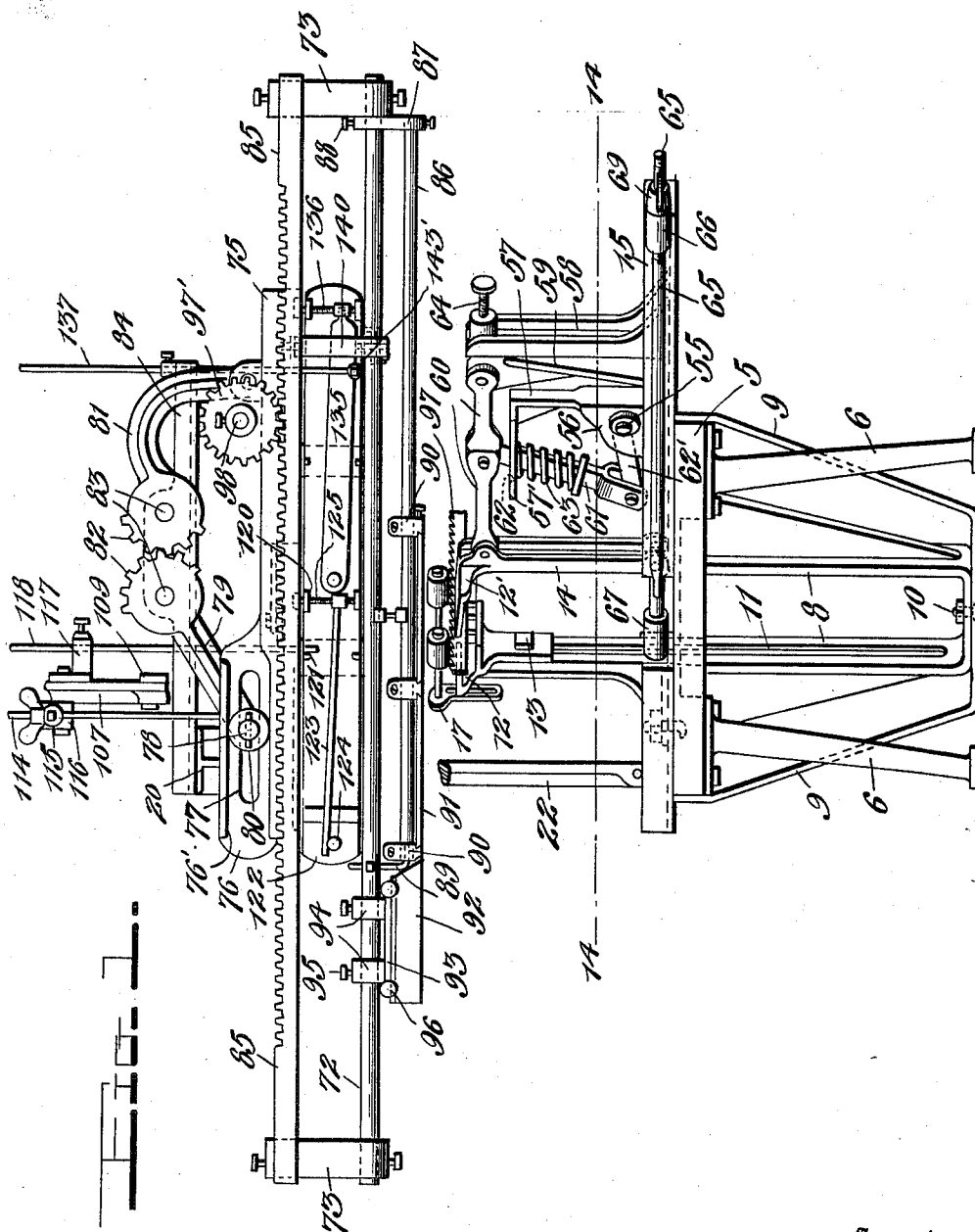


1,018,900.

S. HALTOM.
SAW FILING MACHINE.
APPLICATION FILED FEB. 21, 1911.

Patented Feb. 27, 1912.

10 SHEETS—SHEET 1.



Witnesses

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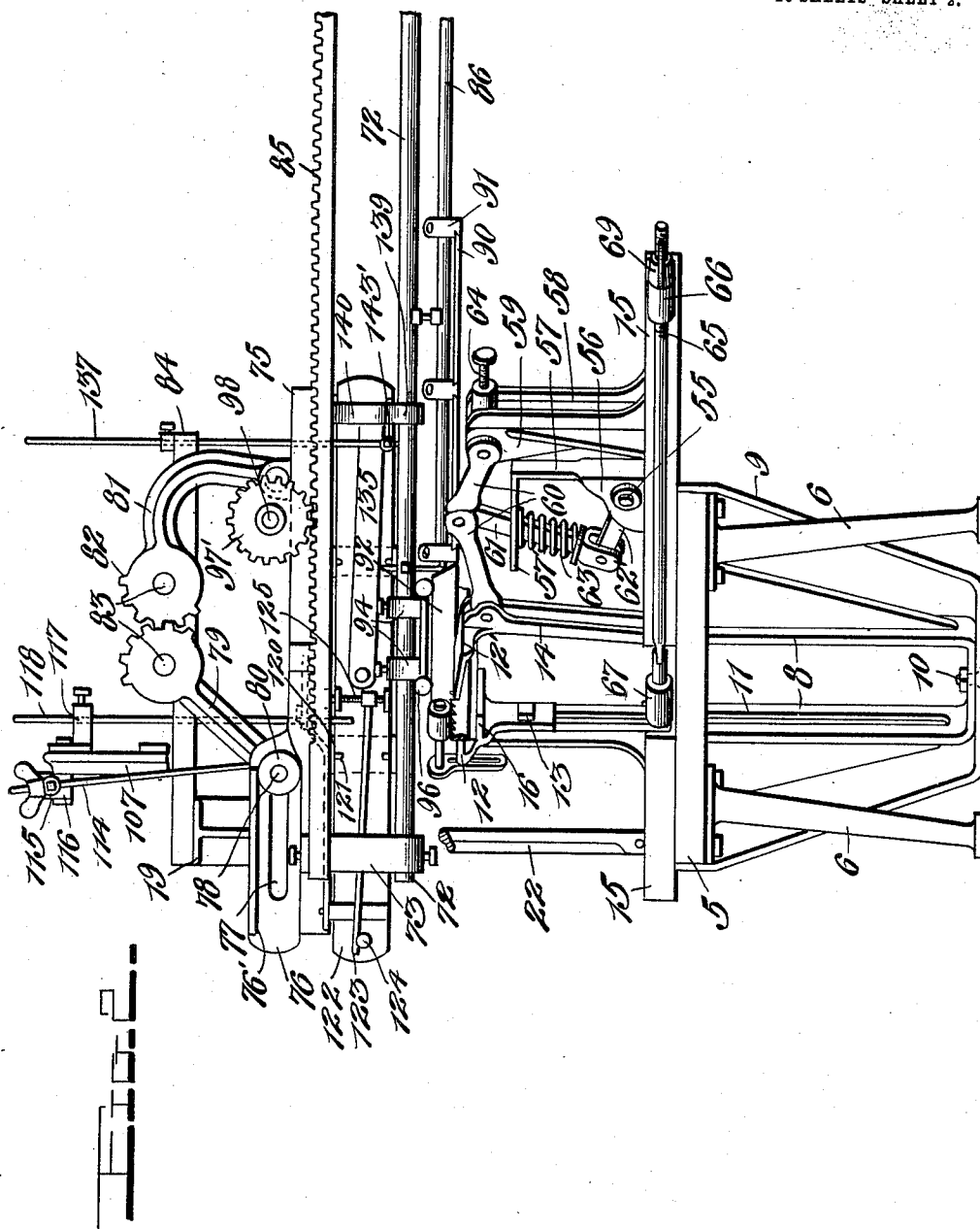
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10 SHEETS—SHEET 2.



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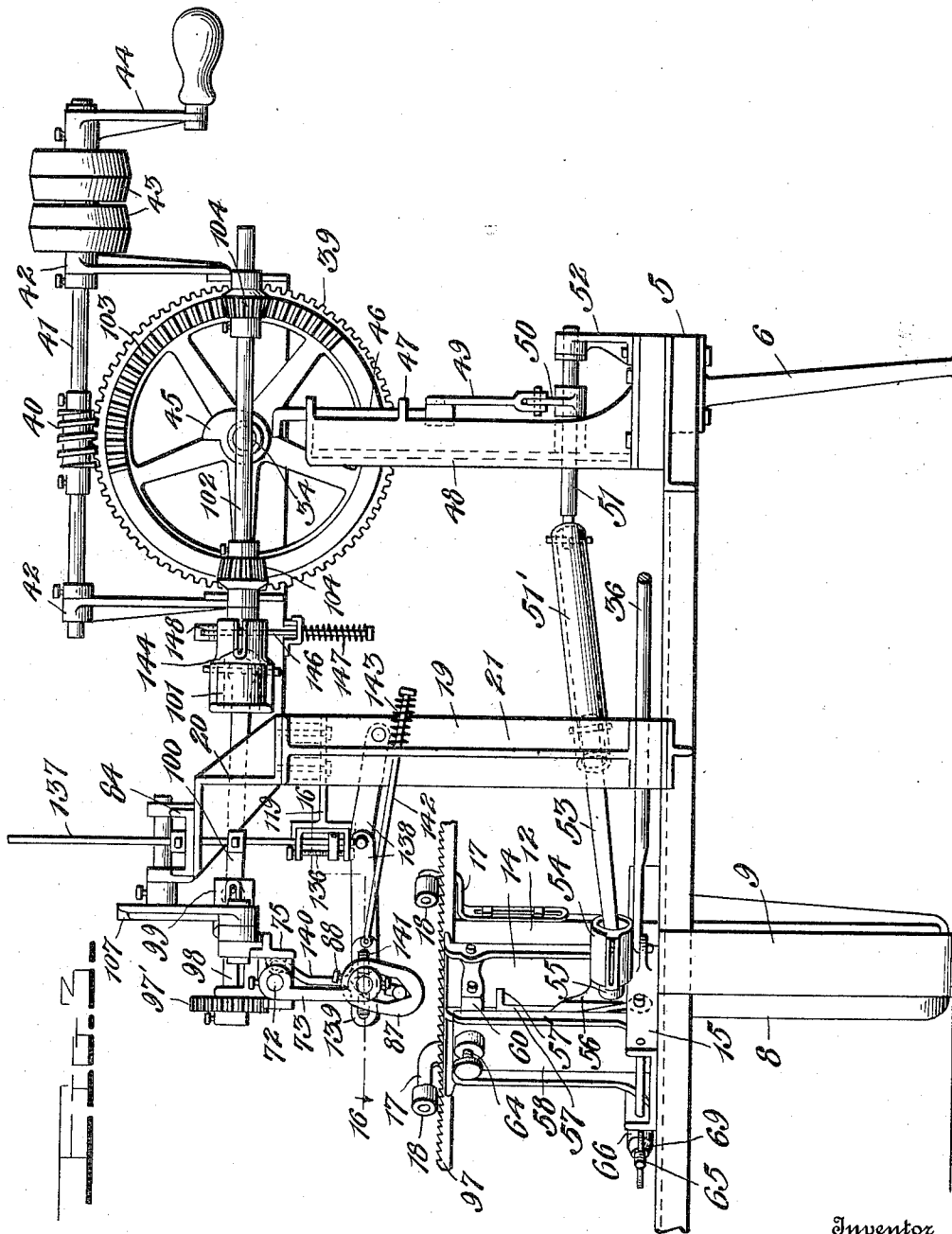
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10 SHEETS—SHEET 3.



