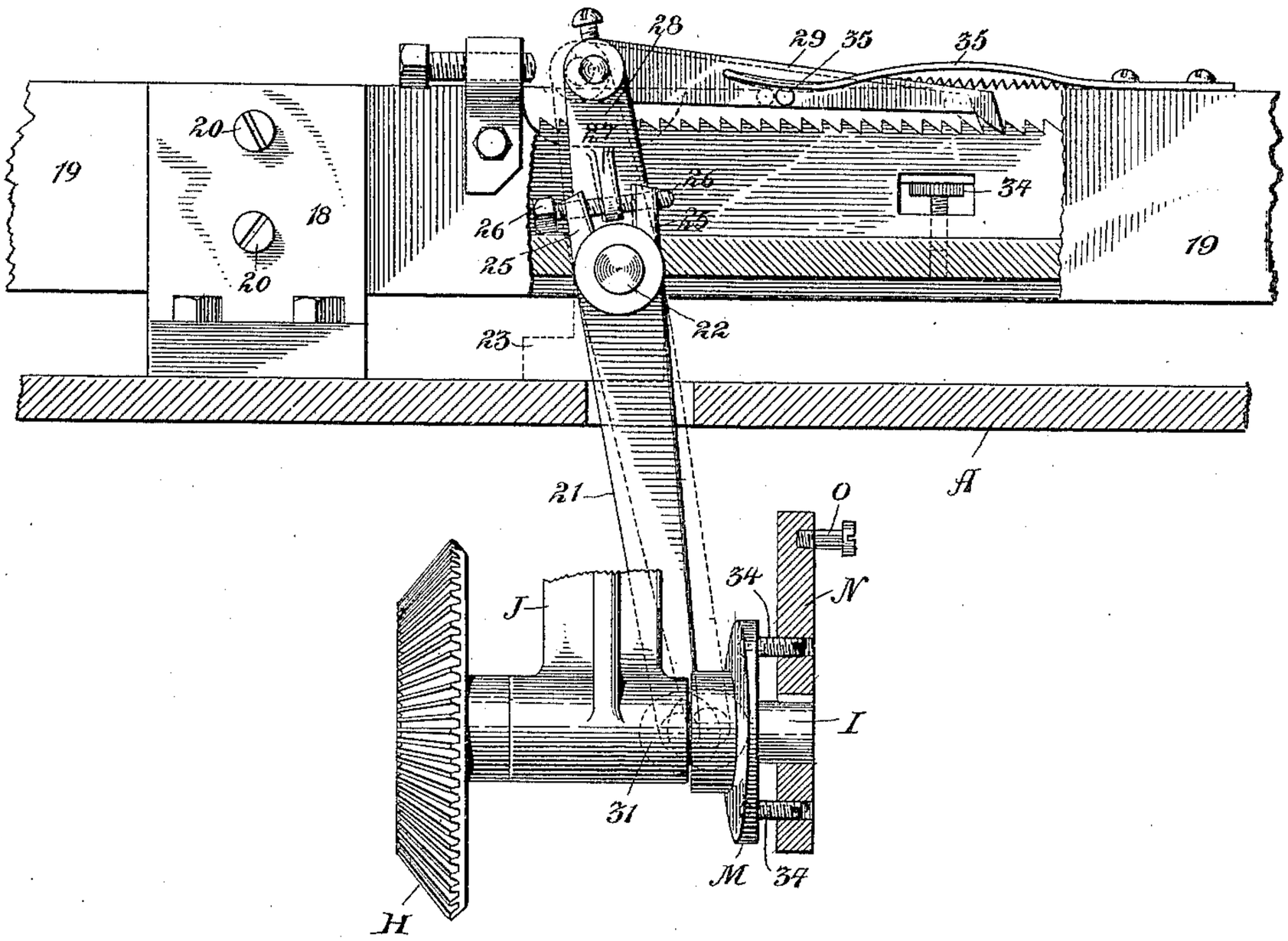
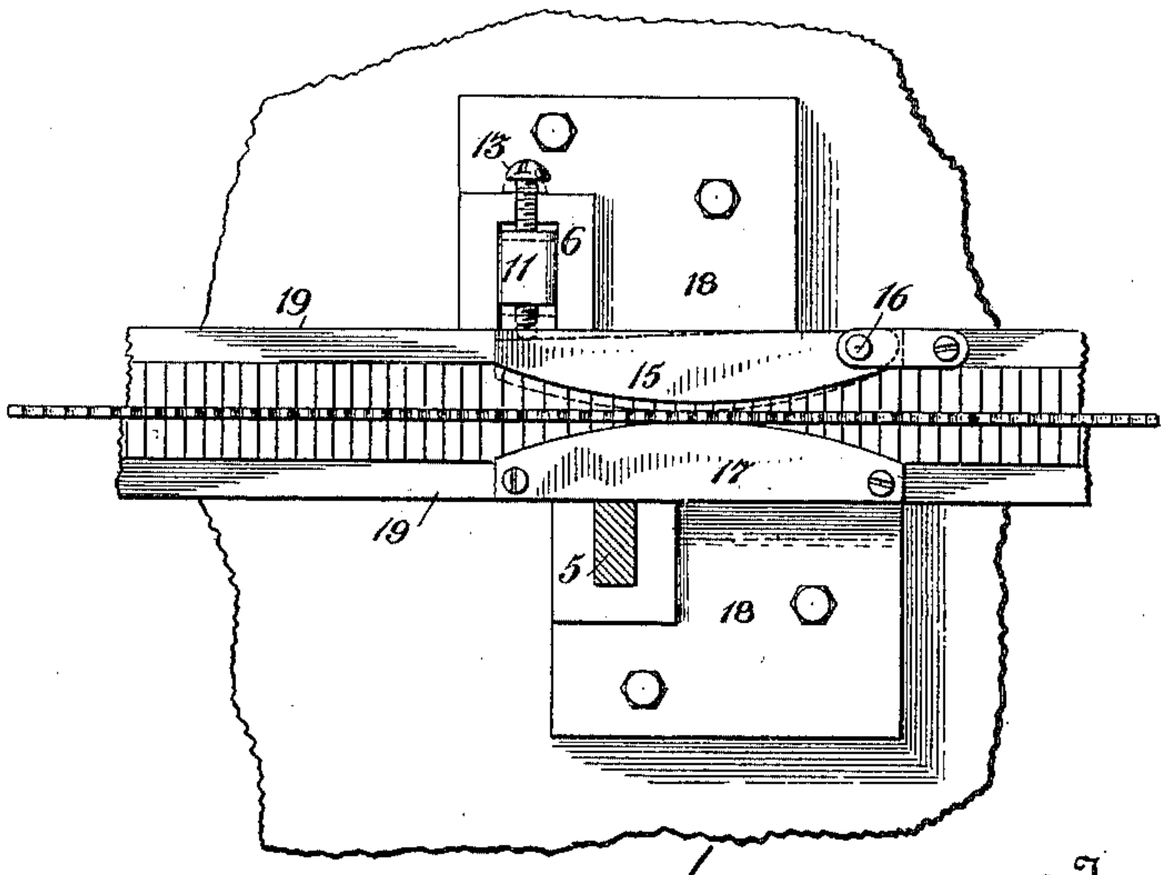


