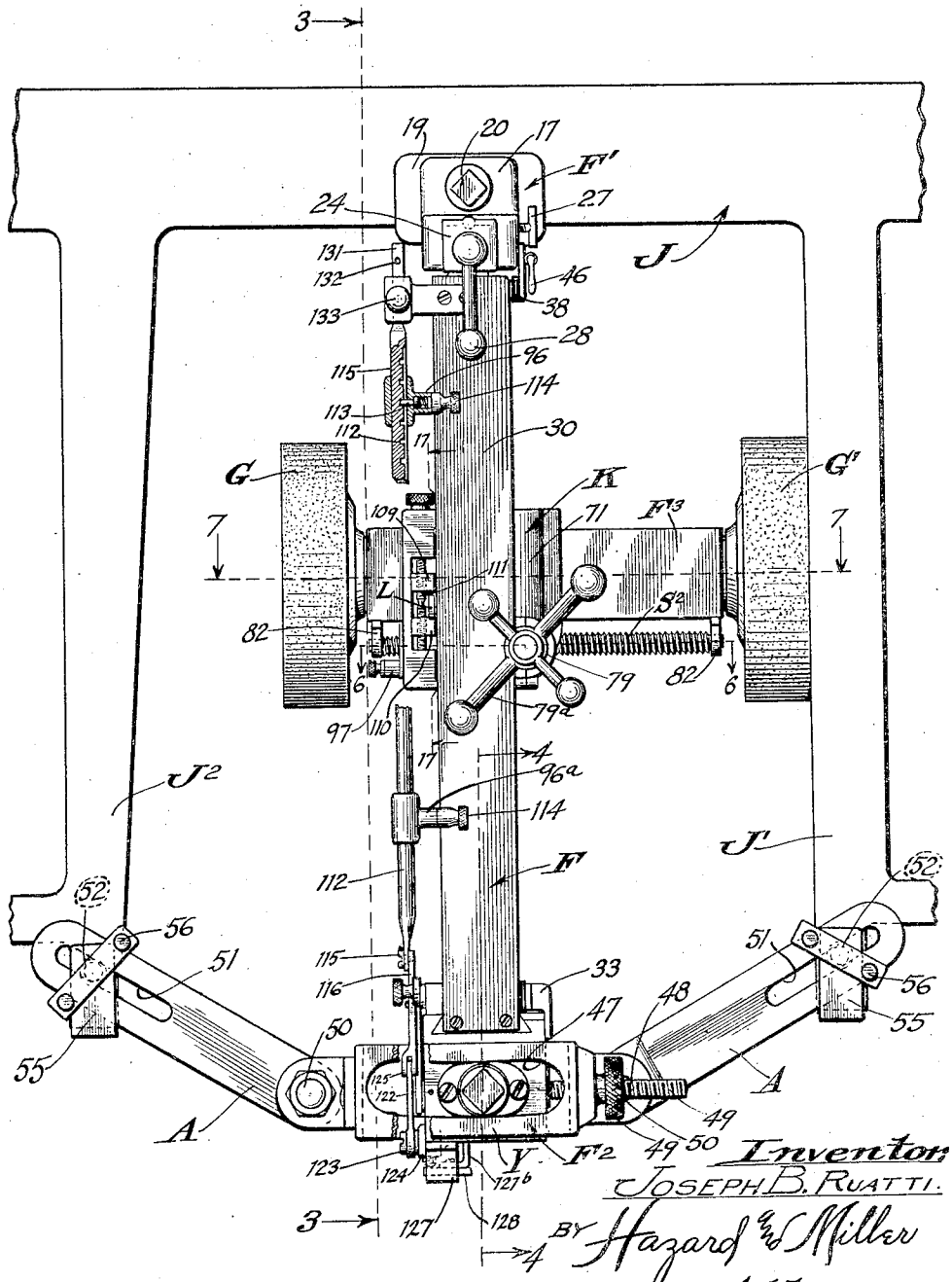
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J. B. RUATTI

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Fig. 1.



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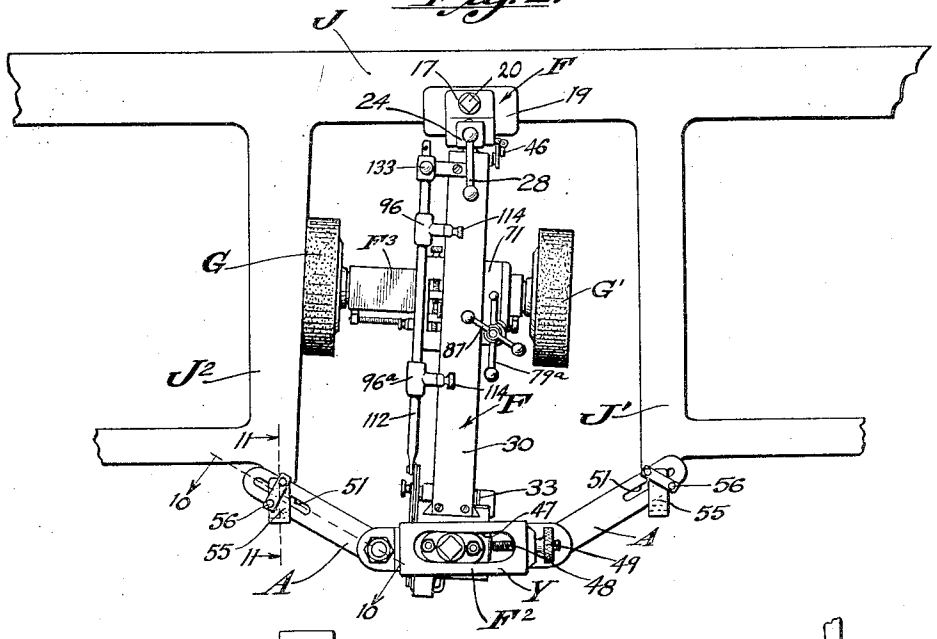
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Fig. 2.



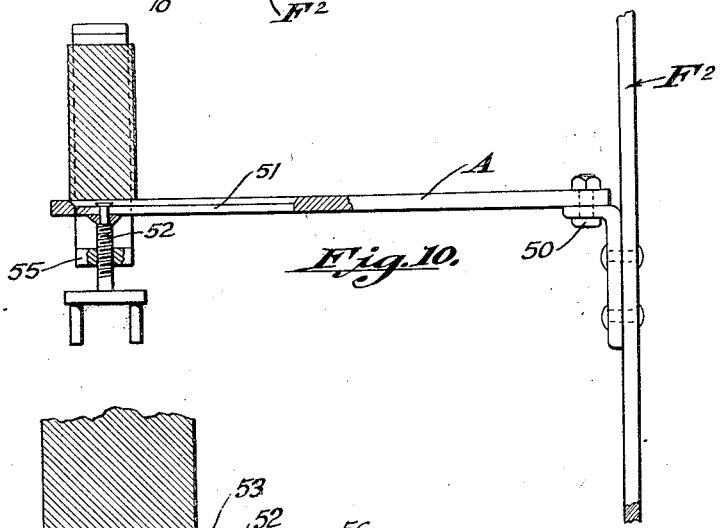
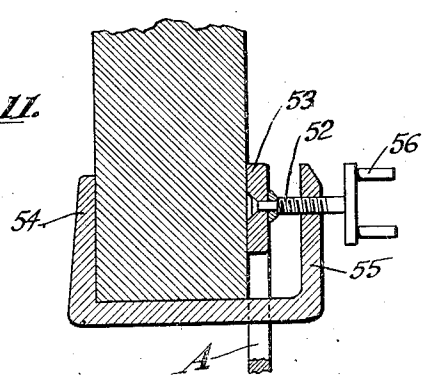


Fig. 10.

Fig. 11.