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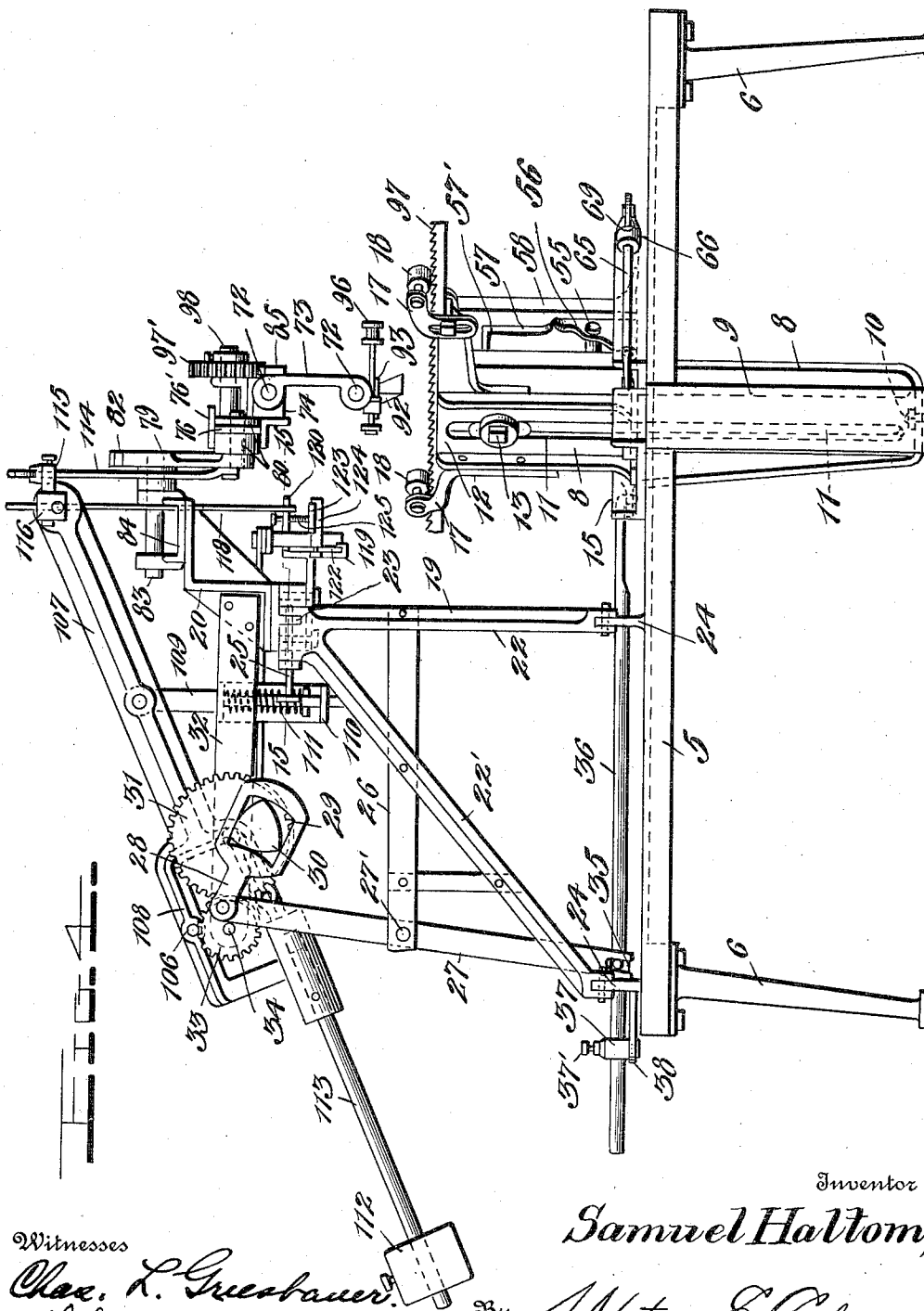
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10 SHEETS—SHEET 4.



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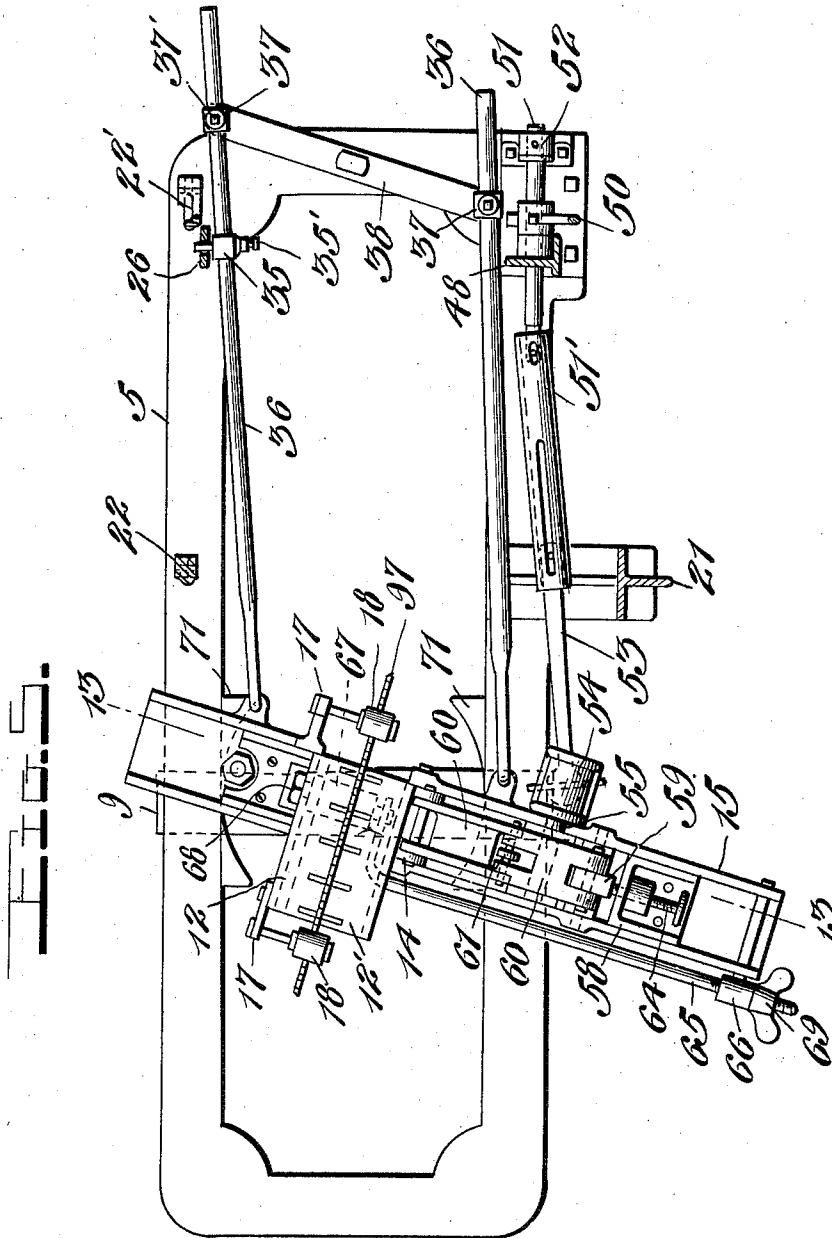
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10 SHEETS—SHEET 5.