Fig. 7.



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UNITED STATES PATENT OFFICE.

AUGUSTUS C. SAXTON, OF BROOKLYN, NEW YORK.

SAW-FILING MACHINE.

SPECIFICATION forming part of Letters Patent No. 684,727, dated October 15, 1901.

Application filed April 19, 1900. Serial No. 13,430. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTUS C. SAXTON, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, (having my post-office address at No. 262 Washington street, in said Brooklyn,) have invented a new and Improved Saw-Filing Machine, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a rear elevation of the machine. Fig. 2 is a side elevation as seen from the right. Fig. 3 is a front elevation of the machine. Fig. 4 is a plan view of the machine. Fig. 5 is a front elevation showing certain details of construction and operation. Fig. 6 is a side elevation, partly in section, showing the more important parts of the feeding mechanism. Fig. 7 is a plan view of the saw clamping or vise mechanism. Fig. 8 is a front view, partly in section, of a modified construction of the saw-carriage, its slideway, and coacting parts. Fig. 9 is a side elevation, partly in section, showing the parts illustrated in Fig. 8. Fig. 10 is a sectional side view of a part of the oscillating frame which carries the file. Fig. 11 is a front plan view of that which is shown in Fig. 10. Fig. 12 illustrates a detail, mostly in vertical section, of certain parts of the feeding mechanism.

In this machine I accomplish the filing of saws in a manner closely resembling hand-filing; but my machine being provided with devices for securing all desirable adjustments the accuracy of the filing is superior to that possible by hand, and, in addition to this, the mechanism and its operation are such that the teeth of the saw are maintained of the same length, in the same plane, and have the same pitch, and each is as near as possible identical with every other, and the speed at which the machine operates is such that a saw may be filed in a small fraction of the time required for filing by hand.

