July 1, 1952 A. R. JOHNSON 2,601,749

SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 1

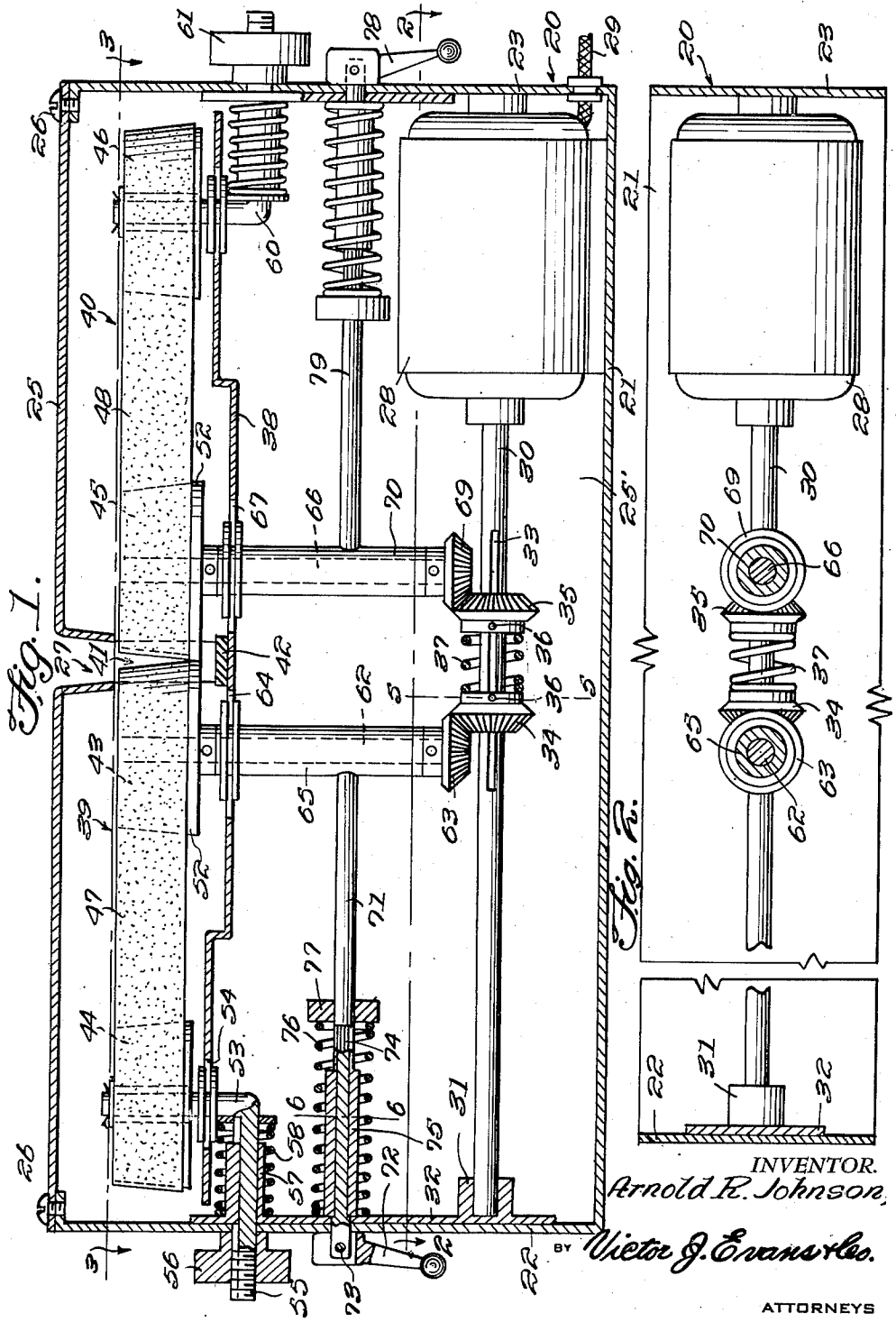

Fig. 1.

Fig. 2.

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July 1, 1952 A. R. JOHNSON 2,601,749

SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 2

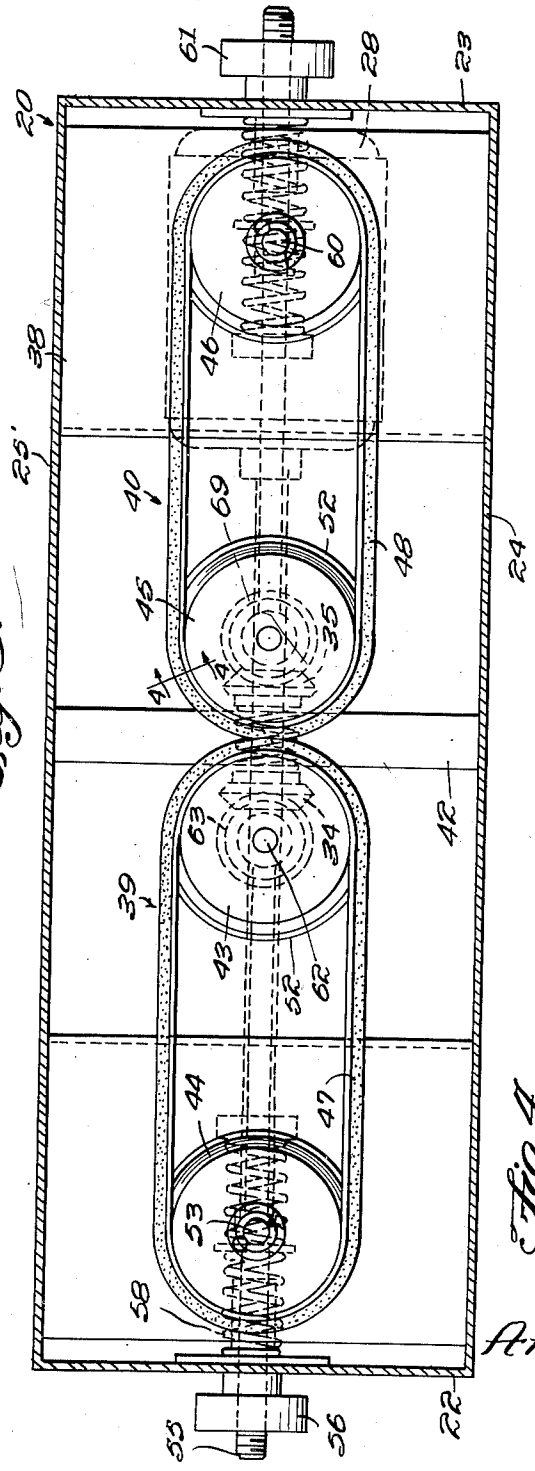

Fig. 3.

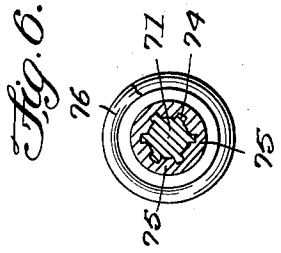

Fig. 6.

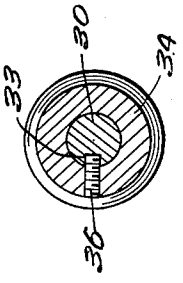

Fig. 5.

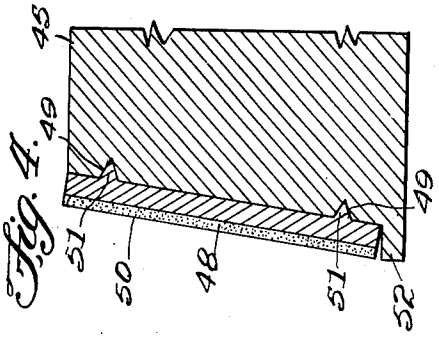

Fig. 4.

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SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 3