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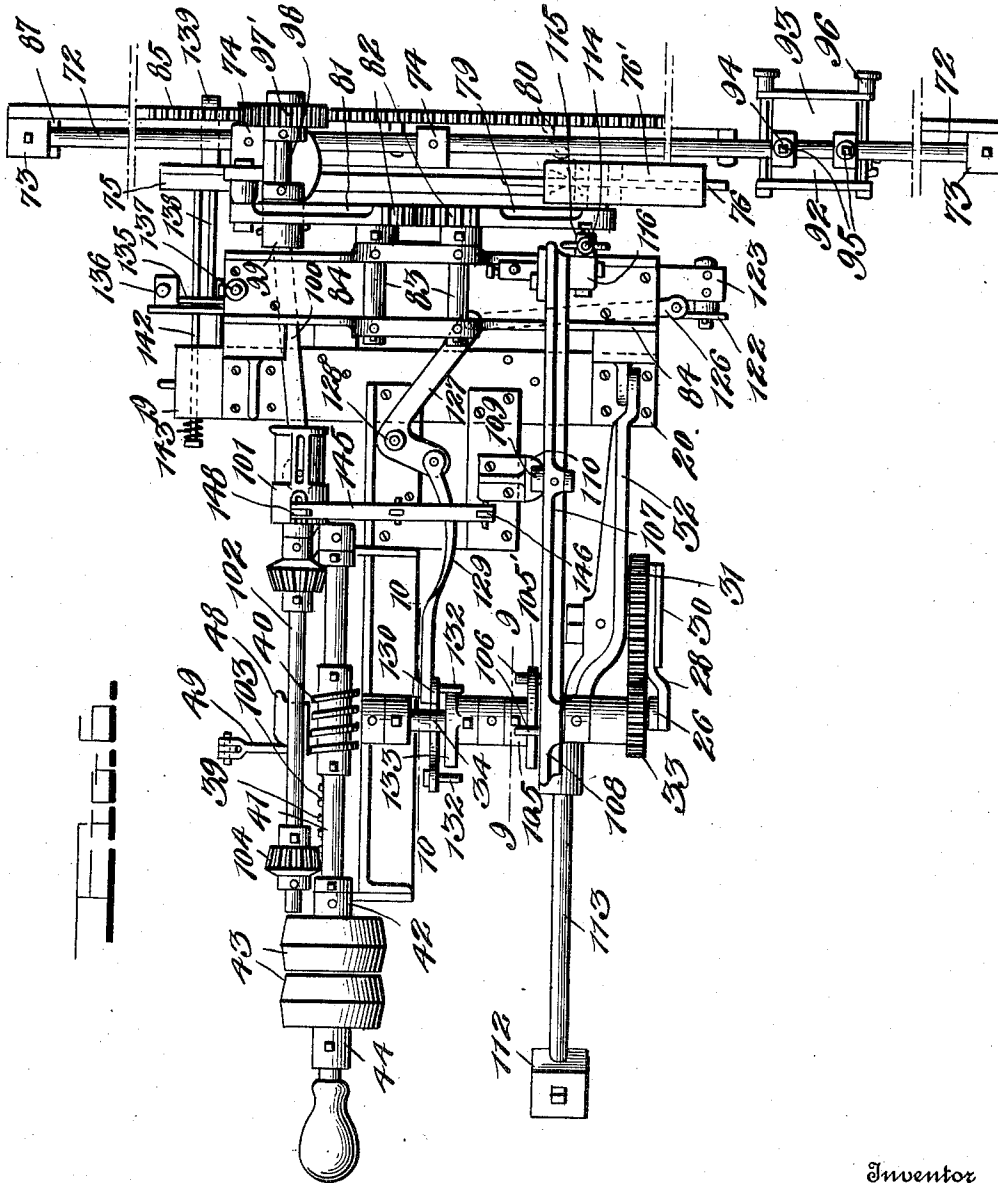
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10 SHEETS—SHEET 6.



Witnesses

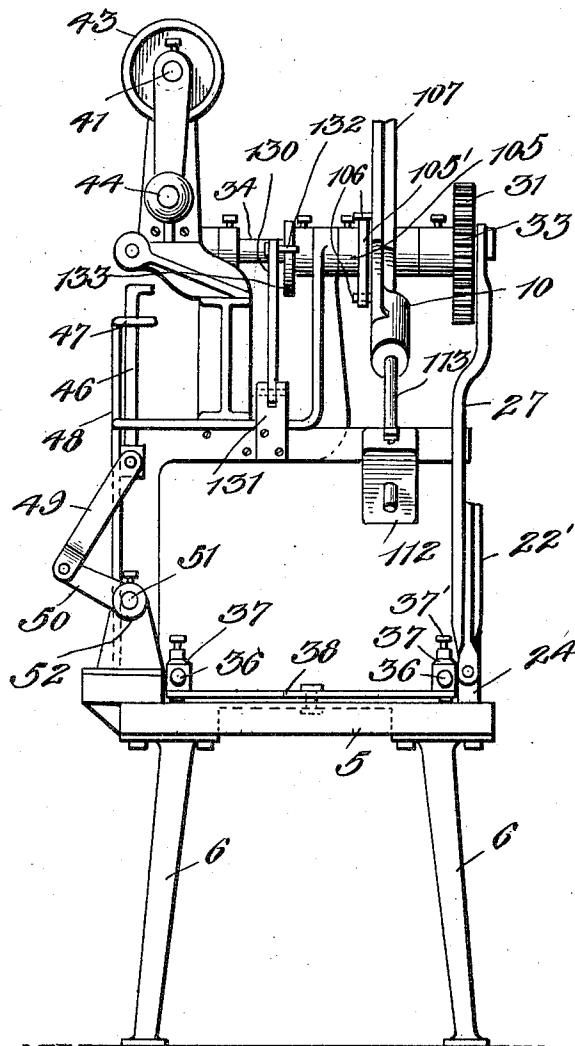
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Fig. 7



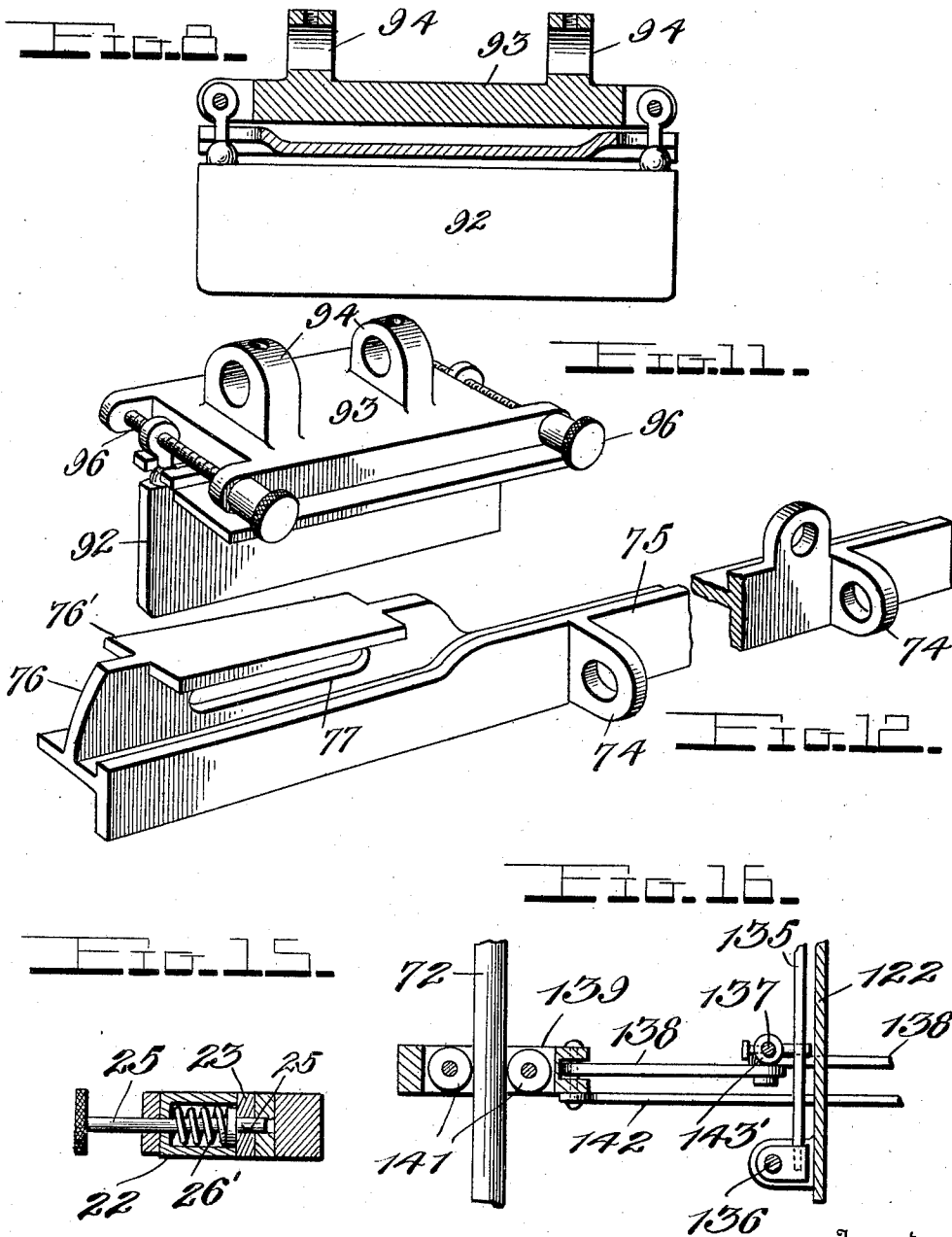
Witnesses

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Witnesses

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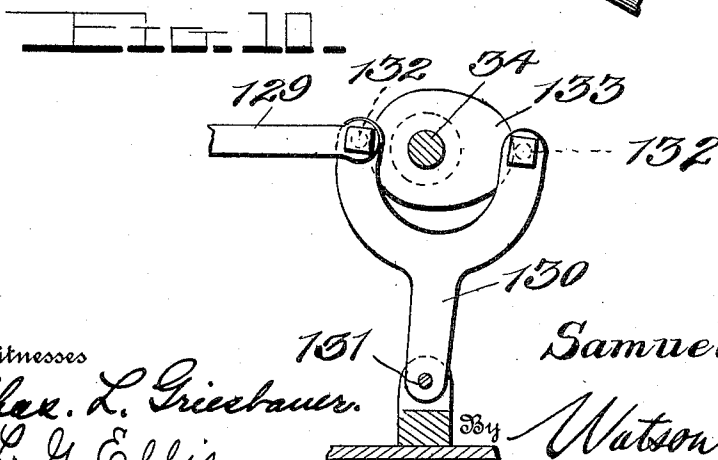
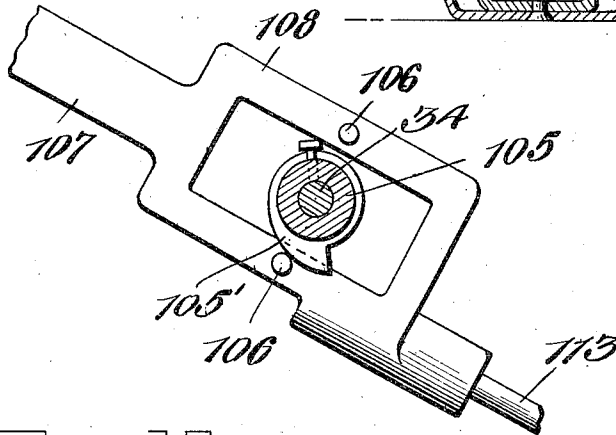
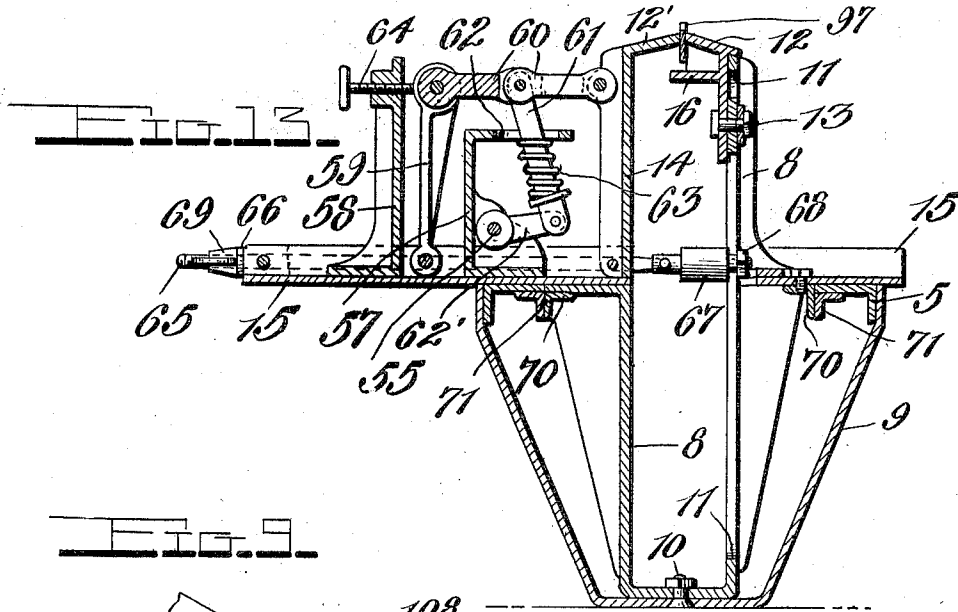
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S. HALTOM.
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APPLICATION FILED FEB. 21, 1911.