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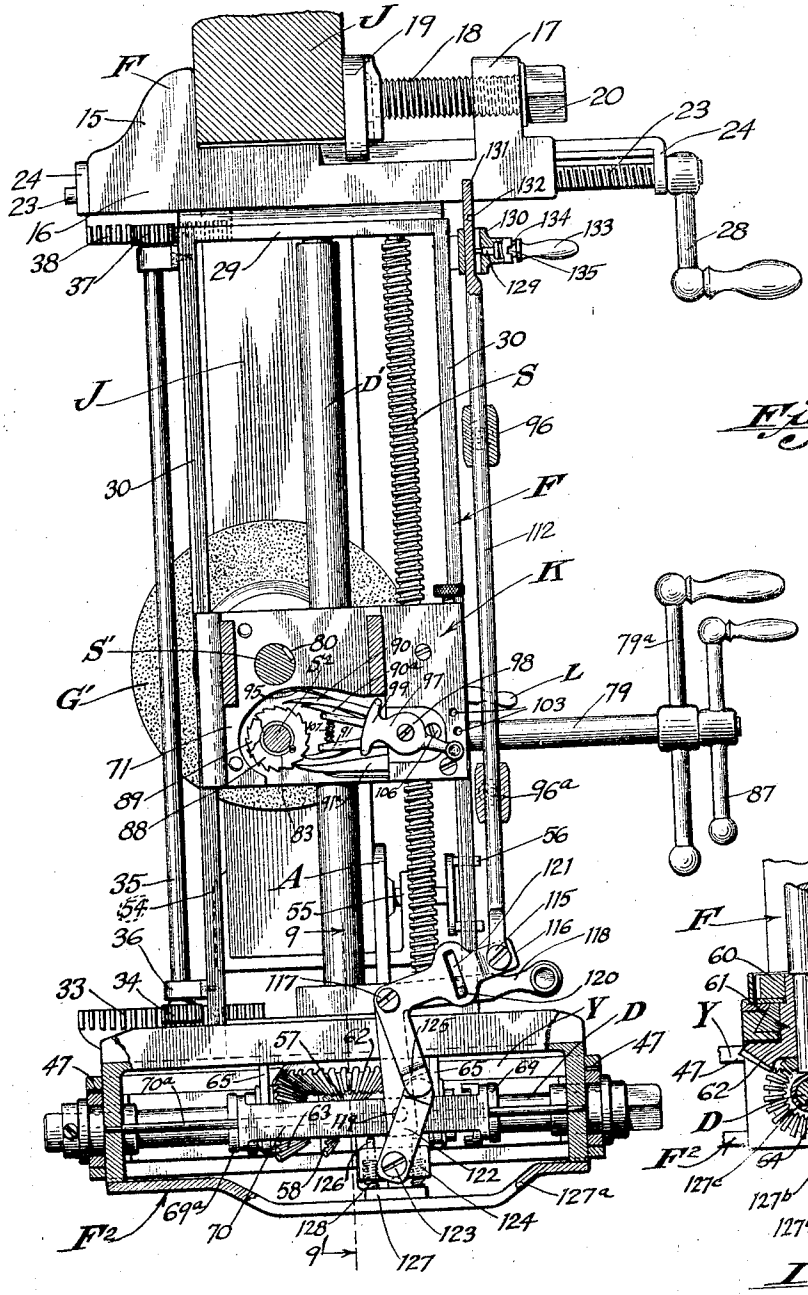


Fig. 3.

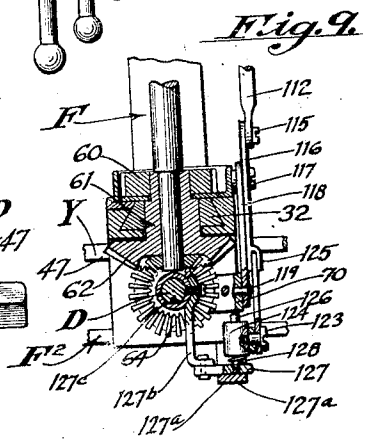


Fig. 9.

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Filed Dec. 14, 1921 7 Sheets-Sheet 4

Fig. 4.

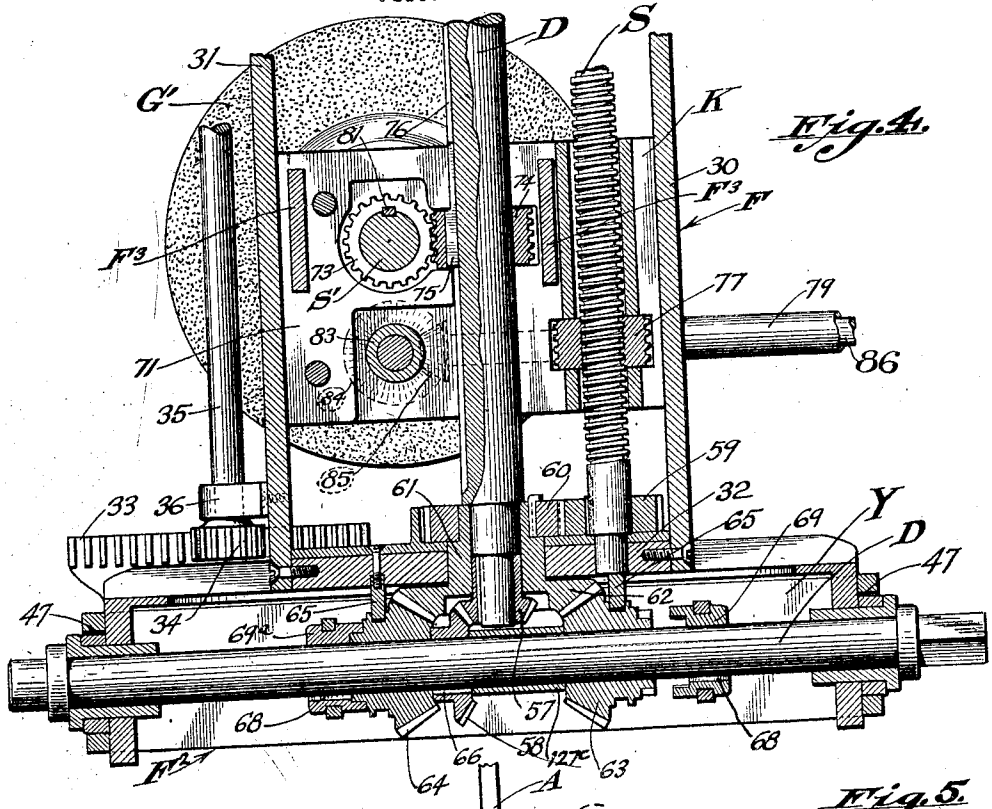
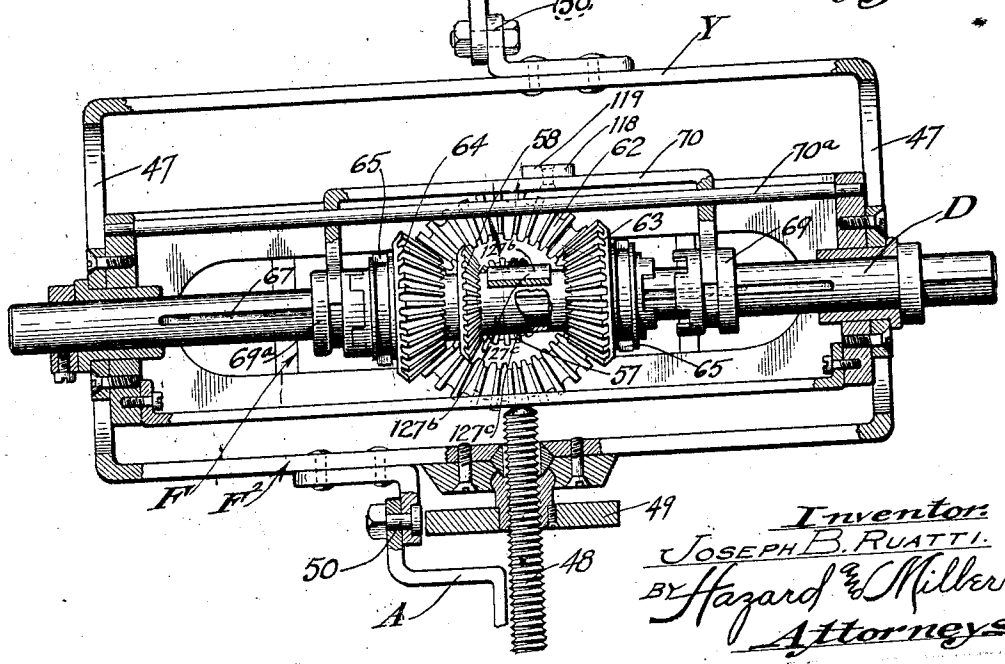


Fig. 5.