A is the table of the machine, supported upon legs B or in any other preferred manner. If separate legs are employed, I prefer to brace them by cross-braces C.

D is the main shaft, upon which are fast and loose pulleys E E′, respectively.

F is the driving-belt. G is a beveled pinion keyed to the shaft D, and H is a beveled gear with which the pinion intermeshes. The gear H is supported upon a shaft I, (see Figs. 3 and 5,) which is supported in a bracket or hanger J. (See Figs. 2 and 6.) The shaft D is held in a bracket K at one side of the machine and in another one, L, at the other side. They are supported on the under side of the table. (See Figs. 1 and 3.)

M is a face-cam attached to the shaft I, and N is a face-plate provided with a wrist-pin O. The edge of this plate N is likewise a cam, as shown best in Fig. 6.

P is a lever, pivoted at Q to the table of the machine, the lower end of which is slotted, as at R, within which slot plays the wrist-pin O. The upper end of this lever P is connected by links S S (see Figs. 4 and 5) to the cross-head T, forming part of the file-supporting frame. This frame is composed of two parts, the cross-head T, above referred to, which is supported by and slides upon two parallel and substantially horizontal rods or bars U U, (see Fig. 4,) which are suitably supported upon the frame of the machine by bearings V V, &c., and the other part of the file-carrying frame (shown at W) is arranged to oscillate somewhat upon one of the bars U, so that when moving in one direction the file may be brought into operative contact with the teeth of the saw, but on the backward movement it will be lifted from such contact. The mechanism whereby this oscillation is effected is in part as follows: Y is a spring the central portion of which is held by any suitable device, such as a lug or pair of screws Z, (see Fig. 4,) and the ends engage with lugs, screws, or the like *a a*, formed upon or attached to arms *b b*, which form part of the oscillating frame W. The action of this spring therefore is always to rock the frame W, which carries the file, upwardly, tending to lift the file from the underlying saw-blade. The file is supported in this oscillating frame W by means of projecting arms *c c*, within each of which is a socket *d*, provided with clamping devices. The sockets are adapted to receive the ends of the file *f*, and the clamps are adapted to hold the ends of the file rigidly when in position, as will be described. I prefer that the ends of the file should be the full size of its body part. This is not essential, however. The sockets *d* and the clamping-screws

e may be so formed as to hold the file irrespective of the shape of its ends. The sockets *d* are shown in detail in Figs. 10 and 11, in which the front end of one of the supporting-arms is shown, as before, at *c*. In this arm is drilled a hole *g*, through which loosely passes the threaded extremity or spindle *h* of one of the sockets *d*. The sockets (see Fig. 11) are pieces of steel having V-shaped recesses *i* milled out of their front ends, of the proper shape to receive the ends of the file *f*, and they are made of two diameters, the spindle *h*, already referred to, being smaller than the body part *d*, thus producing a shoulder *j*, (see Fig. 11,) against which preferably but not necessarily rests a washer *k*, which fits against the side of the arm *c*. *m* is a nut threaded to the spindle *h*, whereby the sockets are rigidly held to the arms *c* after they have been properly adjusted. This matter of the adjustment of the file-holding sockets is of importance in machines of this sort, and it is something which, so far as I am aware, has been neglected by prior inventors in this art. The means for acquiring the stated adjustment may be variously constructed. I therefore do not limit myself in any respect to the special construction which I am about to describe. The form shown by me, however, has proven very effective in use, and it is as follows: As already stated, the threaded spindle *h* is considerably smaller than the hole *g* in the arm *c* through which it passes, and I provide three set-screws *n n n*, which may for convenience have milled heads or be otherwise operated. They pass through correspondingly-threaded holes in the arm *c* in such manner as to bear upon the spindle *h* at three points substantially equidistant on its circumference, as illustrated in Fig. 10. By this means I adjust the sockets to one side or the other of the holes through the arms *c*, and when once adjusted then by screwing up the nut *m* they are rigidly held in their adjusted position. It will be seen that by this method what may be called the "primary" end of the file—in other words, that which first engages with the teeth of the saw—may be set slightly higher than the opposite end, which engages last with the saw, and also it may be set forwardly or rearwardly, as may be necessary. In this way my machine simulates exactly the operation of hand-filing, because a skilled saw-filer enters the front end of his file between the teeth to be sharpened, and as he moves the file forwardly he does so with a gradually-increasing pressure upon it, so that the file, as it were, slides down into the teeth and exerts substantially equal pressure and effects substantially an equal degree of cutting during its entire stroke. If this adjustment was not made in a saw-filing machine, the "bite" of the file would be almost entirely at the commencement of the filing operation, which would be very apt to rip the teeth from the file or rip the teeth from the saw or distort them or cut the metal of the saw-blades so excessively that an upsetting or burring operation would be apt to result, leaving a ragged, uneven, and distorted tooth instead of a sharp, keen, properly-shaped one.