1,018,900.

Patented Feb. 27, 1912.

10 SHEETS—SHEET 9.



Witnesses

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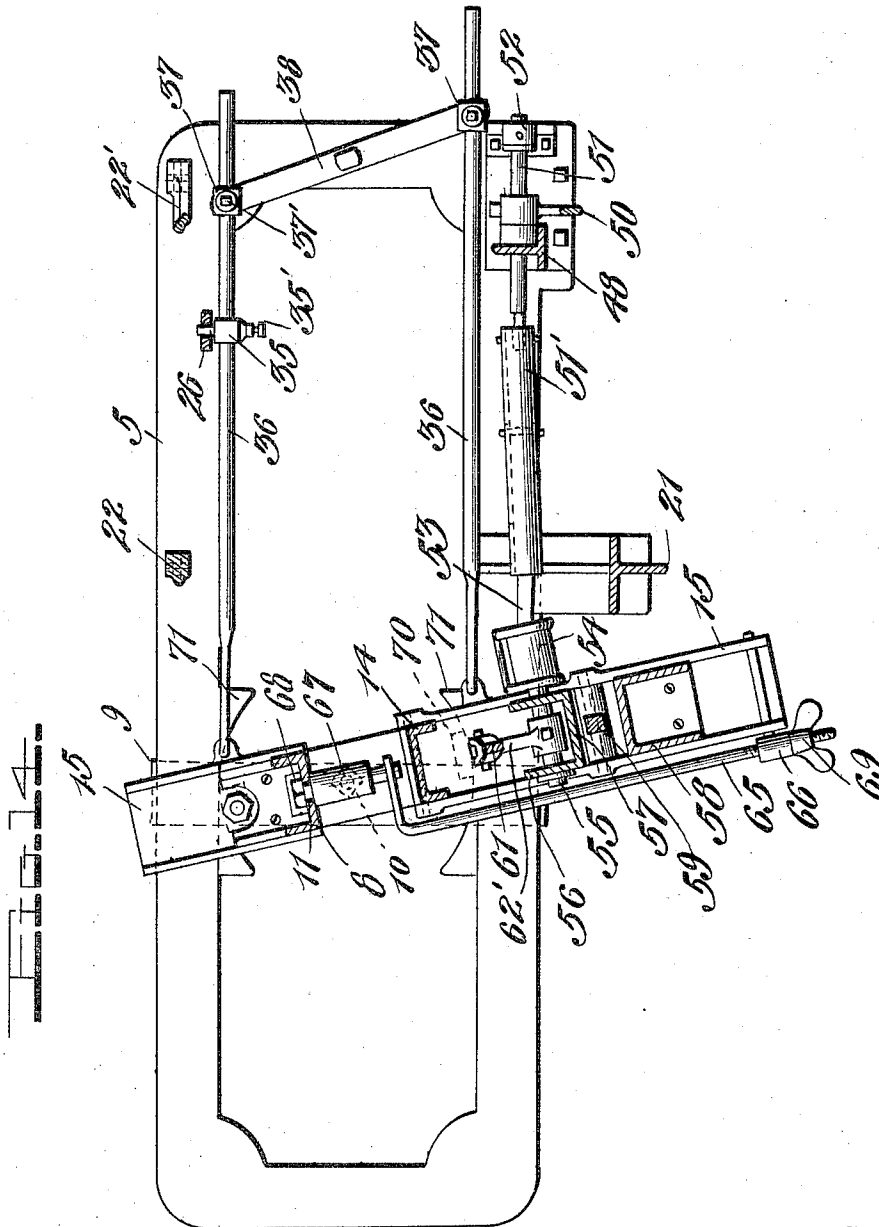
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S. HALTOM.
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APPLICATION FILED FEB. 21, 1911.

Patented Feb. 27, 1912.

10 SHEETS—SHEET 10.



Witnesses

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UNITED STATES PATENT OFFICE.

SAMUEL HALTOM, OF TEXARKANA, TEXAS, ASSIGNOR TO THE SAMUEL HALTOM COMPANY, OF TEXARKANA, TEXAS, A CORPORATION.

SAW-FILING MACHINE.

1,018,900.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed February 21, 1911. Serial No. 609,981.

To all whom it may concern:

Be it known that I, SAMUEL HALTOM, a citizen of the United States, residing at Texarkana, in the county of Bowie and State of Texas, have invented certain new and useful Improvements in Saw-Filing Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to saw filing machines and has for its object to provide a machine of very novel construction whereby the teeth of meat saws and wood and metal saws including band and circular saws may be accurately alined and sharpened.

Another object of the invention is to provide a saw blade support and means for bodily moving the support to angularly position the saw blade with relation to the line of movement of the file.

The invention has for a further object the provision of new and novel means for engaging and disengaging the file with the teeth of the saw and for automatically feeding the saw to the file.

Another object of the invention is to provide a pair of pivotally mounted saw clamping jaws, means for retaining the saw blade in a horizontal position in the jaws, and means coöperatively associated with the saw filing mechanism and automatically operated at the proper time to move one of said jaws from clamping engagement upon the saw blade whereby the same may be fed to the file.

Still another object of the invention is to provide means for properly positioning the file to engage the teeth at the desired angle and means for automatically forcing the file into frictional engagement with the edges of the saw teeth.

A still further object of my invention is to provide means for automatically forcing the file into engagement with the edges of the saw teeth as it is moved downwardly upon the same.

With the above and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a front end elevation of a saw filing machine embodying my improve-

ments; Fig. 2 is a similar view showing the saw clamping jaws open and the feeding plate engaged with the saw blade; Fig. 3 is a side elevation thereof; Fig. 4 is a similar view looking from the opposite side of the machine; Fig. 5 is a top plan view of the base frame and the movable saw positioning support; Fig. 6 is a top plan view of the saw filing mechanism; Fig. 7 is a rear end elevation; Fig. 8 is a central longitudinal section of the saw blade feeding device; Fig. 9 is a section taken on the line 9—9 of Fig. 6; Fig. 10 is a section taken on the line 10—10 of Fig. 6; Fig. 11 is a detail perspective view of the feeding device; Fig. 12 is a detail perspective view of the guide bar which supports the lifting arms; Fig. 13 is a section taken on the line 13—13 of Fig. 5 showing the clamping jaws open; Fig. 14 is a section taken on the line 14—14 of Fig. 2; Fig. 15 is an enlarged section taken on the line 15—15 of Fig. 4; and Fig. 16 is a section taken on the line 16—16 of Fig. 3.

The machine which is disclosed in the following description is designed with a view to effecting the automatic filing of the teeth of all types of saws with absolute accuracy, the filing operation and feeding of the saw being entirely automatic.

By means of my improved machine considerable time, labor and expense is eliminated in the filing of saw teeth and more particularly in the filing or gumming of cotton gin saws, the machine being of such construction that the parts are easily and quickly adjustable to gum the saw teeth to any desired depth, thus enabling the teeth to hold a large amount of cotton in the operation of the gin.

With my improved automatic saw filing machine a variety of attachments are adapted to be used, and I contemplate the filing of applications for patent on these several attachments.

The present machine as illustrated in the accompanying drawings, discloses mechanism which is capable of successful operation for the filing and sharpening of the teeth of the many different varieties of saws including band saws, hand saws and meat saws.

With the above ends in view, I provide a bed frame 5 which is of substantially rectangular elongated form and is mounted or supported at each of its corners upon the

standards or legs 6. Between the longitudinal sides of the bed frame 5, the saw clamp or support is arranged. This support includes a vertical U-shaped bar 8 which extends above and below the bed frame 5. The intermediate portion of the bar 8 rests upon the intermediate portion of a depending intermediate brace or support 9 which connects the opposite sides of the frame 5. The bar 8 is pivotally arranged for turning movement upon the stud 10 which is fixed in the brace member 9. One of the parallel vertical portions of the elongated U-shaped bar 8 is longitudinally slotted as shown at 11 and upon the upper end of this bar the jaw 12 is adjustably mounted, a bolt 13 which is carried by said jaw extending through the slot 11 for sliding movement therein. The end of this bolt is provided with a clamping nut whereby the jaw 12 may be rigidly clamped in its adjusted position upon the upper end of the member 8. The other of the jaws 12' which clamp the saw rigidly in position is formed upon the upper end of the pivotally mounted channel bar 14. As shown in Fig. 1, one of the parallel vertical portions of the member 8 is of greater length than the other and extends above the bed frame 5. The channel bar 14 is pivotally mounted upon the upper end of the shorter vertical portion of the bar 8. The ends of these bars are disposed between the channel bars 15 between and upon which the pivoted jaw actuating means is arranged. The relatively stationary jaw 12 carries a suitable supporting plate 16 for the saw blade which supports the saw in position when the movable jaw 12' is out of clamping engagement with the saw blade. A pair of vertical arms 17 are mounted upon the jaw 12 and in the ends of these arms the guide rollers 18 are disposed for engagement upon the saw blade to retain the same at all times in a horizontal position under the weight of the filing and feeding mechanism.