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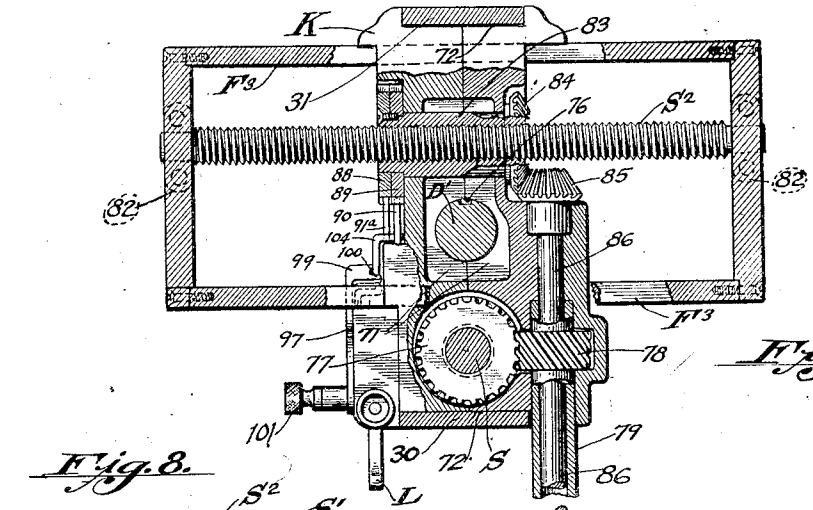


Fig. 6.

Fig. 8.

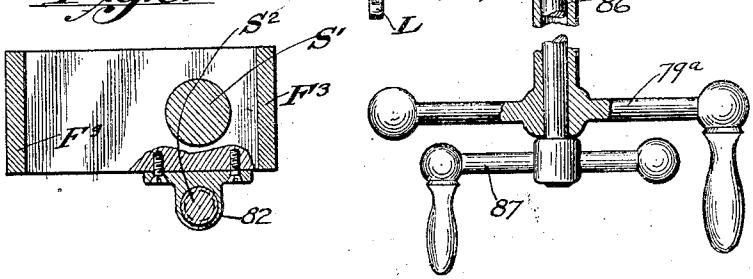
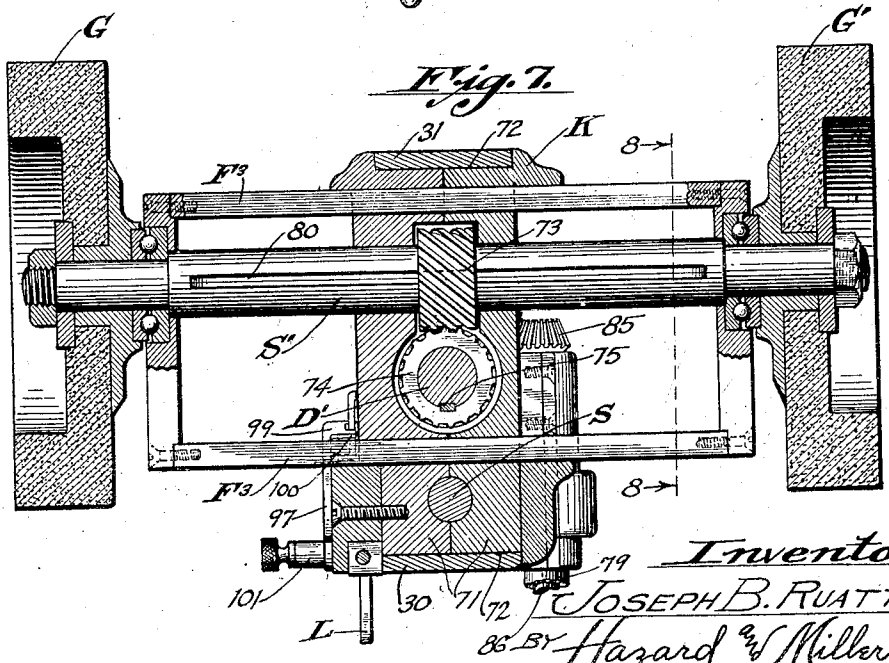


Fig. 7.



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Fig. 12.

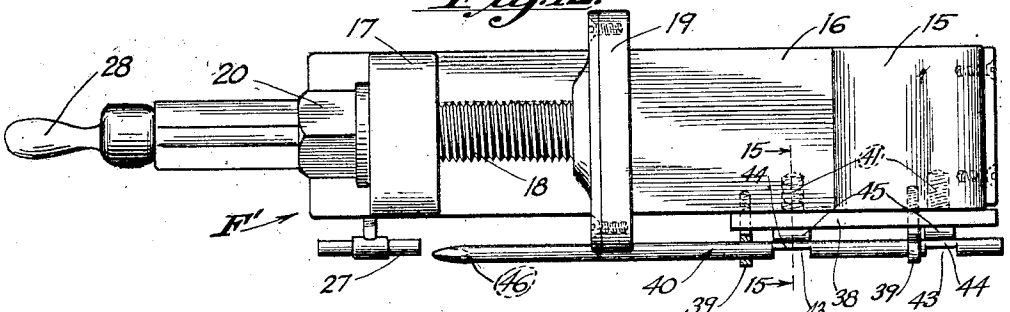


Fig. 13.

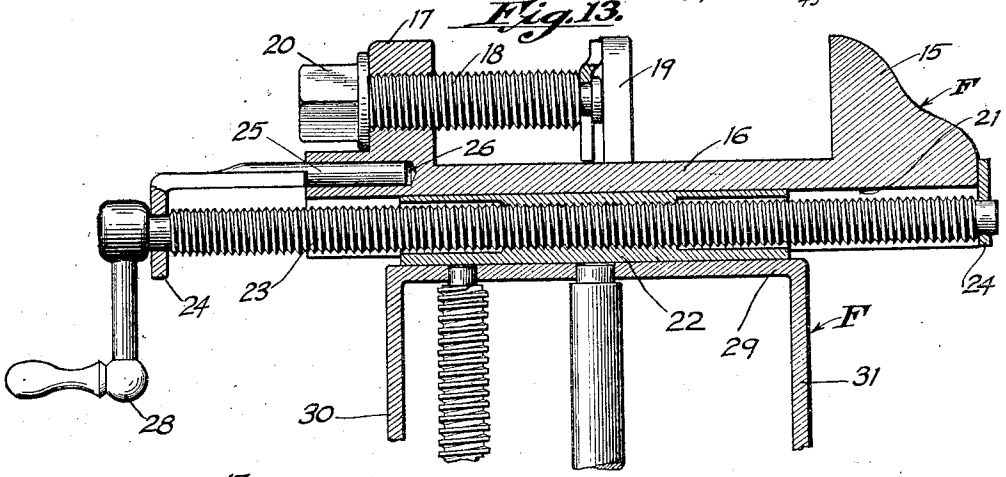


Fig. 14.