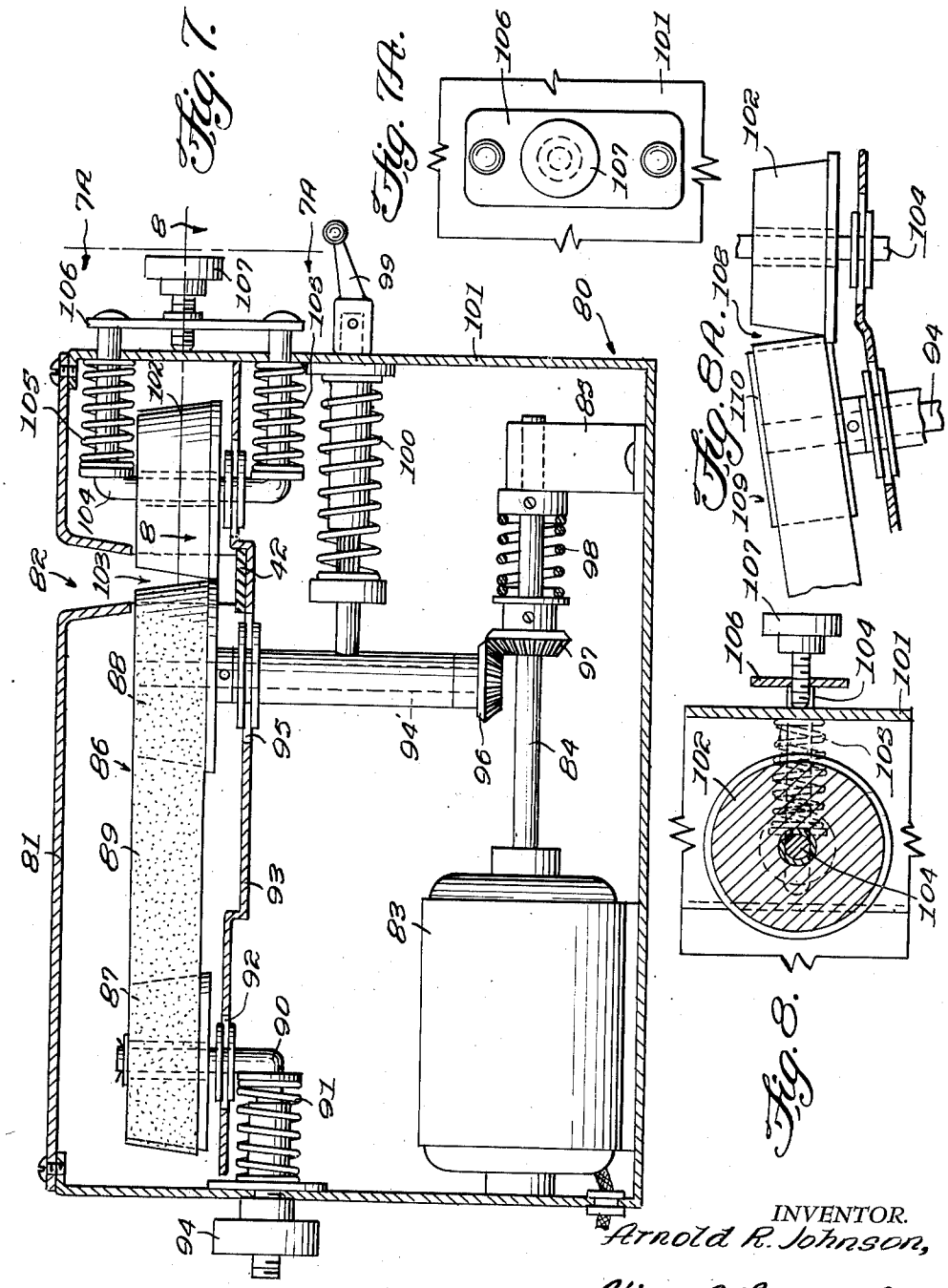

Fig. 7.

Fig. 7A.

Fig. 8A.

Fig. 8.

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SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 4

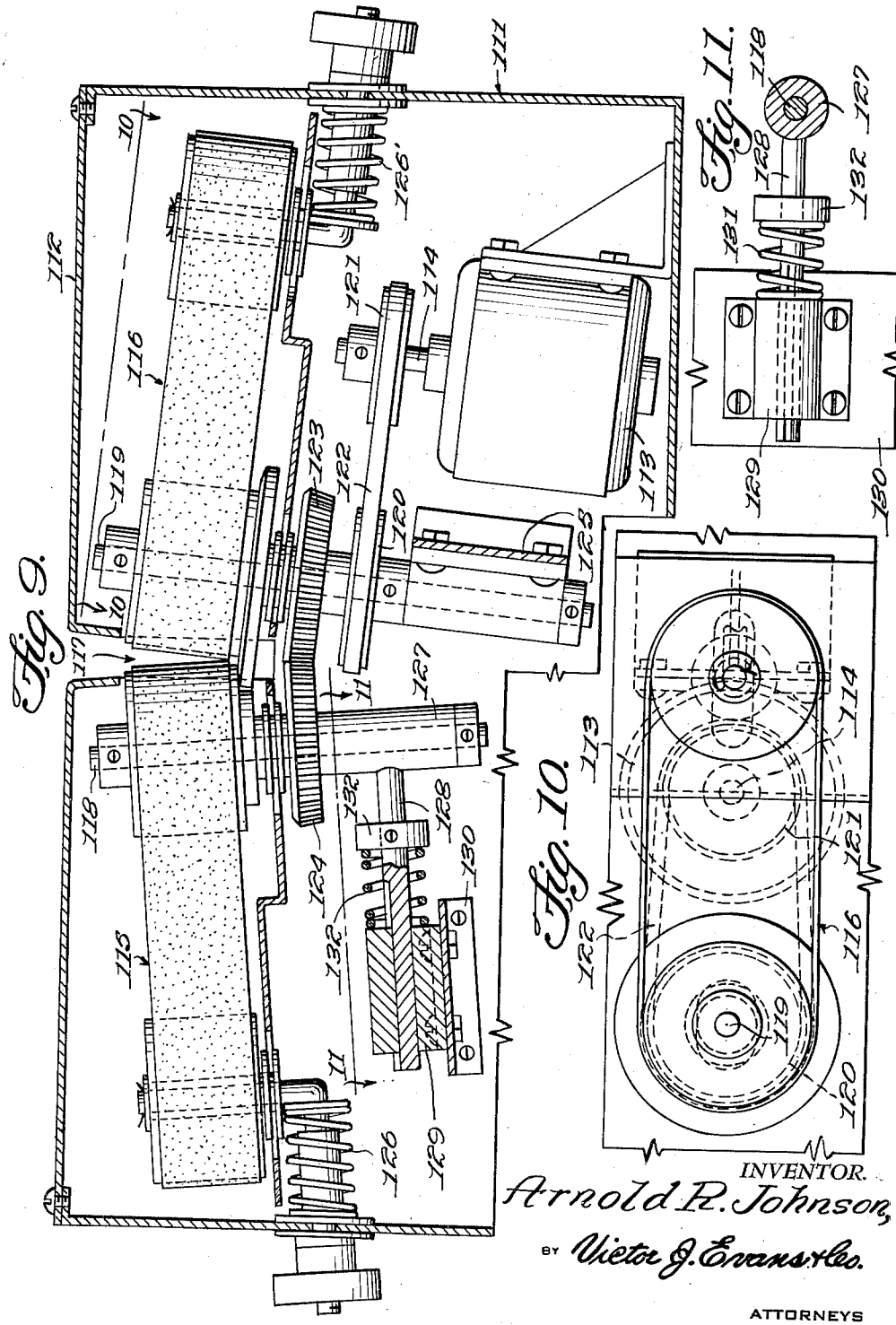

Fig. 9.

Fig. 11.

Fig. 10.