Upon the bed frame 5 of the machine, at one end thereof, a frame structure 19 is arranged in which the mechanism for automatically moving the file carrier and clamping and releasing the saw blade is arranged. This frame includes the Z-shaped end supports 20 which are arranged beneath the longitudinal channel bar 84. One of these end supports is rigidly fixed to one end of a channel bar 84 and to the upper end of the vertical standard 21 which at its lower end is mounted upon the base frame 5. In order to facilitate the insertion and removal of band saws to and from the supporting stand, the bar 84 is supported at its other end to the other of the supports 20 which is removably arranged upon the pivotally mounted upright 22 and diagonal brace 22' which is integrally formed with said up-

right at its upper end. An ear 23 depends from the under side of the bar 20 and to this ear the upper end of the upright is adapted to be removably secured. At their lower ends the upright and brace are pivotally mounted upon the lugs 24 which are fixed upon the base frame 5 as clearly shown in Fig. 4. In the integrally connected upper ends of the upright and brace, a bolt 25 is arranged. This bolt is normally held in an aperture provided in the ear 23 by means of a spring 26' which is disposed upon said bolt within the upper end of the support (see Fig. 15). The bolt is formed on its outer end with a knurled head and is adapted to be withdrawn from the aperture in the ear 23 so that the upright 22 and brace 22' may be swung outwardly upon the lugs 24. The brace and upright are further connected by means of a cross bar 26 and the end of this bar is provided with an opening to receive a pin 27' fixed to an oscillatory lever 27 intermediate of its ends. The upper end of this lever is pivotally connected to a cam actuated element 28, which is provided with an opening 29 to receive a cam 30 fixed upon the face of a gear 31 which is mounted to rotate upon a stud fixed in the frame bar 32. Power is transmitted to the gear 31 through the medium of a pinion 33 which is fixed upon the end of a transverse shaft 34. The lower end of the oscillatory lever 27 is bifurcated to receive a stud formed upon a collar 35 which is fixed upon one of a pair of longitudinally movable rods 36. The collar 35 is rigidly secured to the rods 36 by means of a set screw 35'. One end of each of the rods 36 is pivotally connected to one of the channel bars 15 which carries the saw clamping jaw operating means. The other ends of the rods 36 are rigidly fixed in the blocks 37 which are swiveled upon the ends of a cross bar 38 which is pivotally mounted intermediate of its ends upon one end of the base frame 5. The rods 36 are securely clamped in the blocks 37 by means of the set screws 37'. By means of the elements above described, a partial rotary motion of the saw blade clamp or support is obtained. When power is imparted to the transverse shaft 34 through the medium of suitable means which will be hereinafter more fully explained, the gear 31 is rotated and the lever 27 is oscillated upon the end of the bar 26 through the medium of the cam elements 28 and 30. This oscillation of the lever 27 moves the rods 36 longitudinally and in reverse directions, the bar 38 swinging horizontally upon its pivot. Thus the saw clamping support is partially rotated upon its pivot 10 to angularly position the saw blade with relation to the line of movement of the file as shown in Fig. 5. Upon the

continued rotation of the gear 31, the saw blade will be positioned at a reverse angle to that shown in said figure so that saws of that character which require that the teeth be cut at right and left angles will be properly positioned for the correct and accurate cutting of the teeth in the operation of the machine.

The means whereby the pivotally mounted clamping jaw 12' is automatically moved to release the saw blades so that the same may be automatically fed in the operation of the filing mechanism, is substantially as follows. Upon the opposite end of the shaft 34, a worm gear wheel 39 is fixed and with this gear wheel the worm 40 fixed upon the power shaft 41 co-acts to rotate the shaft 34 at a very slow speed. The rapidity of the turning movement of the saw support or stand is further reduced by the provision of the large gear wheel 31 which meshes with the pinion 33, whereby the movements of the filing mechanism and the saw support are properly timed so that the filing of the saw teeth may be accurately and completely accomplished. The shaft 41 is mounted in suitable bearings 42 which are arranged upon the frame structure 19. Belt wheels 43 are arranged upon one end of the shaft 41, one of said wheels being an idler. A driving belt from any suitable source of power traverses these wheels and is shifted from the loose to the tight pulley for the operation of the machine. A crank 44 may also be fixed to the end of the shaft so that the machine can also be manually operated. A cam 45 is fixed upon the end of the shaft 34 and engages the upper end of a rod 46 which is mounted for movement in suitable guides 47 provided upon a standard 48 which is mounted upon the bed frame 5. The lower end of this rod is pivotally connected to one end of a link 49, the other end of said link being pivoted to an arm 50 fixed upon a shaft 51 mounted to rock in suitable bearings 52. The shaft 51 is connected through the medium of a tubular tumbling rod 51', to the shaft 53 which in turn is similarly connected by means of a short sleeve 54 with a shaft 55 which is mounted between bearing plates 56 formed upon the vertical guide member 57. The shafts 51 and 53 have sliding movement in the ends of the tubular tumbling rod 51' so that they will not bind in the turning movement of the saw clamping support. This tumbling rod 51' and the sleeve 54 provide universal connections between the shafts 51, 53 and 55 so that rotation is imparted to the shaft 55 when the shaft 51 is rocked in its bearings by the engagement of the cam 45 with the upper end of the vertically disposed movable rod 46. Between the vertical guide 57 and a channeled upright 58, a post 59 is pivotally fixed at its lower end between

the channel bars 15. To the upper end of this post one end of a link 60 is pivotally connected and a similar link is also pivotally connected at one end to the upper end of the pivotally mounted clamping jaw 12'. The other ends of the links 60 are pivotally connected to each other and to the upper end of a vertically movable rod 61. This rod moves in an elongated slot 62 which is provided in the horizontally disposed upper end portion 57' of the guide member 57. The lower end of the rod 61 is bifurcated for pivotal connection to an arm 62' which is fixed to the shaft 55. A coiled spring 63 is arranged upon the rod 61 between the under side of the slotted plate 57' and an annular flange which is formed upon said rod. It is believed that the operation of this portion of the machine will be readily understood. When rotary movement is imparted to the shaft 34, the cam 45 is engaged with the upper end of the rod 46 and forces the same downwardly. This downward movement of the rod 46 rocks the shaft 51 in its bearings through the medium of the link 49 and arm 50 as more clearly shown in Fig. 7. This rocking movement of the shaft 51 is transmitted to the shaft 55 in the manner previously set forth and the arm 62' which is carried by the shaft 55 is forced upwardly, thereby also moving the rod 61 upwardly together with the pivotally connected ends of the links 60. This movement of the links moves the pivotally mounted clamping jaw 12' away from the saw blade and removes the pressure on said blade to a sufficient extent to permit the blade to freely move between the jaws.

In order to regulate the extent of movement of the jaw 12' in accordance with the thickness of the saw blade, I provide the adjusting screw 64 which is threaded in the upper end of the upright 58 and is swiveled to the pivotally mounted post 59. Thus upon turning the adjusting screw, the post may be moved to position the links 60 with relation to each other, thereby regulating the extent of their movement and consequently of the jaw 12'. If the saw being operated upon does not require that the teeth be cut at right and left angles, the saw blade support may be allowed to remain stationary in the operation of the filing mechanism, by simply loosening the set screw 37', or moving the collar 35 on the rod 36 to disengage its stud from the lower end of the oscillatory lever 27.

In order to eliminate all possibility of the separation of the jaws after they have been clamped upon the saw blade, I provide the holding rod 65 which is movable at one end in a bearing sleeve 66 fixed upon one of the channel bars 15. The other end of this rod is bent at right angles and is connected to a cylinder 67 which is longitudinally movable

in the slot 11 of the longer vertical portion of the member 8. A clamping nut 68 is threaded upon the reduced end of this cylinder to rigidly fix the same in position. The rod 65 is threaded at one end and has engaged thereon a wing nut 69 which is adapted to engage the bearings 66 and force the adjustably mounted jaw 12' toward the saw blade. The vertical arm of the U-shaped bar 8 upon which the jaw 12 is mounted is sufficiently resilient so that the same is moved when the nut 69 is turned on the end of rod 65, thereby firmly clamping the jaws together. It will thus be seen that the jaws are held in close contact with the opposite sides of the saw in the turning movement of the support. Depending plates 70 are fixed to the channel bars 15 for engagement with the arcuate guide plates 71 which are secured to the longitudinal side bars of the bed frame 5. These guides serve as additional supports for the saw clamp and retain the same in its proper position so that the saw blade is retained at the desired angle. The foregoing description relates to the saw clamping and supporting device and the means for automatically releasing the saw to feed the same as the teeth are sharpened. The following description relates to the means for automatically moving the file and reversing its direction of movement, engaging said file with the saw teeth and firmly depressing the file upon the same, and suitable means for moving the file carrier laterally to secure the desired pressure of the file upon the edges of the saw teeth. This automatic filing mechanism also includes means for engaging and moving the saw blade between the holding jaws when the blade is released in the manner disclosed in the foregoing description.

The file carrying mechanism comprises the pair of parallel rods 72 which are fixed at their ends in the connecting links 73. The upper rod 72 is longitudinally slidable in a bearing 74 formed upon the support 75. This support at one end is formed into a longitudinal vertically disposed plate 76 and is provided with a slot 77 to receive a trunnion 78 mounted in the lower end of an arm 79. Upon the upper and lower longitudinal edges of the plate 76 the flanges 76' are formed to provide guides for the rollers 80 mounted upon the trunnion 78. An arm 81 is also pivotally connected at one of its ends to the support 75 and is curved as shown in Fig. 1. The upper ends of the arms 79 and 81 are formed with the segmental gears 82. These gears are fixed upon the ends of the supporting shafts 83 which are mounted in suitable bearings provided upon the channel bar 84 mounted at its ends upon the Z-shaped supports 20. It will thus be seen that the file carrier is suspended from the lower ends of the arms 79 and 81. To the upper ends of

the connecting links 73 a rack bar 85 is secured. Upon the lower rod 72 the feeding device and the files are mounted. The files are arranged upon a rod 86 which is adjustably fixed upon the rod 72 and is mounted in a collar 87 at one end, said collar being secured upon the rod 72 by means of the set screw 88. By rotating the collar 87 upon the rod 72, the rod 86 may be disposed out of the same vertical plane with the carrier rod 72. The rod 86 is supported at its other end by means of the rod 89 which is fixed in the carrier rod 72. Upon the rod 86 a plurality of clamps 90 are arranged, and in these clamps the files 91 are mounted. The files are adapted to be rigidly held between the clamps by spacing the clamps on the rod 86 and engaging the files between them. The feeding member 92 is arranged upon the rod 72 in advance of the files 91. This feeding member is arranged for movement upon the under side of a plate 93 which is integrally formed with the sleeves 94 slidably arranged upon the rod 72 and adapted to be rigidly fixed thereon by means of the set screws 95. The feeding element 92 has lugs formed thereon in which the adjusting screws 96 carried by the supporting plate 93 are threaded. By adjusting these screws the feeding element 92 may be disposed at an angle with relation to the line of movement of the carrier so as to force the saw blade 97 forwardly between the released clamping jaws as said element enters the teeth of the blade. In Fig. 2 I have illustrated the manner in which the element 92 is adapted to engage in the saw teeth and move the blade. As this element 92 is disposed at a different angle from the blade of the saw, it will be obvious that as it is moved forwardly, the saw blade will also be moved forwardly to the extent of the difference in angularity between said blade and the feed element.