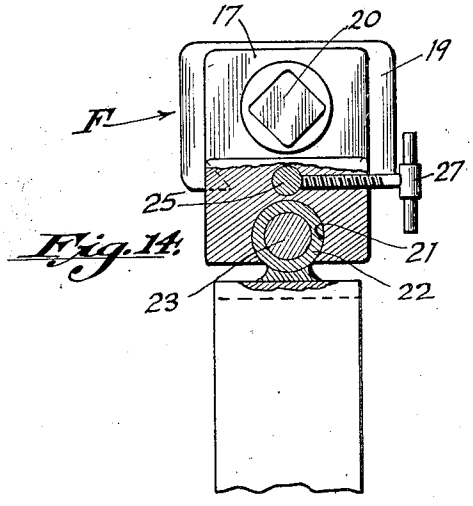


Fig. 15.

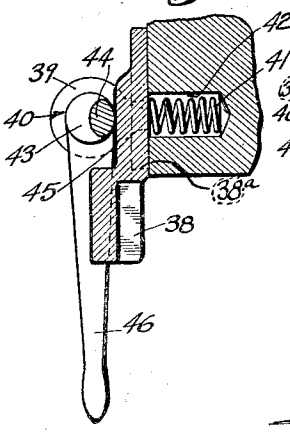
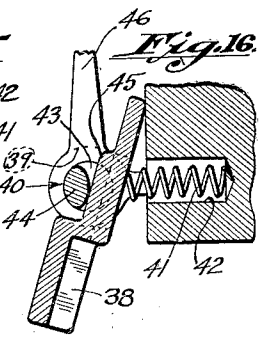


Fig. 16.



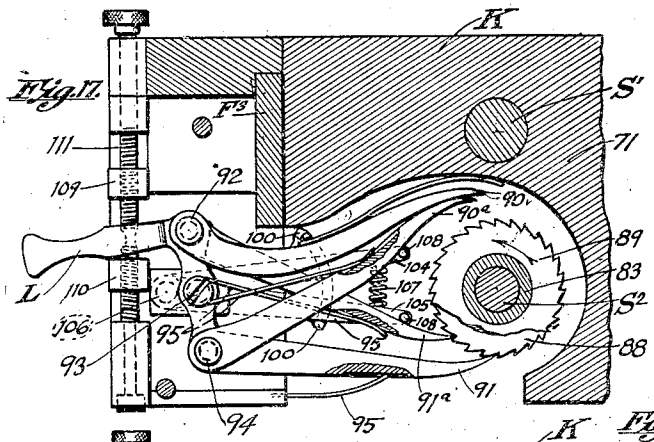
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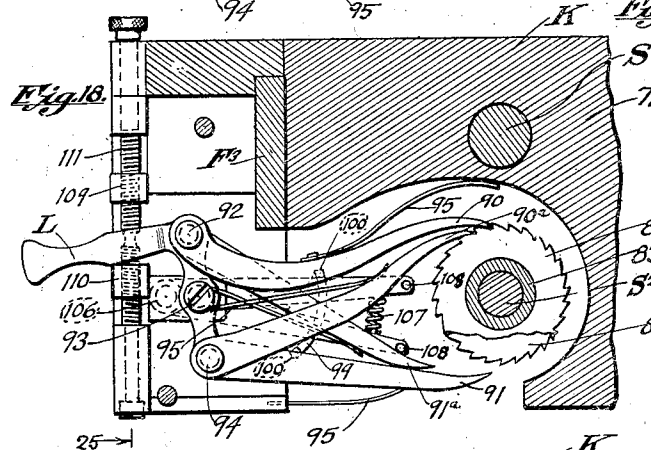
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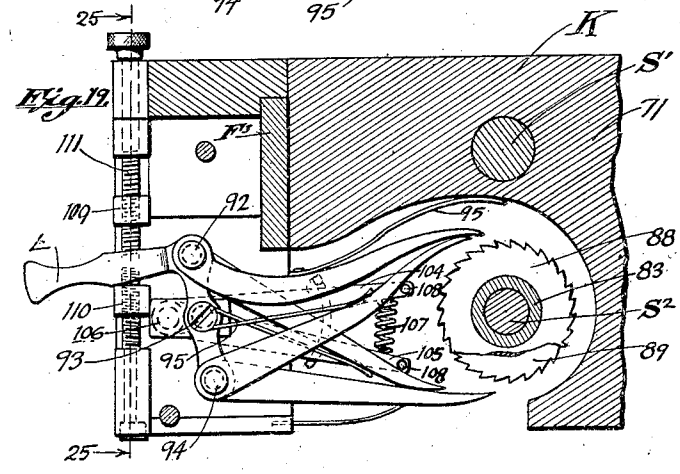
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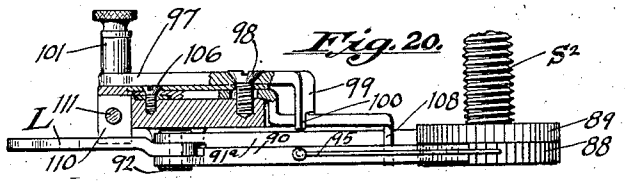
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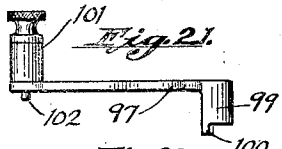
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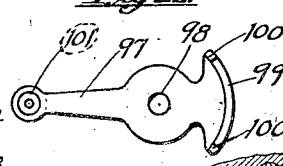


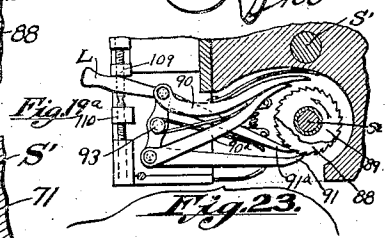


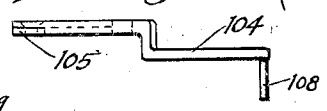


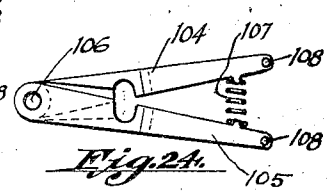












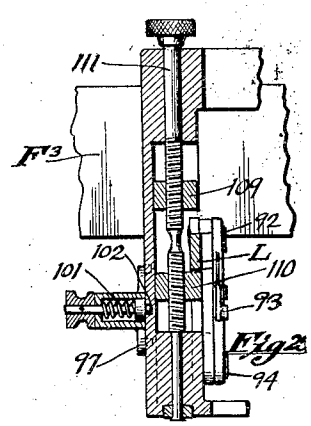


Fig. 2

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Patented Aug. 26, 1924. 1,506,504

UNITED STATES PATENT OFFICE.

JOSEPH B. RUATTI, OF LOS ANGELES, CALIFORNIA.

MACHINE FOR FINISHING JOURNAL FRAMES.

Application filed December 14, 1921. Serial No. 522,393.

To all whom it may concern:

Be it known that I, JOSEPH B. RUATTI, a citizen of Austria, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Machines for Finishing Journal Frames, of which the following is a specification.

My invention relates generally to grinding machines, and more particularly, although not necessarily, to a machine for grinding the journal frames of locomotives in effecting a finishing of the latter to accommodate the journal boxes and blocks.

A purpose of my invention is the provision of a grinding machine of the above described character which is attachable to a journal frame and operable to effect with facility and dispatch the accurate finishing of the confronting sides of a journal frame.

I will describe one form of grinding machine embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings,

Figure 1 is a view showing a portion of a journal frame having applied thereto one form of grinding machine embodying my invention, the latter being adjusted to effect a grinding of one vertical wall of the frame.

Fig. 2 is a view similar to Fig. 1 with the machine adjusted to effect a grinding of the other vertical wall of the frame.