Another important feature wherein my sockets differ from any heretofore known, so far as I am aware, is the method of connecting the files to the sockets. Under my invention I provide for each socket a loosely-fitting sleeve or collar *o*, which is adapted to slide freely back and forth over the sockets, and in this collar I thread a set-nut *p*, (preferably having a milled head.) As already stated, the files are so shaped at their ends that they properly fit the V-shaped recess in the end of the socket. In adjusting the file within the sockets I first loosen the set-screws *p* and slide the collars, respectively, to the right and left back against the washers *k*. Then the file is simply dropped into place, and it automatically assumes exactly the proper position. The sleeves are then in a moment moved back again to near the inner ends of the respective sockets, and upon setting up the screws *p* the file will be immediately held in proper position.

To return now to the devices which effect the oscillation of the file-supporting frame W. That which gives it its upward movement has already been described. The mechanism which depresses it during its filing stroke is as follows, reference being had particularly to Figs. 2, 3, and 5: *q* is a rock-shaft supported in bearings *r r*. *s* is an arm keyed to the shaft *q*, upon which is an antifriction-roller *t*, which engages with the face of the cam N. *u* (see Figs. 2 and 5) is a plate-spring fastened at one end to the base of the machine, and at the other end it bears against the hub of the arm *s* in such manner as to depress the arm and maintain permanent contact between the roller *t* and the face of the cam N. *v* is another arm keyed to the shaft *q*, which engages at its end with a connecting-rod *w*, (see Fig. 5,) which in turn connects with a pivoted bell-crank 1, pivoted at 2 to the under side of the table of the machine. The free end of the bell-crank is provided with a roller 3 for a purpose hereinafter to be explained, and near its end it engages with a set-screw 4, set in the rectangular end of a sliding bar 5, which passes upwardly through the table of the machine and through a supporting-block 6 and carries a roller 7 on its upper end. This roller engages with the upper edge of the cross-bar 9 of the oscillating frame W, so that as the arm 1 of the bell-crank moves downwardly its contact with the upper end of the set-screw 4 pulls down also the sliding bar 5, and the roller 7 upon its upper end, engaging with the upper edge of the cross-bar 9, in turn causes the oscillating frame W to tip downwardly, thereby bringing the file into contact with the teeth. There are various adjustments in this part of the mechanism whereby exactness in operation is secured, none of which, however, need be specially referred to, excepting

to state that by setting the screw 4 higher or lower in the rectangular end of the bar 5 the downward pressure of the file upon the teeth of the saw may be exactly adjusted. As heretofore stated, the free end of the bell-crank 1 carries on its end a roller 3, which as this end of the crank rises and falls engages with a cam-shaped block 10 on the lower end of a lever 11, which is pivoted at 12 to some rigid part of the machine, and at the upper end of this lever 11 there is a transversely-arranged set-screw 13. (See especially Fig. 7, also Figs. 3, 4, and 5.) This set-screw engages with the free end of one jaw 15 of the saw-clamping vise. This jaw is pivoted at 16 to the slideway for the saw-carriage, which will be hereinafter explained. The opposite jaw 17 of the vise is rigidly connected to the slideway or other suitable support by screws, as shown. The timing of the apparatus is such that during the forward propulsion or feed of the saw carriage and blade the lever 11 does not exert pressure upon the movable jaw 15; but just prior to the descent of the file, as heretofore explained, (by reason of the oscillation of the frame which carries it) and its engagement with the teeth of the saw the bar 11 is rocked upon its axis 12 and the jaw 15 closed upon the saw-blade, whereby it is held immediately adjacent to the teeth to be filed between the rigid jaw 17 and the slightly-movable one 15. There are various adjustments employed by me in connection with this lever 11—that is to say, the cam-block 10 is connected to its lower end by a screw, as shown, (see Fig. 5,) which works in a slot in the lower end of the bar 11, so that the block may be shifted vertically, whereby the thrust received from the roller 3 may be markedly differentiated, in this manner compensating for saw-blades having considerable variance in thickness. The more minute adjustment I secure by means of the set-screw 13 at or near the upper end of the bar 11, which immediately engages with the free end of the movable jaw 15. By screwing this in or out one or more revolutions or a fraction of one revolution I can secure the most minute adjustment and properly grip the finest saw-blade.