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SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 5

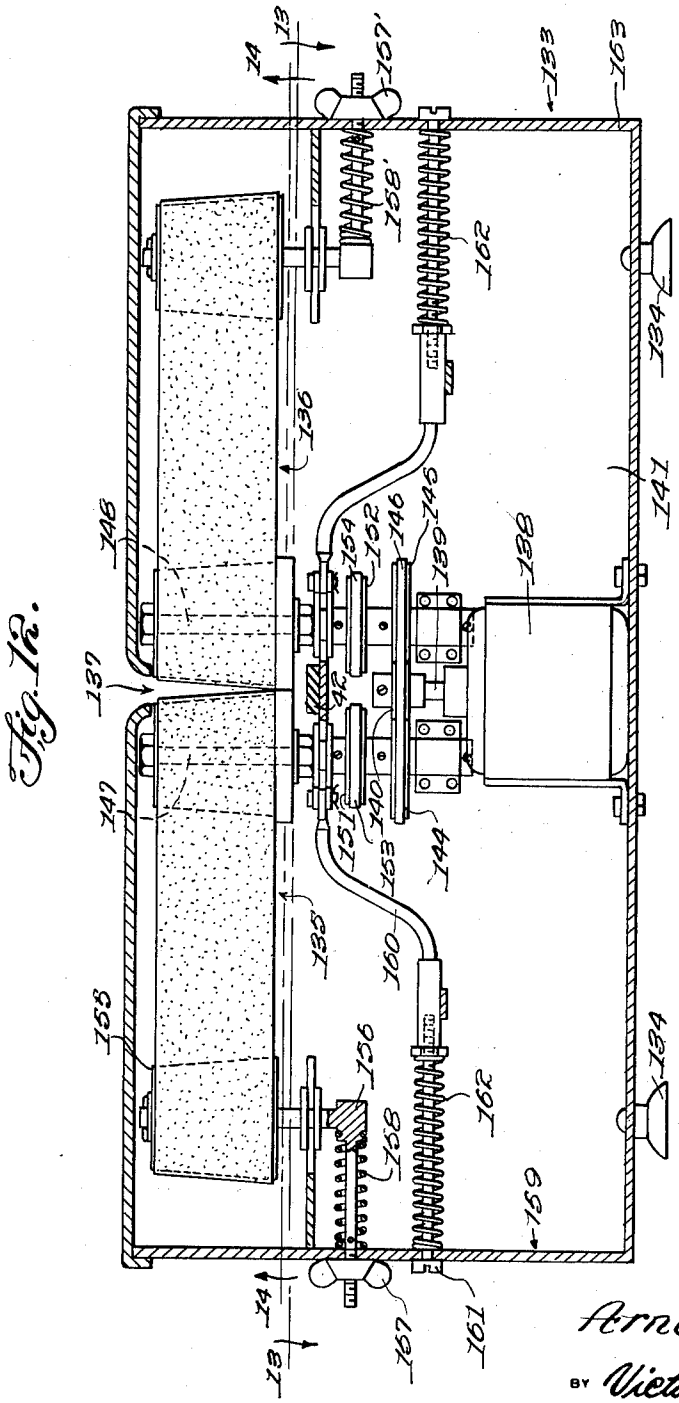

Fig. 12.

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July 1, 1952 A. R. JOHNSON 2,601,749

SPRING TENSION GRINDING MACHINE

Filed Aug. 15, 1949 6 Sheets-Sheet 6

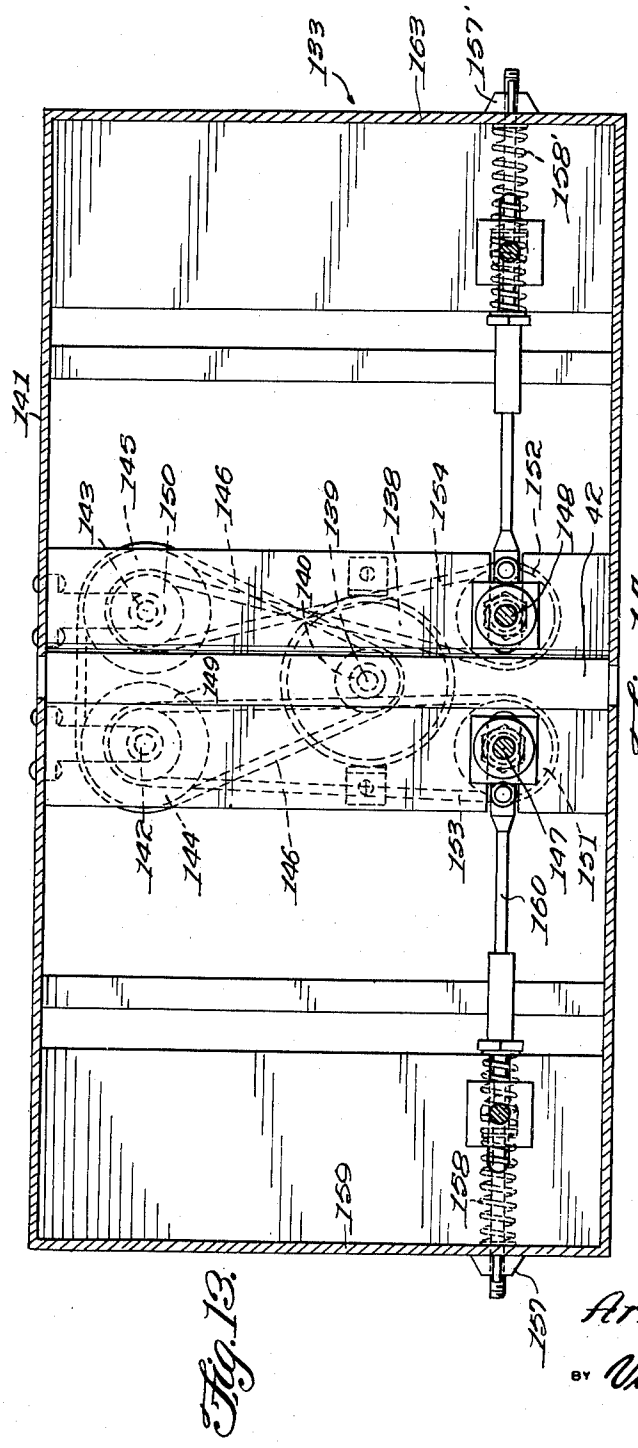

Fig. 13.