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a bottom plan view of that portion of the machine shown in Fig. 4.

Figs. 6 and 7 are horizontal sectional views taken on the lines 6—6 and 7—7, respectively, of Fig. 1.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7.

Fig. 9 is a vertical sectional view taken on the line 9—9 of Fig. 3.

Figs. 10 and 11 are sectional views, partly in elevation, taken substantially on the lines 10—10 and 11—11, respectively, of Fig. 2.

Fig. 12 is a top plan view of the machine shown in the preceding views.

Fig. 13 is a central longitudinal sectional view of that portion of the machine shown in Fig. 12.

Fig. 14 is a vertical sectional view taken on the line 14—14 of Fig. 12.

Fig. 15 is a sectional view taken on the line 15—15 of Fig. 12, and Fig. 16 is a view similar to Fig. 15 showing the cam lever in released position.

Figs. 17, 18 and 19 are fragmentary sectional views of the carriage comprised in the machine showing in side elevation the feeding mechanism in all of its several positions.

Fig. 19[a] is a view similar to Fig. 17, but upon a reduced scale, showing the lever L and the parts operated thereby in the other extreme position.

Fig. 20 is a top plan view of the mechanism shown in Fig. 17.

Figs. 21 and 22 are views showing in plan and side elevation, respectively, the adjusting lever of the feeding mechanism.

Figs. 23 and 24 are views showing in top plan and side elevation, respectively, the control arms of the feeding mechanism.

Fig. 25 is a sectional view taken on the line 25—25 of Fig. 19.

Similar reference characters refer to similar parts in each of the several views.

Referring to the drawings, my invention, in its present embodiment, essentially comprises as shown in Figs. 1, 2 and 3, an upper clamping frame designated generally at F′ adapted to be secured to the horizontal portion or upper end of a journal frame for swingingly sustaining a main frame F between the parallel portions of the journal frame, and a lower supporting frame designated generally at F^2 which is adapted to be sustained by the journal frame through the medium of arms A for slidably receiving the lower end of the main frame F. The main frame F is provided with a carriage designated generally at K which is movable vertically on the frame to effect a vertical adjustment or movement of grinding elements G and G′, so that the latter will traverse the confronting faces of the vertical portions of the journal frame in effecting a grinding of such faces. Driving mechanism is provided for effecting the vertical movement of the carriage, and means operable by the movement of the carriage is designed to control the driving mech-

anism in such manner that a rectilinear movement of the carriage takes place. In addition to the latter, feeding means is associated with the carriage to cause the outward feeding of either grinding element so as to maintain the element in grinding contact with the surface of the journal frame, this means being operable by the movement of the carriage and therefore automatic.

As clearly shown in Figs. 3, 12 and 13, the clamping frame F′ includes a relatively stationary jaw 15 formed on one end of a casting 16 including a projection 17 in which is threadedly fitted a shank 18 carrying on its inner end a movable jaw 19, and a nut 20 on its outer end by means of which the shank can be rotated to effect a feeding of the jaw 19 toward or away from the jaw 15 in receiving and clamping the horizontal portion J of the journal frame. As clearly shown in Fig. 14, the casting 16 is formed with an elongated socket 21 in which is slidably and rotatably fitted a sleeve 22 internally threaded to receive a screw 23 journaled in brackets 24. One of the brackets 24 is provided with an extension 25 which is removably fitted in a recess 26 of the casting 16 and temporarily locked therein by means of a set screw 27, so that the screw 23 can be readily removed from the casting, as will be understood. The sleeve 22 is welded or otherwise suitably fixed to the main frame F so that it co-operates with the socket 21 in swingingly supporting the main frame as a unit upon the clamping member and to thereby allow of a lateral adjustment of the machine between the vertical portions J′ and J^2 of the journal frame. By rotation of the screw 23 through the medium of a crank 28, the sleeve 22 can be moved forwardly or rearwardly within the socket 21 to effect a corresponding movement of the main frame F and to thereby effect the desired positioning of the grinding elements with respect to the journal frame, as will be more clearly described hereinafter.

As shown in Figs. 3, 4, and 9, the main frame F includes an upper portion 29 to which the sleeve 22 is attached, side portions 30 and 31, and a bottom portion 32 bolted or otherwise secured to the lower ends of the side portions and of dovetail form in cross section as clearly shown in Fig. 9, to slidably fit in a correspondingly shaped channel formed in the upper portion of the base frame F^2. As the main frame F is slidably associated with both the clamping frame F′ and the base frame F^2, it will be clear that it is capable of horizontal adjustment between the frames and through the medium of the screw 23, as has been described.

In order to effect a uniform movement of both ends of the main frame and to thereby insure the easy adjustment thereof, the following mechanism is provided:

As shown in Figs. 3 and 4, the base frame F^2 is provided with a rack bar 33 which meshes with a pinion 34 fixed to the lower end of a shaft 35 journaled in bearings 36 secured to the side portion 31 of the main frame. The upper end of the shaft 35 is provided with a pinion 37 which is adapted to mesh with a rack bar 38 carried by the clamping frame F′. As clearly shown in Figs. 12, 15 and 16, the rack bar 38 is provided with slots 38^a adapted to receive the shanks of eye screws 39 which form bearings for a rod 40. In this manner the rack bar 38 is capable of being moved into or out of engagement with the pinion 37, it being understood that the screw eyes 39 are threadedly fitted within the casting 16. Expansible springs 41 mounted in recesses 42 formed in the casting 16 normally urge the rack bar to disengaging position with respect to the pinion 37 as is clearly shown in Fig. 16. For moving the rack bar into engagement with the pinion and against the action of the springs 41, the rod 40 is provided with recessed portions 43 formed to provide eccentrically mounted cams 44 which are adapted to engage projections 45 formed on the outer side of the rack bar 38. The cams 44 are moved to engage the projections 45 by a handle 46 formed on one end of the rod, and when the cams are in engagement with the projections, as shown in Fig. 15, the rack bar will be moved into engaging position with respect to the pinion. The purpose of mounting the rack bar so as to engage or disengage the pinion is to allow the removal of the main frame F from the clamping frame F′ and thus facilitate the application and removal of the machine.

The construction of the base frame F^2 is clearly shown in Fig. 5, and as here shown, a driving shaft D is journaled therein with its opposite ends projecting through arcuate slots 47 formed in the opposite ends of a rectangular yoke Y. An adjusting screw 48 is threadedly mounted in one side of the yoke Y and a nut 49 engages the screw for effecting an inward or outward feeding thereof to cause the screw to move the base frame F^2 and consequently the main frame F to any desired position with respect to the vertical. As clearly shown in Figs. 1, 2 and 10, the arms A are secured to the yoke Y through pivotal connections 50, and these arms are slotted as indicated at 51 to receive the shanks of adjusting screws 52 which carry movable jaws 53 adapted to co-operate with stationary jaws 54 in securing brackets 55 to the lower ends of the vertical portions J′ and J^2 of the journal frame. As clearly shown in Fig. 11, each shank 52 is threadedly fitted in the bracket 55 and is provided with a handle 56 by means of

which it can be manually rotated to effect an engagement or disengagement of the bracket with respect to the work.

Referring now to Figs. 3, 4, 6 and 7, a driven shaft D' is journaled in the main frame F and operably connected at its lower end to the driving shaft D through the medium of a bevel gear 57 meshing with a similar gear 58 fixed to the driving shaft D for rotation therewith. A screw-threaded shaft S is journaled in the main frame F and is operatively connected to the driving shaft D by a gear 59 keyed to the shaft S and meshing with a similar gear 60 keyed to a sleeve 61 surrounding the shaft D' and provided with a bevel gear 62 which constantly meshes with bevel gears 63 and 64 rotatable on the shaft D.

