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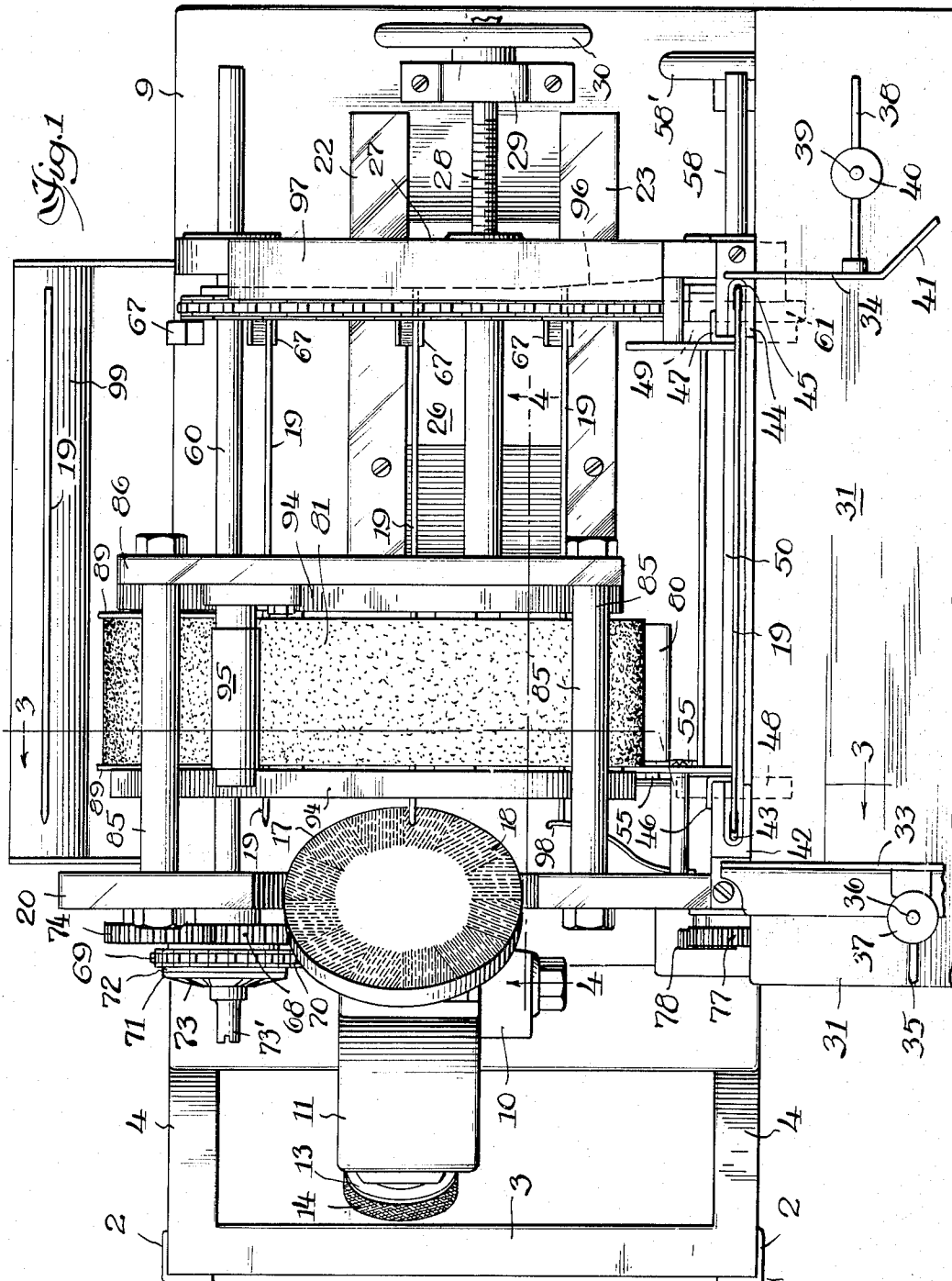
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2,733,552