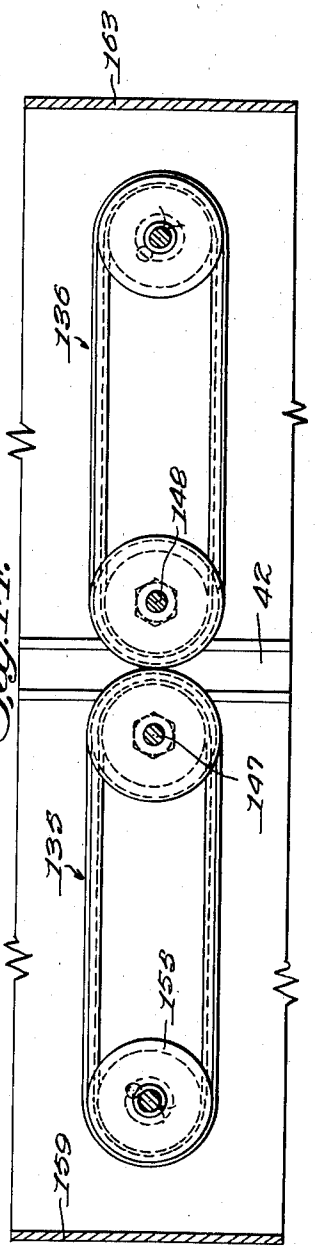

Fig. 14.

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UNITED STATES PATENT OFFICE

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SPRING TENSION GRINDING MACHINE

Arnold R. Johnson, Underwood, N. Dak.

Application August 15, 1949, Serial No. 110,415

2 Claims. (Cl. 51—140)

1

This invention relates to a sharpening machine, and more particularly to a machine for sharpening knives and similar edged implements.

The object of the invention is to provide a sharpening machine which includes rotary sharpening or grinding elements that can be adjusted for work of different sizes or shapes.

Another object of the invention is to provide a sharpening machine which is power operated, the machine including grinding elements that are adapted to form a throat therebetween for receiving a knife or other implement to be sharpened and wherein the knife is engaged by the grinding elements.

Still another object of the invention is to provide a sharpening machine for resharpening the cutting edges of knives and the like, the machine including grinding elements whose parts can be positioned as desired, there being a resilient means for maintaining the parts of the grinding elements under proper tension.

Still another object of the invention is to provide an implement-sharpening machine which is constructed so that the sensitive moving parts thereof are protected from contamination, the machine being adapted to be used for domestic or commercial purposes, and wherein the sharpening is accomplished by endless abrasive belts, engaging the cutting edge of the implement to produce a smooth, sharp cutting edge on the implement.

Still another object of the invention is to provide a sharpening machine whose parts can be readily removed and replaced as desired, the machine being simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

Figure 1 is a vertical sectional view through the implement-sharpening machine, according to the present invention;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 1;

Figure 4 is an enlarged sectional view taken on the line 4—4 of Figure 3;

Figure 5 is an enlarged sectional view taken on the line 5—5 of Figure 1;

Figure 6 is an enlarged sectional view taken on the line 6—6 of Figure 1;

2

Figure 7 is a vertical sectional view showing a modified form of the sharpening machine;

Figure 7a is a sectional view taken on the line 7a—7a of Figure 7;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7;

Figure 8a is a fragmentary side elevational view, with parts in section, howing another modified arrangement of the sharpening elements;

Figure 9 is a vertical sectional view through still another modified form of the sharpening machine;

Figure 10 is a sectional view taken on the line 10—10 of Figure 9;

Figure 11 is a sectional view taken on the line 11—11 of Figure 9;

Figure 12 is a vertical sectional view through another modified form of the invention;

Figure 13 is a sectional view taken on the line 13—13 of Figure 12;

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

Referring in detail to Figures 1 through 6 of the drawings, there is shown a machine for sharpening knives or other similar edged implements. The sharpening machine of Figures 1 through 6 includes a hollow housing 20 which may be fabricated of any suitable material, and the housing 20 includes a bottom wall 21 and a pair of spaced parallel end walls 22 and 23. Extending between the end walls 22 and 23 is a pair of spaced parallel side walls 24 and 25', Figure 3. A cover 25 is adapted to close the upper open end of the housing 20, and the cover 25 is detachably connected to the housing 20 by suitable securing elements, such as screws 26. The cover 25 is provided with an opening 27 therein for a purpose to be later described.

Positioned in the housing 20 and supported on the bottom wall 21 is a power source, such as an electric motor 28, which is adapted to be connected to a suitable source of electrical energy by means of a cable 29. The motor 28 serves to rotate the drive shaft 30, the shaft 30 having one of its ends rotatably supported in a bearing 31 which is part of the plate 32, Figure 1. The shaft 30 is provided with a keyway 33, and mounted on the shaft 30 is a pair of spaced bevel gears 34 and 35. A key or screw 36 projects through each of the bevel gears 34 and 35 and into the keyway 33, so that rotation of the shaft 30 causes rotation of the bevel gears 34 and 35. A coil spring 37 is circumposed on the drive shaft 30 and the coil spring 37 is interposed between the bevel gears

34 and 35 for normally urging the bevel gears to their proper spaced relation.