The gears 63 and 64 are maintained in meshing relation to the gear 62 through depending forks 65 secured to the lower end of the frame F so that this driving connection between the shafts D' and S and the driving shaft D moves as a unit with the main frame. To allows of the movement of the gear 58 on the shaft D while at the same time rotating with the shaft, a feather 66 is slidably mounted in a slot 67 (Fig. 5) formed in the shaft D. This slot 67 also receive feathers 68 of clutches 69 and 69a slidably mounted on and rotatable with the driving shaft D. These clutches 69 and 69a are provided with teeth adapted to engage similar teeth formed on the gears 63 and 64, and when in engagement provide an operative connection between the driving shaft and such gears. It is of course to be understood that only one gear 63 and 64 is adapted to be operatively connected to the driving shaft D at one time, and to this end a yoke 70 having forked ends for engagement with the clutches 69 and 69a is provided, and this yoke is movable on a rod 70a and is so associated with the clutches as to cause either one clutch or the other to engage one gear or the other. As both gears are constantly in mesh with the gear 62, it will be clear that rotation of the latter in one direction or the other can be effected according as one gear 63 or 64 is locked to the shaft D. As the gear 62 is operatively connected to the shaft S, it will be clear that rotation of the latter can be effected in either direction depending upon which clutch is in engagement.

As shown in Figs. 4, 6 and 7, the carriage K is made up of two sections 71 adapted to be secured to each other and formed to provide terminal guideways 72 in which the vertical portions 30 and 31 of the main frame F are adapted to slidably fit to allow of vertical movement of the carriage upon the frame. The sections have their confronting faces formed to accommodate the driven shaft D' and the feed shaft S, while the sections are formed transversely with slots in which the side portions of a rectangular frame designated generally at F^3 are slidably fitted to allow of a longitudinal adjustment of the frame on the carriage. As clearly shown in Fig. 7, a shaft S' is journaled in suitable bearings carried by the frame F^3, and this shaft has fixed to its opposite ends the grinding elements G and G'. This shaft S' extends through the carriage K and is provided with a spiral gear 73 which meshes with a similar gear 74 fixed to the driving shaft D for rotation therewith but movable vertically thereon by means of a feather 75 slidably fitted in a slot 76 (Fig. 4). As clearly shown in Fig. 4, the sections of the carriage K accommodate a spiral gear 77 which threadedly receives the shaft S and which has engagement with a spirial gear 78 fixed to a sleeve shaft 79 (Fig. 6). The positioning of the gear 77 with relation to the carriage K is such that upon rotation of either shaft S or 79, rotation of the gear 77 is effected to cause a bodily lifting or lowering of the carriage K within the main frame F thereby effecting a vertical adjustment of the grinding elements G and G'.

As clearly shown in Figs. 4 and 7, the shaft S' is provided with a groove 80 in which is slidably received a feather 81 for locking the gear 73 to the shaft for rotation therewith, and to allow longitudinal movement of the shaft and yet maintain an operative connection between the gear 73 and the gear 74. By this arrangement it will be seen that irrespective of the longitudinal adjustment of the frame F^3, an operative connection is maintained between the shafts D' and S' so that a driving of the grinding elements G and G' is at all times effected. The adjustment of the frame F^3 is necessary in order that one grinding element or the other can be moved laterally to maintain a grinding engagement with the surface of the work. To this end a screw-threaded shaft S^2 is mounted in bearings 82 secured to the frame F^3 as clearly shown in Fig. 8, and this shaft S^2 is engaged by an internally threaded sleeve 83 journaled in the carriage K as shown in Fig. 6. The sleeve 83 is formed at one end with a bevel gear 84 meshing with a similar gear 85 fixed to the inner end of a shaft 86, the latter extending through the sleeve shaft 79 and provided with a handle 87 by means of which the shaft can be rotated to operate the gears 84 and 85 in effecting rotation of the sleeve 83. The sleeve shaft 79 is provided with a handle 79a by means of which such shaft can be rotated. It will be understood that by rotation of the sleeve 83 the shaft S^2 is moved in one direction or the other depending upon the direction of rotation of the sleeve, and that through this shaft a longitudinal adjust-

ment of the frame F^3 can be effected. The opposite end of the sleeve 83 carries ratchet wheels 88 and 89, with the teeth of one wheel extending in the opposite direction to the teeth of the other wheel as is clearly shown in Figs. 17 to 19. These ratchet wheels are adapted to be engaged by pawls in effecting rotation of the sleeve in one direction or the other, and to this end the mechanism shown in Figs. 17 to 19 has been provided.

As shown in Fig. 17, two sets of pawls are provided with the pawls of one set designated at 90 and 90^a and adapted to engage the ratchet wheel 89, and the pawls of the other set designated at 91 and 91^a and adapted to engage the ratchet wheel 88. The pawls 90 and 91^a are pivoted at 92 to a lever pivoted at 93, while the pawls 90^a and 91 are pivoted on the lever at the point indicated at 94. All the pawls are normally urged into engagement with the ratchet wheels by means of springs 95 mounted in the manner shown in Fig. 17, but the actual engagement of the pawls with their respective ratchet wheels is controlled by the lever L which, as shown, has one end thereof projecting from the carriage for engagement by stops 96 and 96^a as clearly shown in Fig. 3. In Fig. 17, the lever L is in one extreme position in which the pawls 91 and 91^a are in engagement with the ratchet wheel 88. When the lever is moved to its other extreme position, as shown in Fig. 19^a, the pawl 91 is retracted while the pawl 91^a is advanced to cause rotation of the ratchet wheel 88 in the direction of the arrow. When the lever is returned to the position shown in Fig. 17, it will be clear that the pawl 91^a is retracted and the pawl 91 advanced to engage and partially rotate the ratchet wheel 88 in the same direction. It will therefore be seen that according as the lever L is moved from one extreme position to the other, the pawls 91 and 91^a will be operated to effect a step by step rotation of the ratchet wheel 88 in the same direction. By reference to Fig. 6 it will be seen that upon rotation of the ratchet wheel 88, the feed shaft S^2 is moved to the right thereby effecting a corresponding adjustment of the frame F^3 and the grinding elements G and G'.

In order to effect an adjustment of the grinding elements in the opposite direction from that just described, the pawls 90 and 90^a and the ratchet wheel 89 are provided, which are adapted to operate in the same manner as the pawls 91 and 91^a. However, in the present instance it is necessary to shift the pawls 91 and 91^a out of engagement with the ratchet wheel 88 and the pawls 90 and 90^a into engagement with the ratchet wheel 89. This is effected by means of a control lever 97 which, as clearly shown in Fig. 3, is pivoted on the carriage at the point indicated at 98. As shown in Figs. 21 and 22, the control lever is provided at one end with a head 99 including spaced projections 100. At the opposite end the lever is formed with a handle 101 including a spring pressed pin 102 (Fig. 5) adapted to engage in any one of several notches 103 (Fig. 3) for locking the lever in any adjusted position. In Fig. 17, the lever 97 is shown accommodating a pair of arms 104 and 105 pivoted on the carriage at the point indicated at 106 and arranged within the head 99 and between the projections 100 so that when the lever 97 is moved about its pivot, the projections 100 will engage the arms and thus effect movement of the latter about the pivot 106. As clearly shown in Figs. 17 and 24, the arms 104 and 105 have arranged therebetween an expansible spring 107, while at the free ends of the arms pins 108 are provided adapted to normally engage the pawls 90^a and 91^a under the expansive action of the spring 107.