The saw-carriage, the slideway therefor, and the mechanism for feeding it, all of which have heretofore been incidentally referred to, are in detail as follows: Referring more particularly to Figs. 1, 2, 4, and 6, 18 18 18 18 are four rectangular plates bolted in their horizontal section to the table of the machine, as shown, and between their upwardly-extending flanges they support the slideway 19 for the saw-carriage. I construct this slideway in two forms, one shown in Figs. 8 and 9 and the other shown in the figures generally. I will describe the latter form first. This slideway is composed, generally speaking, of a metallic channel-bar having a squared trough-like recess extending through it from end to end, within which the saw-carriage slides. It is supported in any suitable manner, as by screws 20, (see Figs. 2 and 6,) upon the plates 18 referred to. The saw-carriage proper is the same in construction as that referred to in my application for a saw-setting machine now pending in the United States Patent Office as Serial No. 735,579 and need not here be particularly described, excepting to state that the devices which immediately clamp the saw and which vertically adjust it are or may be the same as shown in said pending application.

The feeding mechanism is as follows: 21 (see Fig. 6) is a crank-arm keyed to a shaft 22, which is supported upon a bearing 23 at one end and in the slideway 19 at or near the other end. Upon the shaft 22 are keyed two hubs 24, from each of which project upwardly two lugs 25 25, within which are adjusting-screws 26 26, which engage with lugs 27 on the respective arms 28, loosely supported upon the shaft 22, and from the upper ends of these arms 28 (see Figs. 6 and 12) project horizontally the feeding-pawls 29 and 30, respectively, which engage alternately with the feeding-teeth on the upper edge of the saw-carriage in a manner substantially the same as that described in my said pending application. This entire mechanism is actuated by a roller 31 on the lower end of the crank-arm 21, (see Fig. 6,) which engages with the face-cam M on the counter-shaft I. There are a number of adjusting devices connected with this feeding mechanism. The more important are as follows: The cam M is not fast on the shaft I. On the contrary, it is adapted to slight longitudinal adjustment on said shaft by means of the adjusting-screws 34 34, which pass through the face-plate N and engage with the outer side of the cam M, so it may be adjusted longitudinally on the shaft I, and thus affect the throw of the feeding-pawls, compensating for lost motion incident to wear and also enabling marked changes to be made in the feeding mechanism. The finer adjustments are obtained through the adjusting-screws 26 26, (see Figs. 6 and 12,) which being run to the right or the left and engaging with the lugs 27 on the respective pawl-carrying arms 28 move them to the right or left in very minute degrees, as desired, so that the engagement of the feeding-pawls with the teeth on the saw-carriage may be exactly adjusted and the feed of the saw exactly register with the position and movement of the file. The pawls are held down to their work by means of springs 35 or in any other suitable manner.

In Figs. 8 and 9 I show in end and side views, respectively, a modified construction of the slideway for the saw-carriage the purpose of which is to afford adjustment to compensate for marked differences in the width of saw-blades, since some blades are half an inch wide or thereabout, whereas others are two or more inches in width. Also by this construction my machine is adapted to sharpen carpenters' or other similar saws. In this

construction the angle-plates 18 18, &c., are or may be the same as before and the side plates 19 19 of the slideway likewise the same. The bottom of the slideway, however, instead of being integral with the side plates is made of two separate bars 36 36, which are connected to the side plates by pins 37, which work in slots 38, made in the side plates, so that the bottom of the slideway is adjustable vertically, and from the under side of the bars 36, composing the said bottom, there are downwardly-projecting portions or lugs 39, which engage with wedges 40, which are supported upon the table A of the machine. There are four wedges, of course, two at each end of the table, which engage with the respective halves 36 of the movable bottom of the slideway. In this way by introducing or withdrawing the wedges the slideway will be adapted to receive carriages with saw-blades of markedly different widths. The movable bottom 36 is made in two parts and also the series of wedges separate from each other in order that there may be a space (shown best in Fig. 8) at 41 through which wide saw-blades may project downwardly, and sometimes when wide carpenters' saws are to be sharpened I cut the table A of the machine in two, strapping it together by straps A′ (two or more of them being employed for the purpose) to give the requisite strength. When these wide saws are manipulated upon the machine, the two halves of the saw-carriage are clamped together at the ends beyond the saw-blade, and of course the adjusting-screws described in my previous application (which screws are threaded into the halves of the saw-carriage and regulate the vertical height of the blade) are removed.