GRINDING MACHINE

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5 Sheets-Sheet 1



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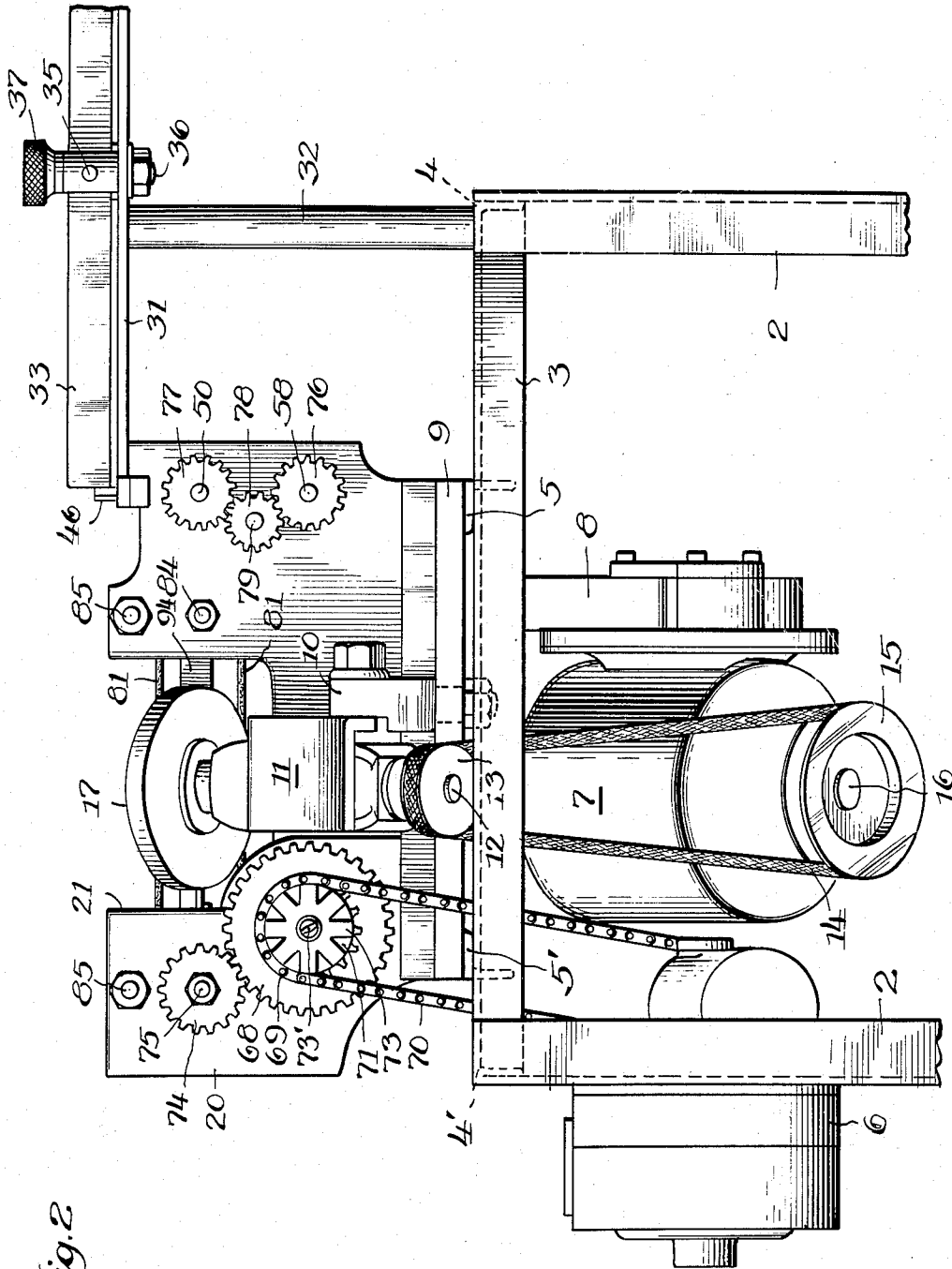