By this arrangement it will be seen that when the control lever 97 is moved to effect movement of the arms 104 and 105, a corresponding movement of the pawls 90^a and 91^a is effected to cause one or the other to engage one ratchet wheel or the other as shown in Figs. 17 and 18, or to occupy a neutral position in which neither of the pawls engage their respective ratchet wheels as shown in Fig. 19. Because of the manner in which the pawls 90^a and 91^a are associated with the pawls 90 and 91, it will be clear that movement of either pawl 90^a and 91^a to disengaging position with respect to the ratchet wheel will cause a corresponding movement of the pawl 90 or 91. Thus, it will be clear that when the control lever 97 is in extreme position, the pawls 91^a and 91 will engage the ratchet wheel 88 as shown in Fig. 17, and when the lever is in the other extreme position, the pawls 90 and 90^a will engage the ratchet wheel 89 as shown in Fig. 8. However, when the control lever is the neutral position, neither pair of pawls will engage the ratchet wheels as is clearly shown in Fig. 19.

To control the throw of the lever L and consequently the degree of rotation of the feed shaft S^2 by movement of the pawls, stops 109 and 110 are provided which are adjustable upon the reversely threaded portions of a screw or shaft 111 mounted in suitable bearings formed in the carriage K as is clearly shown in Figs. 17 and 25. Rotation of the shaft 111 effects a vertical adjustment of the stops 109 and 110 toward or away from each other, and as these stops are arranged upon opposite sides of the horizontal portion of the lever L, it will be clear that the movement of such lever will be controlled in accordance with the position of these stops.

Referring now to Figs. 1 and 3, the stops 96 and 96^a are shown as mounted for ver-

tical adjustment upon a rod 112 by means of spring pressed pins 113 movable by handles 114 to engage or be disengaged from notches 115 formed in the rod 112. The lower end of the rod 112 is connected to a bell crank lever 116 at the point indicated at 115, the lever being fulcrumed at the point indicated at 117. Upon this same pivot 117 is mounted an actuating bell crank lever 118 which is pivotally connected at the point indicated at 119 to the yoke 70. A pin 120 is carried by the lever 118 and works within an arcuate slot 121 formed in the lever 116, the arrangement of the pin and slot being such that when the lever 116 is moved to either of its extreme positions, the pin will engage one of the ends of the slot to cause a rocking movement of the lever 118 and thereby a shifting of the yoke 70 to move one clutch 69 or 69[a] into or out of engagement with the gear 63 or 64. In order to effect the required movement of the clutches to prevent any prolonged cessation in rotation of the shaft S and to thereby secure a continuous reciprocating movement of the carriage K, an arm 122 is provided which is pivoted at the point indicated at 123 on a block 124, all as clearly shown in Figs. 3 and 9. The upper end of the arm 122 is rounded as shown and works in the bifurcated end 125 of the lever 118, the ends of the bifurcated portion being also rounded as shown. The block 124 is mounted for vertical movement on pins 126 secured in a block 127, this block being slidably sustained on a bar 127[a] by means of a bracket 127[b] secured to a sleeve 127[c] slidable on the shaft D. Springs 128 are mounted on the pins 126 for normally urging the block 124 upwardly on the pins.

As shown in Fig. 3, the lever 116 is in one extreme position wherein the clutch 69[a] is engaged and the clutch 69 disengaged. When it is desired to move the clutch 69 into engaging position and the clutch 69[a] into disengaging position, the lever 116 is swung clockwise around the pivot 117 as a center, thereby causing the bifurcated end 125 to move in a corresponding direction and to thus rock the arm 122 to the left of its pivot. Under the action of the springs 128, the arm 122 is urged upwardly, and it is by virtue of this upward urging that the arm accelerates the movement of the lever 116 after the arm and lower portion of the lever 118 becomes disalined with relation to the vertical. As a result of this movement a sudden thrusting of the lever 116 is effected near the end of its movement so that when the pin 120 is in engagement with one end of the slot, the lever 118 is suddenly moved to effect a shifting of the yoke 70 to cause a rapid engagement of the clutch 69 and a like disengagement of the clutch 69[a].

When reversing the movement of the clutches to cause the clutch 69[a] to be engaged and the clutch 69 to be disengaged, a reverse movement of the lever 116 is effected, and under the action of the spring urged arm 122 the lever 116 and consequently the yoke 70 is suddenly moved to effect the operation of the clutches. It will be understood that the movement of the lever 116 is effected through the medium of the rod 112, and that the latter is capable of being moved downwardly to one extreme position wherein the clutches are positioned oppositely to that shown in Fig. 3, and moved upwardly to another extreme position or that position shown in Fig. 3 wherein the clutches are positioned as shown. The rod 112 is also capable of occupying a neutral position wherein the lower portion of the lever 116 and the arm 122 are in vertical alinement, with the lever 118 occupying such a position that neither of the clutches 69 and 69[a] are in engagement. The rod is adapted to be secured in this neutral position by means of a spring pressed pin 129 movable in a sleeve 130 through which the flattened upper end 131 of the rod extends. This end 131 is provided with a notch 132 adapted to receive the pin 129 and to thereby lock the rod in neutral position and against vertical movement. The pin 129 is capable of being retracted through the medium of a handle 133 and locked in this position by rotating the handle to cause a lug 134 to be disalined with respect to slots 135.

The operation of the entire machine is as follows:

In the application of the machine to a journal frame, the clamping member F′ is first applied and secured to the horizontal portion J of the frame as shown in Fig. 1. The application of the base frame F^2 is now in order, and it will be understood that when the arms are clamped to the vertical portions J′ and J^2, the base frame will be vertically alined with respect to the clamping frame F′. The main frame F is now placed in position between the frame F′ and the frame F^2 with the rack bar 38 in disengaging position until the main frame has been properly applied, when the lever 46 is operated to move the rack bar into engagement with the pinion 37. The extension 25 of the bracket 24 is inserted into the recess 26 and locked therein by means of the screw 27 whereby horizontal adjustment of the main frame can be effected by rotation of the screw shaft 23 as has been described. This horizontal adjustment of the main frame F allows of the proper positioning of one grinding element G or G′ with respect to the confronting side of the vertical portions J′ and J^2 of the journal frame, and after such grinding element has

been adjusted, say for instance the grinding element G′, Fig. 1, the machine is ready for operation.

The headed end of the driving shaft D is adapted to be connected to any suitable source of power for effecting rotation of the shaft in the direction of the arrow in Fig. 4, and with the clutch 69ª in engagement with the gear 64, it will be clear that rotation of the shaft S is effected in such direction as to cause a downward feeding of the carriage K through the medium of the spiral gear 77. Simultaneously with the movement of the carriage K, the shaft D′ is rotated to cause in turn a continuous rotation of the shaft S′ and the grinding element G′. Manual adjustment of the grinding element G′ is now effected through an operation of the shaft 86 to cause a lateral adjustment of the grinding element to engage the side of the portion J′. Vertical adjustment of the grinding element is obtained by rotation of the sleeve shaft 79 which in turn operates the shaft S so that the grinding element can move to the desired position on the surface of the portion J′. These adjustments having been made, the continuous rotation of the shaft S causes a rectilinear movement of the carriage K with a corresponding movement of the grinding element G′, thus causing the latter to move upwardly and downwardly on the side of the member J′ in effecting a grinding of its surface. When the carriage K reaches its lowermost position, such position being determined by the adjustment of the stop 96ª, the lever L engages the stop, and under continued downward movement of the carriage the lever L forces the rod 112 downwardly to cause a shifting of the clutches so that the clutch 69 now engages the gear 63, while the clutch 69ª is thrown into disengaging position with respect to the gear 64. With the gear 63 now locked to the shaft D, it will be clear that a reverse rotation of the feed shaft S is effected thereby causing an upward movement of the carriage K with a corresponding movement of the grinding element G′. The carriage K continues to travel upwardly until the lever L engages the stop 96 when an elevation of the rod 112 occurs to disengage the clutch 69 and again engage the clutch 69ª, thereby causing a reversal in the movement of the carriage K. It will be understood that this rectilinear movement of the carriage continues so long as power is applied to the shaft D, and that the travel of the carriage in either direction can be readily controlled by an adjustment of the stops 96 and 96ª.