The operation of the machine has been so far stated in the previous explanation that a brief description only is necessary. A saw-blade is clamped within the carriage in the manner set forth in my said pending application, Serial No. 735,579. It is then introduced within the slideway for the carriage and pressed forward until the first tooth is near the file. The machine is then set in motion, during which the lever P and coacting parts effect the transverse reciprocating movement of the file-carrying frame, which during its movement in one direction causes the file to engage with the teeth of the saw, and in the reverse direction the file is lifted from the teeth and goes back idle. As each tooth is filed the feeding mechanism propels the carriage, with the saw-blade, a distance exactly equal to one tooth of the saw. During the operation of the file it engages with the teeth and moves across them in a manner practically the same as that of handwork, excepting that it is much more exact, uniform, and even. The angle at which the file is placed relative to the saw-blade will determine the angle of the teeth. Sometimes I so arrange the parts that the file moves at right angles to the saw-blade. Sometimes I change the angle so as to file carpenters' saws, rip-saws, or those of cabinet-makers and butchers, each with its appropriate and most preferred form of teeth.

It will be obvious to those who are familiar with this art that various modifications may be made in the details of construction of practically every part shown by me. I therefore do not limit myself to the details in any respect.

I claim—

1. In a saw-filing machine, a file-holding frame embodying a transversely-sliding part and a vertically-oscillating frame pivoted thereto, a spring to elevate the free edge of said frame, and a bar provided with an anti-friction-roller which engages with the said frame and depresses it during the forward or filing stroke, and means to actuate said bar, for the purposes set forth.

2. In a saw-filing machine the combination of a saw-holding carriage adapted to rigidly hold a straight-edged saw, a slideway for the carriage, feeding-teeth on the upper edges of the carriage, alternately-acting feed-pawls which engage with said teeth, means to adjust the pawls, and a reciprocating file-holding frame adapted to engage the file with the teeth of the saw during movement in one direction but not in the reverse direction, for the purposes set forth.

3. In a saw-filing machine a reciprocating frame for holding a file, having projecting arms, holes in the arms provided with triangularly-spaced set-screws, adjustable sockets for the support of the file, held and adjusted by said set-screws, clamps to hold the file in the sockets, whereby the impact of the file upon the teeth of the saw-blade may be uniform and its cutting action regulated during each stroke of the file, and means to reciprocate the same, for the purposes set forth.

4. In a saw-filing machine the combination of a file-holding frame having projecting arms, holes in the arms provided with triangularly-spaced set-screws, sockets held and adjusted by said set-screws, open V-shaped recesses in the sockets adapted to receive the ends of the file, and clamps adapted to hold the ends of the file in said recesses, for the purposes set forth.

5. In a saw-filing machine the combination of a longitudinally-movable carriage for the support of a straight-edged saw, a slideway for the carriage, feeding devices for said carriage embodying teeth on the carriage, a rock-shaft, a crank-arm upon the rock-shaft provided with lugs and set-screws, a pawl-arm loose on said shaft and adapted to engage with said set-screws and a feed-pawl on said last-named arm, for the purposes set forth.

6. In a saw-filing machine the combination of a carriage for the support of the saw, embodying two plates between which the saw is clamped, teeth or detents on the upper edge of the plates with which the feeding devices engage, a slideway fixed on the frame of the

machine within which the carriage is received, feeding devices for said carriage embodying a rock-shaft, an adjustable arm upon the rock-shaft, a feeding-pawl carried by said arm, and an adjustable cam for actuating said rock-shaft, for the purposes set forth.

7. In a machine of the class stated the combination of a carriage adapted to hold a saw-blade, a slideway within which such carriage moves, an adjustable bottom for the slideway whereby the carriage may be bodily elevated or depressed, and supplemental devices carried by the carriage for the vertical adjustment of the saw-blade within it, for the purposes set forth.

8. In a machine of the class stated the combination of a carriage adapted to hold a saw-blade, a slideway within which said carriage moves, feeding mechanism for intermittently propelling said carriage, an adjustable bottom for the slideway made in two parts with an opening between them, and means to elevate or depress said movable bottom likewise having a space between them whereby wide blades may pass downwardly between said devices, for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 9th day of April, A. D. 1900.

AUGUSTUS C. SAXTON.

Witnesses:
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EDGAR R. MEAD.