Arranged in the housing 20 and secured to the walls thereof is a body member 38 which supports a pair of grinding or sharpening elements 39 and 40. The grinding elements 39 and 40 are similar in construction, and these grinding elements coact to define a V-shaped throat 41 therebetween for the reception therein of the implement, such as a knife, to be sharpened. Arranged below the throat 41 and secured to the body member 38 is a bumper member 42 which may be of any suitable material, such as rubber, and the bumper member 42 prevents the knife or other implement from striking the body member 38 so that damage to the implement will be prevented.

The grinding element 39 includes a pair of tapered pulleys 43 and 44 which are mounted for adjustable movement toward and away from each other. The other grinding element 40 includes a pair of similarly-tapered pulleys 45 and 46. Trained over the pulleys 43 and 44 is an endless abrasive belt 47, while trained over the other pair of pulleys 45 and 46 is an abrasive belt 48. As shown in Figure 4, the tapered pulleys 43 through 46 are preferably provided with grooves 49 for receiving therein ridges 51 that project inwardly from the belt 48, the ridges 51 and grooves 49 coacting to prevent accidental dislodgment of the abrasive belts from the tapered pulleys. The abrasive belts are provided with a layer of suitable abrasive material 50, Figure 4, on their exterior surface. Further, each of the tapered pulleys is provided with an annular flange 52 on their lower ends, and the flanges 52 help to insure that the abrasive belts be properly positioned on the pulleys.

The pulley 44 is supported by an L-shaped bolt 53 which projects through a slot 54 in the body member 38. An end of the bolt 53 is threaded exteriorly, as at 55, for a portion of its length, and a suitable nut 56 is arranged in threaded engagement with the portion 55. The bolt 53 has a portion thereon slidably projecting through a bushing 57 which is part of the plate 32, and the coil spring 58 is circumposed on the bushing 57, the coil spring 58 abutting the washer 59, Figure 1. The washer 59 is secured to the bolt 53, and the adjacent end of the spring 58 is secured in any suitable manner to the washer 59. The coil spring 58 is of such a construction that it normally draws or urges the pulley 44 toward the end wall 22 so that the belt 47 will be maintained under proper tension. Further, by adjusting the nut 56, the tension on the coil spring 58 can be adjusted as desired. The other corresponding pulley 46 on the grinding element 40 serves the same purpose as the pulley 44, and the construction and adjustment thereof is the same as the previously-described construction of the pulley 44. Thus, an L-shaped bolt 60 rotatably supports pulley 46, and an adjusting nut 61 is arranged in threaded engagement with the end of the bolt 60, the nut 61 serving the same purpose as the nut 56.

Arranged at right angles with respect to the drive shaft 30 is a driven shaft 62 which has its upper end connected to the pulley 43. The lower end of the driven shaft 62 carries a bevel gear 63 which meshes with the bevel gear 34 on the shaft 30. The shaft 62 projects through a slot 64 in the body member 38, and a sleeve 65 rotatably embraces the shaft 62. Arranged in spaced parallel relation with respect to the driven shaft 62 is a driven shaft 66 which has its upper end connected to the pulley 45. The shaft 66 projects through a slot 67 in the body member 38 and carried by the lower end of the driven shaft 66 is a bevel gear 69 which meshes with the bevel gear 35. A sleeve 70 slidably embraces the driven shaft 66.

A means is provided for moving the driven shafts 62 and 66 toward and away from each other, whereby the size of the throat 41 can be adjusted to accommodate knives or other implements of varying sizes or shapes. A rod 71 has one end secured to the sleeve 65, and the other end of the rod 71 projects out of the end wall 22, Figure 1. A manually-operable operating lever 72 is pivotally connected to the projecting end of the rod 71 by means of a pin 73. Thus, the lever 72 can be shifted from the position shown in Figure 1 to a position in alignment with the rod 71 so that this movement of the lever 72 will cause longitudinal shifting movement of the rod 71, whereupon movement of the pulley 43 will be effected. The rod 71 is provided with a splined portion 74 which projects through a bushing 75 that is part of the plate 32, Figure 6. A coil spring 76 is circumposed on bushing 75, and the coil spring 76 is interposed between the plate 32 and a collar 77 which is secured to the rod 71. The coil spring 76 normally urges the driven shaft 62 away from the end wall 22. Similarly, a means is provided for adjusting the position of the pulley 45 of the grinding element 40. Thus, an operating lever 78 functions in the same manner as the lever 72, and the operating lever 78 is pivotally connected to a rod 79 which is secured to the sleeve 70. Thus, by proper pivotal movement of the lever 78, the pulley 45 can be moved relative to the pulley 43, whereupon the size of the throat 41 can be adjusted as desired to accommodate various sizes of implements which are to be sharpened.

In use, the implements, such as the knife, to be sharpened, are passed through the opening 27 in the cover 25 and the knife is arranged in engagement with the abrasive belts 47 and 48. Thus, the knife is positioned in the throat 41 which is shaped like a V. Then, upon actuation of the motor 28, the shaft 30 will be rotated to thereby drive the shafts 62 and 66, which results in the endless abrasive belts 47 and 48 being revolved, whereupon a sharp beveled edge will be produced on the knife. The pulleys 44 and 46 are constantly maintaining the belts of the grinding elements under proper tension, due to the previously-described structure. Further, the size of the throat 41 can be adjusted by proper positioning of the levers 72 and 78.