From a consideration of the description of the feeding mechanism shown in Figs. 17 and 19, it will be understood that with the feeding mechanism adjusted by means of the control lever 97 to cause a feeding of the shaft S^2 in the direction of the grinding element G^2, that each time the lever L engages one of the stops 96 or 96ª, a partial feeding of the grinding element toward the work is effected, so that the element is at all times maintained in grinding engagement with the work. When employing the grinding element G to effect a finishing of the portion J^2 of the journal frame, the entire main frame is swung to the position shown in Fig. 2 by an adjustment of the base frame F^2 through a manipulation of the screw 48. In this position the grinding element G is moved into contact with the side of the portion J^2 so that upon operation of the shaft D, the grinding element will be moved rectilinearly along the surface of the work, while at the same time being continuously rotated and constantly fed to maintain the element in grinding contact with the work. It is to be understood that to effect the necessary feeding of the grinding element, the control lever 97 is moved so that the pawls occupy the positions shown in Fig. 18, so that when the lever L is engaged by the stops it will cause a feeding of the shaft S^2 in the direction of the grinding element.

To effect a proper finishing of the sides of the journal frame at points near the upper or lower ends thereof, it will be understood that through a manipulation of the cranks 28, 79ª and 87, the grinding elements can be properly positioned to grind all points of the surfaces.

Although I have herein shown and described only one form of grinding machine embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

I claim as my invention:

1. A grinding machine comprising a frame, a carriage movable vertically on the frame, grinding elements sustained on the carriage, means carried by the frame for continuously rotating the grinding elements irrespective of the position of the carriage, feeding means for effecting a lateral adjustment of the grinding elements, and means for moving said carriage first in one direction and then the other on said frame, both of the last mentioned means being controllable by the movement of the carriage.

2. A grinding machine comprising a frame pivotally sustained at one end and slidably supported at the other, a carriage movable vertically on the frame, grinding elements sustained on the carriage, means carried by the frame for continuously rotating the grinding elements irrespective of the position of the carriage, feeding means for effecting a lateral adjustment of the

grinding elements, means for moving said carriage first in one direction and then the other on said frame, and a stationary adjustable means for controlling both of the last mentioned means to vary the feed of the grinding elements and the movement of the carriage in either direction.

3. A grinding machine comprising a main frame, a carriage movable vertically on the frame, rotary grinding elements carried by the frame, means for continuously rotating the grinding elements irrespective of the position of the carriage, means for feeding the carriage upwardly and downwardly on the frame, said means including a screw shaft, a driving shaft, gears loosely mounted on the driving shaft and operatively connected to the screw shaft, clutches movable to lock either of the gears to the driving shaft to effect rotation of the screw shaft in either direction, and means operable by movement of the carriage for actuating said clutches in such manner as to effect a reciprocating movement of the carriage through the medium of said screw shaft.

4. A grinding machine comprising a main frame, a carriage movable vertically on the frame, rotary grinding elements carried by the frame, means for continuously rotating the grinding elements irrespective of the position of the carriage, means for feeding the carriage upwardly and downwardly on the frame, said means including a screw shaft, a driving shaft, gears loosely mounted on the driving shaft and operatively connected to the screw shaft, clutches movable to lock either of the gears to the driving shaft to effect rotation of the screw shaft in either direction, and adjustable means operable by movement of the carriage for actuating said clutches in such manner as to effect a reciprocating movement of the carriage through the medium of said screw shaft.

5. In a grinding machine, a carriage, grinding elements sustained on the carriage, and means for feeding the elements laterally on the carriage comprising a screw-threaded shaft, ratchet wheels fixed to the shaft with the teeth of one wheel arranged in reverse relation to the teeth of the other wheel, and pawls arranged in sets with the pawls of one set adapted to engage one wheel to effect rotation of the shaft in one direction, and the pawls of the other set engageable with the other wheel to effect rotation of the screw shaft in the opposite direction.

6. In a grinding machine, a carriage, grinding elements sustained on the carriage, and means for feeding the elements laterally on the carriage comprising a screw-threaded shaft, ratchet wheels fixed to the shaft with the teeth of one wheel arranged in reverse relation to the teeth of the other wheel, pawls arranged in sets with the pawls of one set adapted to engage one wheel to effect rotation of the shaft in one direction, and the pawls of the other set engageable with the other wheel to effect rotation of the screw shaft in the opposite direction, and means adjustable to cause either set of pawls to engage or disengage their respective ratchet wheels for the purpose described.

7. A grinding machine comprising a frame, a carriage movable vertically on the frame, rotary grinding elements sustained on the carriage, means for continuously rotating the elements irrespective of the position of the carriage, a screw-threaded shaft for moving the carriage vertically in either direction upon the frame, means for rotating the screw shaft in one direction or the other, and means controlling the last means comprising clutches, a rod operatively connected to the clutches and movable to cause one clutch or the other to be engaged whereby rotation of the screw shaft is effected in one direction or the other, stops adjustable on the rod, and a lever sustained on the carriage and adapted to engage either of said stops for moving the rod in one direction or the other.

8. A grinding machine comprising a frame, a carriage movable vertically on the frame, rotary grinding elements sustained on the carriage, means for continuously rotating the elements irrespective of the position of the carriage, a screw-threaded shaft for moving the carriage vertically in either direction upon the frame, means for rotating the screw shaft in one direction or the other, and means controlling the last means comprising clutches, a yoke for moving the cluthes whereby rotation of the screw shaft is effected in one direction or the other according as one clutch or the other is in engagement, a lever connected to the yoke, a pin carried by the lever, a second lever having a slot formed therein receiving said pin, an arm pivoted and having its free end in engagement with one end of the second lever, means for urging the arm toward the lever whereby a rapid movement of the lever is effected when moved beyond a predetermined point to effect a corresponding movement of the first lever and consequently the yoke through the medium of the pin and slot connection, a rod connected to the second lever and mounted for longitudinal movement, stops on the rod, and a member sustained on the carriage and adapted to engage said stops for effecting movement of the rod in one direction or the other whereby said levers are actuated to cause the yoke to move one clutch or the other into or out of engagement.

9. A grinding machine comprising a plurality of rotary grinding elements mounted for rectilinear movements, means for rotat-

ing the elements and simultaneously effecting rectilinear movements thereof, pawl and ratchet means operating automatically to effect lateral adjustment of any one of the grinding elements so as to maintain said element in grinding engagement with a piece of work, and means for adjusting the pawl and ratchet means comprising a lever, a shaft having oppositely threaded portions, and stops mounted on the shaft, said stops being adjustable by rotation of the shaft to vary the spaced relation and to change the movement of said lever.

10. A grinding machine comprising a plurality of rotary grinding elements mounted for rectilinear movements, means for rotating the elements and simultaneously effecting rectilinear movements thereof, and pawl and ratchet means operating automatically to effect lateral adjustment of any one of the grinding elements so as to maintain said element in grinding engagement with a piece of work, said pawl and ratchet means including two pairs of pawls, two ratchet wheels having the teeth thereof reversely disposed, a lever, and arms adjustable by movement of said lever to engage the pawls to cause one pair of the latter or the other to engage or disengage their respective ratchet wheels.

11. A grinding machine comprising a plurality of rotary grinding elements mounted for rectilinear movements, means for rotating the elements and simultaneously effecting rectilinear movements thereof, and pawl and ratchet means operating automatically to effect lateral adjustment of any one of the grinding elements so as to maintain said element in grinding engagement with a piece of work, said pawl and ratchet means including two pairs of pawls, two ratchet wheels having the teeth thereof reversely disposed, a lever, and arms adjustable by movement of said lever to engage the pawls to cause one pair of the latter or the other to engage or disengage their respective ratchet wheels, and adjustable means for controlling the throw of said lever for the purpose described.

In testimony whereof I have signed my name to this specification.

JOS. B. RUATTI.