Fig. 2

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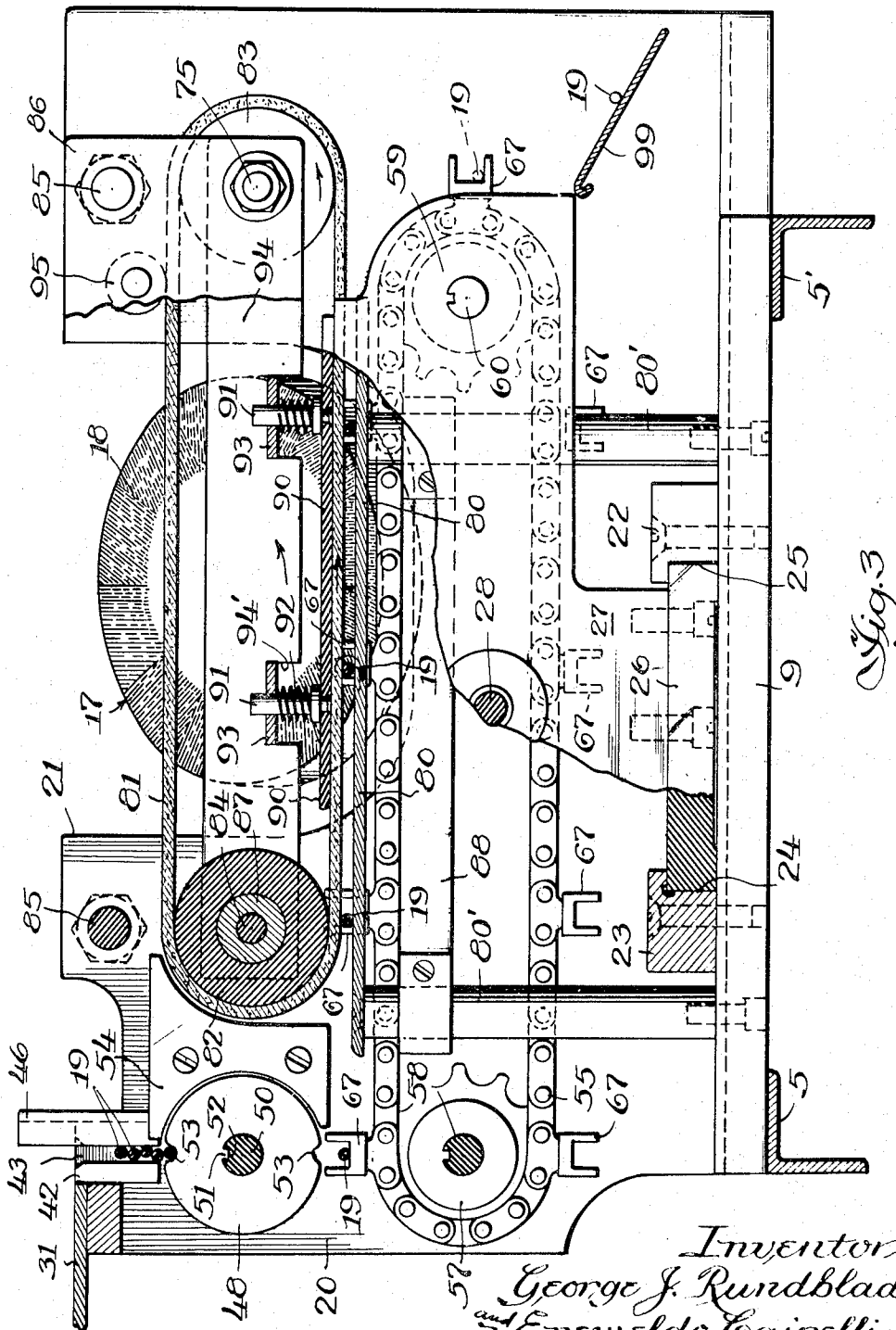
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5 Sheets-Sheet 3