Referring in detail to Figures 7 through 8 of the drawings, there is shown a modified sharpening machine which is adapted to grind only one side of a knife or implement at a time. The sharpening machine of Figures 7 through 8 includes a hollow housing 80 which has a cover 81 detachably connected thereto, the cover 81 being provided with a recess 82, whereby the implement can be positioned in the throat when the implement is to be sharpened. Arranged in the housing 80 is an electric motor 83 which is reversible, whereby it can be made to rotate the drive shaft 84 in opposite directions, as desired. The drive shaft 84 is rotatably supported by a bearing bracket 85, Figure 7, and the motor 83 is adapted to be connected to a suitable source of electrical energy.

Arranged above the motor 83 is a grinding element 86 which includes a pair of tapered pulleys

87 and 88, there being an endless abrasive belt 89 trained over the pulleys 87 and 88. The pulley 87 is supported on an L-shaped bolt 90 which projects through a slot 92 in a body member 93, and a coil spring 91 is circumposed on the bolt 90 for maintaining the belt 89 under proper tension. A nut 94 is threaded onto the bolt 90 and the nut 94 serves the same purpose as the previously-described nut 56. The other pulley 88 of the grinding element 86 is connected to the upper end of a driven shaft 94, the driven shaft 94 projecting through a slot 95 in the body member 93. Secured to the lower end of the driven shaft 94 is a bevel gear 96 which meshes with a bevel gear 97 that is keyed to the drive shaft 84, there being a coil spring 98 for normally urging the bevel gear 97 into engagement with the bevel gear 96.

For moving the tapered pulley 88, an operating lever 99 is provided, and the lever 99 functions in the same manner as the previously-described levers 72 or 78. A coil spring 100 normally urges the pulley 88 toward the end wall 101 of the housing 80.

A tapered guide wheel 102 coacts with the grinding element 86 to define a V-shaped throat 103, the guide wheel 102 being supported on a U-bolt 104. A pair of coil springs 105 are circumposed on the legs of the U-bolt 104 for normally urging the guide wheel 102 away from the end wall 101. A plate 106 is connected to the projecting ends of the U-bolt 104 and a thumb screw 107 is arranged in threaded engagement with the plate 106, the thumb screw 107 abutting the exterior surface of the end wall 101. By proper rotation of the thumb screw 107, the position of the guide wheel 102 relative to the pulley 88 can be adjusted as desired.

Thus, it will be seen that the sharpening machine of Figures 7 through 8 is especially suitable for sharpening butcher knives or other similar implements used for domestic purposes. The implement to be sharpened is positioned in the throat 103, and the motor 83 is actuated to cause the endless belt 89 to revolve. As the endless belt 89 revolves, it sharpens the cutting edge on the implement, and after one side of the implement has been sharpened, the reverse side of the implement is arranged in engagement with the abrasive belt 89.

Referring to Figure 8a, there is shown another modified assembly which includes a grinding element 109 that coacts with the tapered guide wheel 102 to define a V-shaped throat 108 for receiving therein the implement to be sharpened. The grinding element 109 differs from the grinding element 86 of Figure 7 in that the grinding element 109 is provided with a pulley 110 which has straight sides rather than tapered sides.

Referring to Figures 9, 10 and 11, there is shown another modified form of the sharpening machine. Thus, in Figures 9 through 11 the sharpening machine of Figures 9 through 11 includes a hollow housing 111 having a cover 112 detachably connected thereto, there being a motor 113 supported in the housing 111. Connected to the motor 113 is a drive shaft 114 and arranged adjacent the top of the housing 111 is a pair of grinding elements 115 and 116. The grinding elements 115 and 116 coact to define a V-shaped throat 117 therebetween for the reception of the implement to be sharpened.

The grinding element 115 has a driven shaft 118 connected thereto, while the other grinding element 116 has a driven shaft 119 connected thereto. Mounted on the driven shaft 119, Figure 9, is a pulley 120, and arranged in alignment with the pulley 120 is a pulley 121 which is mounted on the drive shaft 114. A belt 122 is trained over the pulleys 120 and 121 so that rotation of the motor 113 causes the abrasive belt of the grinding element 116 to revolve.

Mounted on the driven shaft 119 is a gear 123 which is arranged in meshing engagement with a gear 124, the gear 124 being mounted on the driven shaft 118. Thus, rotation of the driven shaft 119 causes the driven shaft 118 to rotate so that the grinding element 115 is simultaneously actuated. The driven shaft 119 is rotatably supported by a bearing bracket 125 secured to the housing 111.

The coil springs 126 and 126', Figure 9, again serve to maintain the abrasive belt of the grinding elements 115 and 116 under proper tension.

A means is provided for normally urging the gear 124 into engagement with the gear 123. Thus, arranged in rotatable embracing relation with respect to the driven shaft 118 is a sleeve 127 and secured to the sleeve 127 is a rod 128. A portion of the rod 128 is slidably arranged in a bearing block 129 and the block 129 is secured to a bracket 130 which is secured to the housing 111. A coil spring 131 is circumposed on the rod 128, the coil spring being interposed between the block 129 and a collar 132 which is secured to the rod 128. The coil spring 131 normally urges the driven shaft 118 toward the driven shaft 119 so that the gears 124 and 123 remain in mesh.