The file carrier is moved through the medium of a gear 97' which engages with the teeth of the rack bar 85. This gear is fixed upon the end of a shaft 98 which is mounted in a bearing fixed upon the support 75. The shaft 98 is connected by means of a universal joint 99 to one end of the power transmitting shaft 100. This shaft is in turn connected by means of the joint 101 to the shaft 102, said latter shaft being mounted in bearings provided upon the upper frame structure 19. The gear 39 which is fixed upon the shaft 34 is provided upon one face with the teeth 103 which extend partially therearound. These teeth engage the teeth of the beveled pinions 104 which are fixed upon the shaft 102 on opposite sides of the shaft 34. Thus as the gear 39 continuously rotates in one direction, the shaft 102 is first rotated to transmit power to the gear 97 through the medium of which the file carrier is moved in one direction to engage the

files with the teeth of the saw, and then by the engagement of the teeth on the face of the gear 39 with the other of the pinions 104, the direction of rotation of the shaft 102 is reversed, thus also reversing the movement of the file carrier. Previous to this reversal of movement of the carrier, however, the carrier is bodily elevated to disengage the files from the saw teeth. This elevating means I shall now proceed to set forth in detail.

Upon the shaft 34 adjacent to the pinion 33, a cam 105 is fixed, the cam portion 105' thereof being adapted to engage the pins 106 which are fixed in the short rectangular frame 108 formed upon a counterweighted beam 107. This beam is pivotally mounted upon the upper end of a yieldingly supported vertically disposed rod 109. The rod 109 is mounted for movement through the ends of the bearing plate 110, and the spring 111 which is arranged on said rod is normally under compression, and acts to cushion the upward movement of the file carrier when the cam 105' moves off of the pin 106. When the pin is disengaged from the cam portion 105' through the continued rotation of the shaft 34, the beam 107 is returned to its normal position and the files elevated by the counterweight 112 which is fixed upon a rod 113 secured to said beam and extending rearwardly thereof. This counterweight and the weight of the rear portion of the beam overcomes the weight of the file carrier. Thus it will be seen that with every revolution of the shaft 34 the files are raised and lowered twice. It will be understood of course that the cam 105 is of such form and the notches therein so disposed as to maintain the files in engagement with the saw teeth throughout the extent of their forward travel, and after they have left the saw the carrier is instantly elevated and starts upon its return movement while the files are maintained in such elevated position. In the forward movement of the carrier the feeding element 92 will first enter between the teeth of the saw which were last sharpened by the files and move the saw blade so that the files following behind the feeding element engage with the next succeeding tooth, at which time the clamping jaws are automatically closed upon the saw blade. The arm 70 is connected to the forward end of the pivotally mounted beam 107 and is elevated thereby through the medium of the rod 114 which is movable through a block 115 swiveled upon a block 116 arranged upon one side of the beam 107. To the other side of the beam an arm 117 is fixed and in this arm a vertically disposed depending rod 118 is secured. The purpose of this rod will now be disclosed.

A plate 119 is fixed to the Z-shaped sup-

porting members 20 at its ends and extends across the entire front of the machine. Upon its upper edge said plate is formed with horizontal arms 120 which have guide lugs 121 secured therein. The lower edge of the plate 119 is also provided with guide lugs similar to the lugs 121 and between said lugs and the face of the plate 119 a longitudinally movable blade 122 is arranged. A plate 123 is carried by the blade 122 and is disposed in a plane at right angles thereto. One end of the plate 123 is pivoted upon a stud 124 fixed in the first named plate and is adjustable at its other end by means of an adjusting screw 125 which is disposed through lugs formed on the plate 122 and has threaded engagement in the end of the plate 123. One end of a link 126 is pivotally connected to the sliding plate 122 and at its other end is pivoted to one end of the bell crank lever 127 which is fulcrumed as at 128 upon the upper frame structure 19. The other end of the bell crank lever 127 is connected by means of a link rod 129 to a vertically disposed arm 130 which is pivotally mounted at its lower end as at 131 upon the frame. This arm is more clearly shown in Figs. 7 and 10 and at its upper end is bifurcated to receive the shaft 34. Upon opposite sides of the shaft the arm has fixed therein the pins 132 which are adapted to be engaged by the cam 133 fixed upon said shaft. In the operation of this portion of the machine, when the periphery of the cam 133 engages one of the pins 132, the plate 122 is moved longitudinally, thereby engaging the inclined plate 123 with the lower end of the vertically disposed rod 118. This action takes place at the start of the forward movement of the file carrier.

The engagement of the rod 118 with the plate 123 supports the entire weight of the carrier previous to its engagement with the saw teeth and upon the movement of the files 91 into engagement with the teeth, the inclined plate 123 gradually allows the files to lower, the beam 107 swinging upon its pivot on the upper end of the rod 109. The plate 122 moves forwardly with the carrier but slower than the same so that the downward movement of the files and the increased pressure of the same on the saw teeth will be gradual. The files are thus prevented from cutting too freely or deeply and by the provision of this gage device, all the teeth of the saw are cut perfectly uniform in size and depth from the point to the base of the tooth. Means are also provided for swinging the file carrying bar 72 laterally from the front of the machine to cause the files to engage the edges of the saw teeth with the requisite pressure necessary to sharpen the same. This means consists of a bar 135 pivoted at one end upon the face of the sliding plate 122 and ad-

justable thereon to dispose its longitudinal edges in inclined relation to the edges of the plate 122, by means of the adjusting screw 136 which is mounted upon said plate and threaded in the other end of the bar 135. A rod 137 is movably mounted upon the end of the channel bar 84 and extends downwardly in front of the bar 135. The lower end of this rod is pivotally connected to a pair of link bars 138. The end of one of these link bars is pivoted upon the upright 21. The other of said links is pivotally connected to a yoke 139 formed upon the lower end of an arm 140 which is pivoted to the guide member 75. In this yoke the anti-friction rollers 141 are mounted for engagement with the file carrying rod 72 upon opposite sides thereof. A rod 142 is also pivoted at one end to the yoke 139 and is freely movable through an aperture formed in one of the flanges in the angular upright 21. A spring 143 is arranged upon the rear end of this rod between an adjusting nut on the end thereof and said flange and acts to normally maintain the file carrying rods 72 in the same vertical plane as shown in Fig. 3. A collar 143' is fixed upon the lower end of the rod 137 and has a pin formed thereon to extend beneath the lower edge of the pivoted inclined bar 135. By this construction it will be noted that in the forward movement of the file carrier to engage the file with the teeth of the saw blade, the bar 135 will gradually force the rod 137 downwardly and extend the links 138, thereby moving or swinging the lower rod 72 of the file carrier outwardly and forcing the files into close engagement with the edges of the saw teeth. In this manner the proper pressure is secured so that all teeth are filed to the same extent.

The universal joint or connection 101 between the shaft sections 100, and 102 which transmits power from the gear wheel 39 for the movement of the file carrying mechanism is provided at the proper points with a pair of notches or openings 144. A bar 145 is pivotally mounted intermediate of its ends upon the upper end of a spring held rod 146 which is movable through one of the frame elements of the upper frame 19. The spring 147 which is arranged upon said rod normally acts to hold the end of the lever 145 upon the periphery of the shaft connecting element 101. The end of this lever carries a stop member 148 which is adapted for engagement in the notches 144 to absolutely prevent the continued movement in the same direction of the file carrier after the pinions 104 move out of engagement with the gear teeth 103. This positive stop device is also provided in order that the pinions 104 may properly mesh with the teeth of the gear 103, said pinions being held against movement after they

move out of the teeth 103. The engagement of the gear teeth 103 with one of the pinions 104 to reverse the movement of the carrier forces this stop member 148 out of the notch in the connection 101.

From the foregoing description taken in connection with the accompanying drawings, it is believed that a full and clear understanding of the construction and operation of my invention may be obtained.

The machine is entirely automatic in its operation and the teeth of the saw blade are successively sharpened at the proper angle without requiring any manual assistance whatever after the blade has once been positioned in the clamping jaws. The parts operate to insure absolute accuracy so that all types of saws may be sharpened in the proper manner whereby the best results may be secured in their use. The means whereby the saw support is automatically turned to angularly dispose the blade at right and left angles, is a very important feature of the machine and eliminates considerable time and labor which would be required to unclamp the saw blade and change its position. The parts are readily adjusted so that the proper pressure of the files on the teeth of the saw may be obtained. The machine is also operable with very small power and is extremely positive and efficient in practical use.

While I have herein described the preferred construction and arrangement of the various elements, it will be obvious that the machine is susceptible of a great many modifications without departing from the essential features or sacrificing any of the advantages involved therein.

Having thus described the invention what is claimed is:—

1. In a saw filing machine, a longitudinally movable carrier, operating means for reversely moving said carrier, a vertically movable support for said carrier, means normally acting to maintain said carrier and its support in an elevated position, and an automatically actuated stop device to positively limit the longitudinal movement of said carrier in each direction.

2. In a saw filing machine, a vertically movable support, a file carrier longitudinally movable on the support, a pivotally mounted counterweighted beam connected at one end to the support and normally maintaining the same and the carrier in an elevated position, means for moving said file carrier longitudinally in reverse directions, an automatically operated positive stop device to positively limit the movement of the carrier in each direction, and means actuated by said carrier moving means to move the counterweighted beam and lower the file carrier and its support to maintain the file in engagement with the teeth of the saw in

the movement of the carrier in one direction.

3. In a saw filing machine, a vertically movable support, a file carrier longitudinally movable on the support, a yieldingly supported pivotally mounted counterweighted beam connected to said support at one of its ends and normally acting to maintain the support and carrier in an elevated position, means for moving said carrier longitudinally on the support in reverse directions, means actuated by said last named means co-acting with means arranged on the beam to move said beam and lower the file carrier for engagement with the teeth of the saw in the movement of the carrier in one direction, and additional means movable independently of the carrier and co-acting with a stationary element fixed to the beam to permit the file carrier to be forced downwardly and engage the file with the saw teeth.

4. In a machine of the character described, a frame, a support movable on the frame, a file carrier longitudinally movable on the support, means for moving said carrier, a pivotally mounted beam connected at one end to the support and normally holding the support and carrier in an elevated position, means actuated by said carrier moving means to oscillate the beam upon its pivot and lower the support and carrier to engage the files with the teeth of the saw, and additional means mounted upon said frame and co-acting with a relatively stationary element carried by the beam to permit the carrier and support to be forced downwardly and frictionally engage the file with the saw teeth.

5. In a machine of the character described, a frame, a support mounted on the frame for vertical movement, a file carrier longitudinally movable on the support, an oscillatory beam mounted on the frame and connected at one end to the support to normally maintain the support and carrier in an elevated position, means for moving said carrier longitudinally, means actuated by said carrier moving means to move said beam and lower the file carrier and support to engage the file in the teeth of the saw, a plate slidably mounted on the frame, means for moving said plate in the same direction as the file carrier, and a stationary element engaged by said plate in its longitudinal movement to permit the carrier and support to be forced downwardly and frictionally engage the file with the saw teeth.

6. In a machine of the character described, a frame, a file carrier longitudinally movable on the frame, means for moving said carrier, means actuated by said carrier moving means to move the carrier in a vertical plane to dispose the file in its operative and inoperative positions, a plate longitudi-

nally movable on the frame in parallel relation to the carrier, means for moving said plate simultaneously with the movement of the carrier, means carried by said plate co-acting with a stationary element to permit the file to be forced downwardly into frictional engagement with the saw teeth, and additional means for adjusting said last named means to regulate the depth of cut of the file.

7. In a machine of the character described, a frame, arms pivotally mounted on the frame, a support suspended from said arms, a file carrier longitudinally movable on the support, means for moving the carrier longitudinally, means actuated by said carrier moving means to raise and lower the support and file carrier to move the file to its inoperative or operative position, a plate slidably mounted on the frame, an inclined plate carried by said sliding plate, means for sliding said plate in the longitudinal movement of the file carrier, a stationary element engaged by said inclined plate to permit the carrier to be forced downwardly and frictionally engage the file with the saw teeth, and means for adjusting the inclination of said plate to regulate the depth of cut of the file.

8. In a machine of the character described, a frame, a support mounted on said frame, a tool carrier longitudinally movable on the support, means for moving said carrier in reverse directions, means for automatically elevating the carrier at the end of its longitudinal movement in one direction to disengage the tool from the work, a plate slidable on the frame coöperating with said last named means to permit the tool to be forced downwardly during the time the tool is engaged with the work, means connected to said plate and actuated by said carrier moving means to slide the plate, movable means connecting the frame and the carrier, an adjustable element mounted on said sliding plate, and a stationary element to be engaged by said adjustable element in the sliding movement of the plate to move said connecting means and force the carrier laterally upon its support to frictionally engage the tool with the work.

9. In a saw filing machine, a longitudinally and vertically movable file carrier, means for moving said carrier longitudinally, a longitudinally movable plate; cam actuated means coöperatively associated with said carrier moving means to slide said plate in the movement of the carrier, and means engaging said plate in its sliding movement to permit the carrier to be forced downwardly and frictionally engage the file with the teeth of the saw.

10. In a saw filing machine, a frame, a file carrier longitudinally and vertically movable on said frame, means for moving said

carrier longitudinally, means mounted on the frame and movable simultaneously with said carrier and in parallel relation thereto, said means co-acting with a stationary element mounted on the frame to force the carrier downwardly, a pivotally mounted lever arranged on the frame, a connection between said lever and said last named means, and means connected to said lever and actuated by said carrier moving means to move said last named means in the movement of the carrier in one direction to permit the same to be forced downwardly and engage the file with the teeth of the saw.

11. In a saw filing machine, a support, a file carrier longitudinally movable on said support, a slidable plate, means for moving said carrier longitudinally, means actuated by said carrier moving means to slide said plate, and additional means actuated by said plate in its sliding movement to swing the carrier laterally upon its support and frictionally engage the file with the teeth of the saw.

12. In a machine of the character described, a frame, a tool carrier mounted upon said frame for longitudinal movement, said carrier being also laterally movable upon the frame, a guide arranged upon said frame, means mounted on said frame and connected to the carrier to yieldingly hold said carrier against lateral movement, means for moving said carrier longitudinally, means movably mounted in said guide co-acting with said carrier holding means to move the carrier laterally in its longitudinal movement to engage the tool with the work, and means actuated by said carrier moving means to move the member mounted in said guide.

13. In a saw filing machine, a longitudinally movable file carrier and means for moving the same, a feed device arranged on the carrier in advance of the file, in combination with a saw blade support comprising a stationary jaw and a pivotally mounted clamping jaw, a post, links pivotally connected to each other and to said jaw and post, a spring held rod connected to said links, a flexible shaft, an arm connecting said shaft to said rod, and means for rotating said shaft at a predetermined time in the operation of said carrier moving means to move said pivotally connected links and open the pivoted jaw to release the file for movement by said feeding device in one direction of movement of the carrier.

14. In a saw filing machine, a longitudinally movable file carrier, a feeding device on said carrier in advance of the file, means for moving the carrier, in combination with a saw blade support including stationary and movable clamping jaws, a pivotally mounted post, means for adjusting said post with relation to the pivoted clamping jaw,

links pivotally connected to said post and jaw and to each other, a flexible shaft, a vertically movable rod, a connection between said rod and the flexible shaft, means for moving said rod at a predetermined time in the operation of said carrier moving means, and means connecting said shaft and the pivotally connected ends of said links to move said links and open the movable jaw to release the saw blade for movement by said feeding device in one direction of movement of the carrier.

15. In a saw filing machine, a longitudinally movable file carrier, a feeding device arranged on said carrier in advance of the file, means for moving said carrier including a shaft, in combination with a saw blade support comprising stationary and movable clamping jaws, a pivotally mounted post, means for adjusting said post with relation to the movable jaw and rigidly holding the same in its adjusted position, links pivotally connected to said post and jaw and to each other, a flexible shaft, means connecting said shaft to the pivotally connected ends of said links to move the latter and open the pivoted jaw to release the file for movement between the jaws by said feeding device, a cam fixed on the shaft of said carrier moving means, and means mounted upon the frame and connected to said shaft and actuated by said cam at a predetermined time in the operation of the carrier moving means to rotate the shaft and open the clamping jaws.

16. In a machine of the character described, a frame, a tool carrier longitudinally movable on the frame, means for moving said carrier, a pivotally mounted yoke member, guides for said carrier arranged in the yoke, a movable connection between the yoke and said frame having means for yieldingly holding the carrier against lateral movement, a longitudinally movable element, means for automatically operating said element in the same direction as the movement of the carrier, and means actuated by said element in its movement to overcome the action of said carrier holding means and move the carrier laterally to engage the tool with the work.

17. In a machine of the character described, a frame, a tool carrier longitudinally movable on said frame, means for moving said carrier, pivotally connected links connected to said carrier and to the frame, means movably mounted upon the frame to move said links in the longitudinal movement of the carrier and move said carrier laterally to engage the tool with the work, and additional means coöperatively associated with the primary carrier moving means to actuate said last named means to force the carrier laterally throughout its effective longitudinal movement to main-

tain a constant pressure of the tool upon the work.

18. In a saw filing machine, a file carrier, means for moving said carrier longitudinally in reverse directions, means coöperatively associated with said last named means to move the carrier in a vertical plane at each end of the longitudinal movement of the carrier to raise and lower the file with relation to the teeth of the saw, a longitudinally movable plate, means for moving said plate, an inclined plate, pivotally mounted upon said movable plate, means for adjusting the inclination of said plate, and means carried by said last named carrier moving means to engage said inclined plate in the sliding movement of the first named plate to exert a downward pressure upon the file carrier in its longitudinal movement to force the file between the saw teeth and cut the same to a predetermined depth.

19. In a saw filing machine, a file carrier including a rack, means supporting said carrier for longitudinal movement, a rotatable shaft having a gear thereon engaging with the teeth of the rack, means for rotating said shaft, means actuated by said shaft rotating means to move the carrier and its support in a vertical plane at each end of the longitudinal movement of the carrier to engage and disengage the file from the teeth of the saw, means arranged upon the carrier to feed the saw teeth successively to the file, means for creating a downward pressure of the file between the teeth in its longitudinal movement to cut the teeth to a predetermined depth, and additional means automatically operated in the longitudinal movement of the carrier to move the file laterally and frictionally engage the same with the edges of the saw teeth.

20. In a machine of the character described, a frame, a support thereon, a tool carrier mounted on said support for longitudinal movement, means for moving said support, a longitudinally movable element mounted on the frame, cam actuated means for moving said element, and additional means co-acting with said element to move the carrier laterally upon the support and engage the tool with the work.

21. In a machine of the character described, a support, a tool carrier mounted on said support for longitudinal movement, means for moving said carrier, anti-friction guide rollers for said carrier, a longitudinally movable element, means for automatically operating said element in the same direction as the movement of said carrier, and means to be acted upon by said element to swing the carrier laterally upon its support and engage the tool with the work.

22. In a machine of the character described, a frame, a carrier support mounted

on said frame, a carrier mounted on the support for longitudinal movement, means for moving said carrier, a pivotally mounted yoke, guide rollers for said carrier arranged in the yoke, a pair of pivotally connected links connected to said yoke and to the frame, a vertically movable rod connected to the pivotally connected ends of the links to force the same apart, means yieldingly holding the links against movement, and means for automatically forcing the rod downwardly to spread the links in the longitudinal movement of the carrier to swing the carrier laterally upon the support and engage the tool with the work.