The machine of Figures 9 through 11 operates as follows: The motor 113 operates the drive shaft 114 which in turn rotates the driven shaft 119 through the belt 122. This causes the abrasive belt of the grinding element 116 to revolve. Also, since the gears 124 and 123 are arranged in meshing engagement, the driven shaft 118 is rotated to thereby cause the abrasive belt of the grinding element 115 to be revolved so that the implement positioned in the throat 17 will be sharpened.

Referring to Figures 12, 13 and 14, there is shown another modified arrangement of the grinding machine. The machine of Figures 12 through 14 includes a hollow housing 133 which has a plurality of suction cups 134 depending therefrom, whereby the machine will be kept immobile during use thereof. The sharpening machine of Figures 12 through 14 includes a pair of grinding elements 135 and 136 which coact to define a V-shaped throat 137 for receiving therein the implement to be sharpened.

Supported on the bottom of the housing 133 is a motor 138 which operates a drive shaft 139, there being a pulley 140 mounted on the drive shaft 139. Arranged adjacent the rear wall 141 of the housing 133 is a pair of stub shafts 142 and 143. A pulley 144 is mounted on the shaft 142, while a similar pulley 145 is mounted on the shaft 143. A V-belt 146 is trained over the pulley 140 and over the pair of pulleys 144 and 145.

Connected to the grinding element 135 is a driven shaft 147, while connected to the other grinding element 136 is a similar driven shaft 148, the shafts 147 and 148 being arranged forwardly of the shafts 142 and 143. Mounted on the shaft 142 is a pulley 149, while a similar pulley 150 is mounted on the other shaft 143. Mounted on the driven shaft 147 is a pulley 151, while mounted on the driven shaft 148 is a pulley 152. An endless belt 153 is trained over the pulleys 149 and 151, there being a belt 154 trained over

the pulley 150 and the pulley 152. The belt 154 is twisted, as best seen in Figure 13.

Thus, it will be seen that actuation of the motor 138 rotates the shaft 139 to thereby drive the stub shafts 142 and 143. Then, rotation of the shafts 142 and 143 causes the driven shafts 147 and 148 to rotate, and rotation of the shafts 147 and 148 causes the abrasive belt of the grinding elements 135 and 136 to revolve, whereupon the implement positioned in the throat 137 will be sharpened.

The grinding element 135 includes a pulley 155 which is mounted on an L-shaped bar or bolt 156, there being a wing nut 157 arranged in threaded engagement with the bolt 156. A coil spring 158 is circumposed on the bolt 156, and the coil spring 158 normally urges the pulley 155 toward the end wall 159 of the housing 133, so that the endless abrasive belt of the grinding element 135 will be maintained under proper tension. Similarly, a spring 158' functions to maintain the abrasive belt of the grinding element 136 under proper tension at all times. By proper rotation of the wing nut 157, the tension on the coil spring 158 can be adjusted as desired.

For normally urging the driven shafts 147 and 148 toward each other, a support member 160 has one of its ends operatively connected to the driven shaft 147. An elongated bolt 161 projects through the end wall 159 of the housing 133 and is connected to the support member 160. Circumposed on the bolt 161 is a coil spring 162 which normally urges the driven shaft 147 away from the wall 149. Similarly, a coil spring 162' is circumposed on an elongated bolt 161', and the coil spring 162' normally urges the driven shaft 148 away from the end wall 163 of the housing 133. By proper rotation of the bolts 161 and 161', the tension on the coil springs 162 and 162' can be adjusted as desired.

From the foregoing, it is apparent that a sharpening machine has been provided which will efficiently sharpen implements, such as knives and the like. The sharpening machine includes grinding elements which are provided with endless abrasive belts whereby the implements will be sharpened without causing damage to the implements. The various springs on the machine keep the parts of the grinding elements under proper tension, and the sharpening machine is adapted to be used for commercial or domestic purposes. The abrasive belts on the grinding elements coact to define a V-shaped throat therebetween for receiving the implement to be sharpened. The machine is safe and efficient in operation. By using the machine of the present invention, a fine cutting edge is produced on the implement. Both sides of the implement will be ground even, and the implement will not burn by using abrasive belts as disclosed in the present invention. Further, the various parts of the machine can be readily disassembled for replacement as desired.

I claim:

1. In an implement-grinding machine, a hollow housing, an electric motor positioned in said housing, a drive shaft rotatably supported in said housing and connected to said motor, a pair of bevel gears keyed to said shaft and spaced from each other, a pair of spaced driven shafts arranged at right angles with respect to said drive shaft, a gear mounted on an end of each of said driven shafts and arranged in engagement with said bevel gears, a coil spring circumposed on said drive shaft for maintaining said bevel gears in engagement with the gears on said driven shafts, a pair of grinding elements arranged in said housing and coacting to define a V-shaped throat therebetween for receiving the implement to be sharpened, each of said grinding elements comprising a pair of tapered pulleys, an endless abrasive belt trained over said pulleys, one of said pulleys being connected to a said respective driven shaft, an L-shaped rod connected to the other of said pulleys and projecting through said housing, and a spring circumposed on said L-shaped rod for maintaining said belts under proper tension.

2. The apparatus as described in claim 1, and further including manually operable means for varying the size of said throat.

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