23. In a machine of the character described, a frame, a support mounted on said frame, a tool carrier longitudinally movable on the support, means for moving said carrier, a yoke pivoted to the support, guide rollers for the carrier mounted in the yoke, a pair of relatively movable links connecting the yoke and said frame, a rod connected to the yoke extending through the frame, said rod having a spring arranged thereon to yieldingly hold the links against movement, a vertically movable rod connected to said links, a pivoted inclined plate longitudinally movable in the same direction as the carrier, a stud arranged on the rod to engage one edge of the plate, said plate forcing the rod downwardly in the movement of the carrier to move said links and swing the carrier laterally upon its support to engage the tool with the work.

24. In a machine of the character described, a frame, a support mounted on said frame, a tool carrier longitudinally movable on the support, means for moving said carrier, a longitudinally slidable plate, means for sliding said plate in the same direction as the movement of the carrier, a vertically movable rod, means yieldingly holding the rod against movement, means carried by said sliding plate to move the rod, and means connected to said rod and operated by the same to swing the carrier laterally upon its support and move the tool into engagement with the work.

25. In a machine of the character described, a frame, a support mounted on said frame, a tool carrier longitudinally movable on the support, means for moving said carrier, a longitudinally slidable plate, means for sliding said plate in the same direction as the movement of the carrier, a vertically movable rod, means yieldingly holding the rod against movement, means carried by said sliding plate to move the rod, means connected to said rod and operated by the same to swing the carrier laterally upon its support and move the tool into engagement with the work, and means for regulating the extent of movement of said rod to laterally move the tool to a predetermined extent.

26. In a machine of the character described, a frame, a support mounted on the frame, a tool carrier longitudinally movable on the support, means for moving said carrier, a plate longitudinally movable in the same direction as the carrier, means for moving said plate, an inclined plate pivoted at one end to the face of said movable plate, means for adjusting the inclination of said plate, a yieldingly held vertically movable rod, a stud carried by said rod to engage one of the inclined edges of the last named plate whereby said rod is moved, and means connected to said rod and actuated by the same in its movement to swing the carrier laterally upon its support and move the tool into engagement with the work.

27. In a machine of the character described, a frame, a pair of arms movably mounted on the frame, a vertically movable support mounted upon said arms, a carrier longitudinally movable on the support, means for moving said carrier, means for moving the support and the carrier in a vertical plane, said last named means including a shaft, in combination with a work support comprising clamping jaws to rigidly hold the work in position for engagement by the tool, an adjustable feed device arranged upon the carrier to engage the work and feed the same to the tool to a predetermined extent, and means actuated in the rotation of the shaft of said carrier moving mechanism to operate said holding means and release the work therefrom during the movement of the carrier in one direction whereby said work is engaged and moved by the feeding device arranged on the carrier.

28. In a machine of the character described, a longitudinally movable tool carrier, means for moving said carrier, means for moving the carrier in a vertical plane at each end of its longitudinal movement, said latter means including a shaft, a pinion fixed on one end of said shaft, a gear meshing with said pinion, a cam on said gear, an oscillatory lever, a cam element connecting said lever and the cam, in combination with a rotatable work support, and means connecting the work support and said oscillatory lever to rotate the support and angularly position the work therein with relation to the line of movement of the tool.

29. In a machine of the character described, a longitudinally movable tool carrier, means for moving the same, means co-acting with said last named means to move the carrier in a vertical plane at each end of its longitudinal movement, said latter means including a shaft, in combination with a rotatable work support, an oscillatory lever, means connected to one end of said lever operated by said shaft to oscillate the lever, and means connecting the other end of said

lever and the work support to rotate said work support and angularly position the work with relation to the line of movement of the tool.

30. In a machine of the character described, a frame, a support mounted on said frame, a tool carrier longitudinally movable on the support, means for moving said carrier, means coöperating with said last named means to move the carrier in a vertical plane to position the tool with relation to the work, said latter means including a shaft, a beam mounted to oscillate on the frame, a connection between one end of said beam and the carrier support, and means fixed on said shaft engaging with means carried by the beam to oscillate said beam and vertically move the support and carrier.

31. In a machine of the character described, a frame, a pair of arms having co-engaged cogs formed upon one of their ends and rotatably mounted on said frame, a support arranged upon the other ends of said arms, a tool carrier mounted on said support, means for moving said carrier in a vertical plane to engage the tool with the work, said means including a yieldingly supported oscillatory beam, a rod secured to one of said arms and swiveled to one end of said beams, a counterweight on the other end of said beam normally holding the carrier in an elevated position, and means arranged on said shaft co-acting with means fixed to said beam to oscillate said beam and move the carrier to engage the tool with the work.

32. In a machine of the character described, a frame, a pair of movable arms mounted on said frame, a support suspended from said arms, a carrier mounted for longitudinal movement on the support, means for moving said carrier and reversing the direction of its movement, means for moving said carrier and its support in a vertical plane at each end of the longitudinal movement of the carrier, said latter means including a shaft coöperatively associated with said first named carrier moving means, a cam fixed on said shaft, an oscillatory beam mounted on the frame, one end of said beam being connected to one of the movable arms, a counterweight on the other end of said beam to normally dispose the carrier and its support in an elevated position, and means carried by the beam to be engaged by said cam to oscillate the beam and move the carrier downwardly to engage the tool with the work.

33. In a machine of the character described, a frame, a support arranged for vertical movement upon said frame, a tool carrier longitudinally movable on the support, means for moving said carrier, means normally holding the support and carrier in an elevated position, a longitudinally movable inclined plate supported from the frame,

cam actuated means for moving said plate in the same direction as the carrier, and relatively stationary means co-acting with said inclined plate to permit the carrier to
 5 be forced downwardly during its longitudinal movement in one direction whereby the tool is engaged with the work.

34. In a machine of the character described, a frame, a vertically movable support mounted on said frame, a longitudinally movable carrier mounted to swing on the support, means for moving said carrier longitudinally, means for moving the carrier and support vertically at each end of
 15 the longitudinal movement of the support to automatically position the tool with relation to the work, and means for automatically swinging the tool carrier laterally upon its support during its longitudinal movement when the tool is engaged with the work.

35. In a machine of the character described, a frame, a tool carrier longitudinally movable on the frame, means for moving said carrier and reversing the direction of such movement, means for automatically elevating the carrier at the end of its longitudinal movement in one direction to disengage the tool from the work, a stop member carried by said latter means, means slidable on the frame coöperating with said stop member to limit the downward movement of the carrier, and means automatically actuated in the actuation of the carrier moving means to move said slidable means and permit the tool to be forced downwardly into frictional engagement upon the work in the sliding movement of the carrier.

36. In a saw filing machine, the combination of a saw blade support comprising a vertically disposed U-shaped bar, one of the arms of said bar being longer than the other, a jaw vertically adjustable on the longer arm, a second jaw pivotally mounted upon
 45 the shorter arm, manually operable means connected to said longer arm of the bar whereby the same may be moved relative to the shorter arm and the first named jaw positioned relative to the pivoted jaw, and means connected to said pivoted jaw to open
 50 and close the same upon a saw blade.

37. In a saw filing machine, the combination of a saw blade support comprising a vertically disposed U-shaped bar, a jaw
 55 mounted on one end of said bar, a second jaw pivotally mounted on the other end of said bar, spring controlled means to hold said pivoted jaw in its closed position upon a saw blade, additional means to actuate said spring controlled means and move the jaw to its open position, and manually adjustable means for regulating the extent of pivotal movement of said jaw.

38. In a saw filing machine, the combination of a saw blade support comprising op-

posed jaws one of which is movable relative to the other, spring held means connected to said movable jaw to normally maintain the same in its closed position on the saw blade, means for actuating said last named means
 70 to move the jaw to its open position, and additional means for adjusting said spring held means to regulate the extent of movement of said movable jaw.

39. In a saw filing machine, the combination of a saw blade support comprising opposed jaws one of which is movable relative to the other, a vertically disposed pivotally mounted post, links connecting said post with the movable jaw, cam actuated means
 80 connected to said links to move said movable jaw, and means for positioning said pivotally mounted post to regulate the extent of movement of said movable jaw.

40. In a saw filing machine, a file carrier
 85 mounted for longitudinal movement in reverse directions, means for moving said carrier; in combination with a rotatably mounted saw blade support, parallel horizontal rods connected at one end to said support
 90 upon opposite sides of its pivot, a vertically disposed oscillatory bar engaged with one of said rods at its lower end, and means connecting said bar to the carrier operating means to oscillate the bar and move said
 95 rods in reverse directions to rotate the support and position the saw blade at an angle with relation to the line of movement of the file in the effective stroke of the carrier.

41. In a saw filing machine, a vertically
 100 movable support, a carrier longitudinally movable on said support in reverse directions, means for moving said carrier, a counter-weighted beam normally maintaining the support in an elevated position, additional means actuated by said carrier moving means to move the beam and force the support downwardly, said latter means including a gear, in combination with a rotatably mounted saw blade support, parallel
 110 rods connected to said support on opposite sides of its pivot, a link bar connecting said rods to maintain the same in parallel relation, a vertically disposed oscillatory bar engaged at its lower end with one of the
 115 rods and an eccentric link connecting said bar at its upper end to said gear whereby said saw blade support is rotated in the vertical movement of the carrier support to angularly dispose the saw blade with relation to the line of movement of the file.

42. In a saw filing machine, the combination of a saw blade support comprising opposed jaws, one of said jaws being pivotally mounted for movement relative to the other,
 125 a vertically disposed pivotally mounted post, a pair of pivotally connected links connecting said post and the pivoted jaw, spring held means connected to said links to yieldingly hold the same against movement
 130

and maintain the pivoted jaw in clamping engagement with the saw blade, and cam actuated means connected to said latter means to actuate the same and release the
5 pivoted jaw from engagement with the saw blade.

43. In a saw filing machine, the combination of a saw blade support comprising a vertical U-shaped bar, a jaw mounted on one
10 end of said bar, a second jaw pivotally mounted on the other end of said bar for movement relative to the first named jaw, means connected to said pivoted jaw to

move the same to its open and closed positions with relation to the stationary jaw, 15 said means including manually adjustable means whereby the extent of pivotal movement of said jaw may be regulated, and additional means for positioning the stationary jaw with relation to the pivoted jaw. 20

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

SAMUEL HALTOM.

Witnesses:

E. NEWT SPINEY,
J. W. MILLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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