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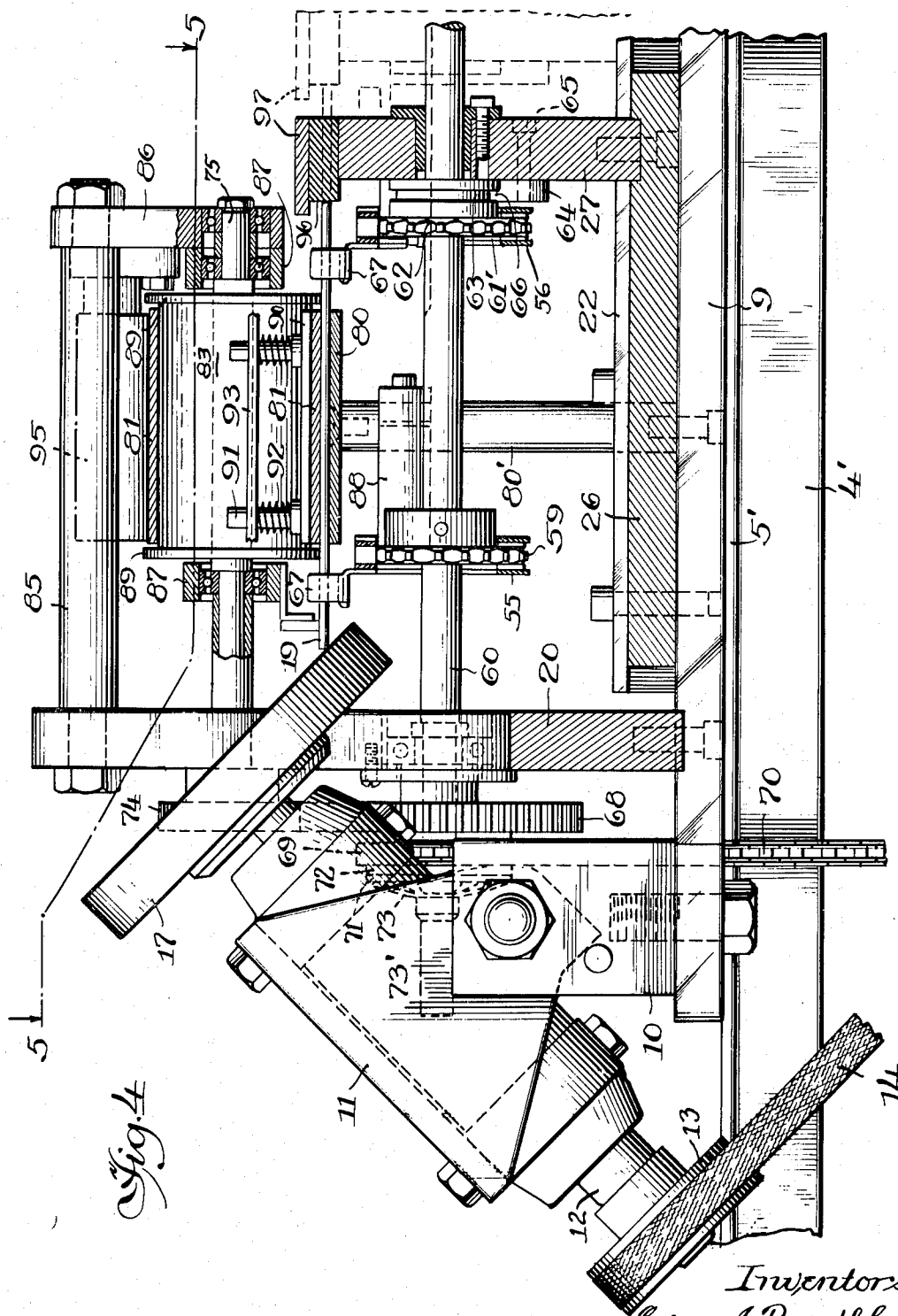
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5 Sheets-Sheet 4



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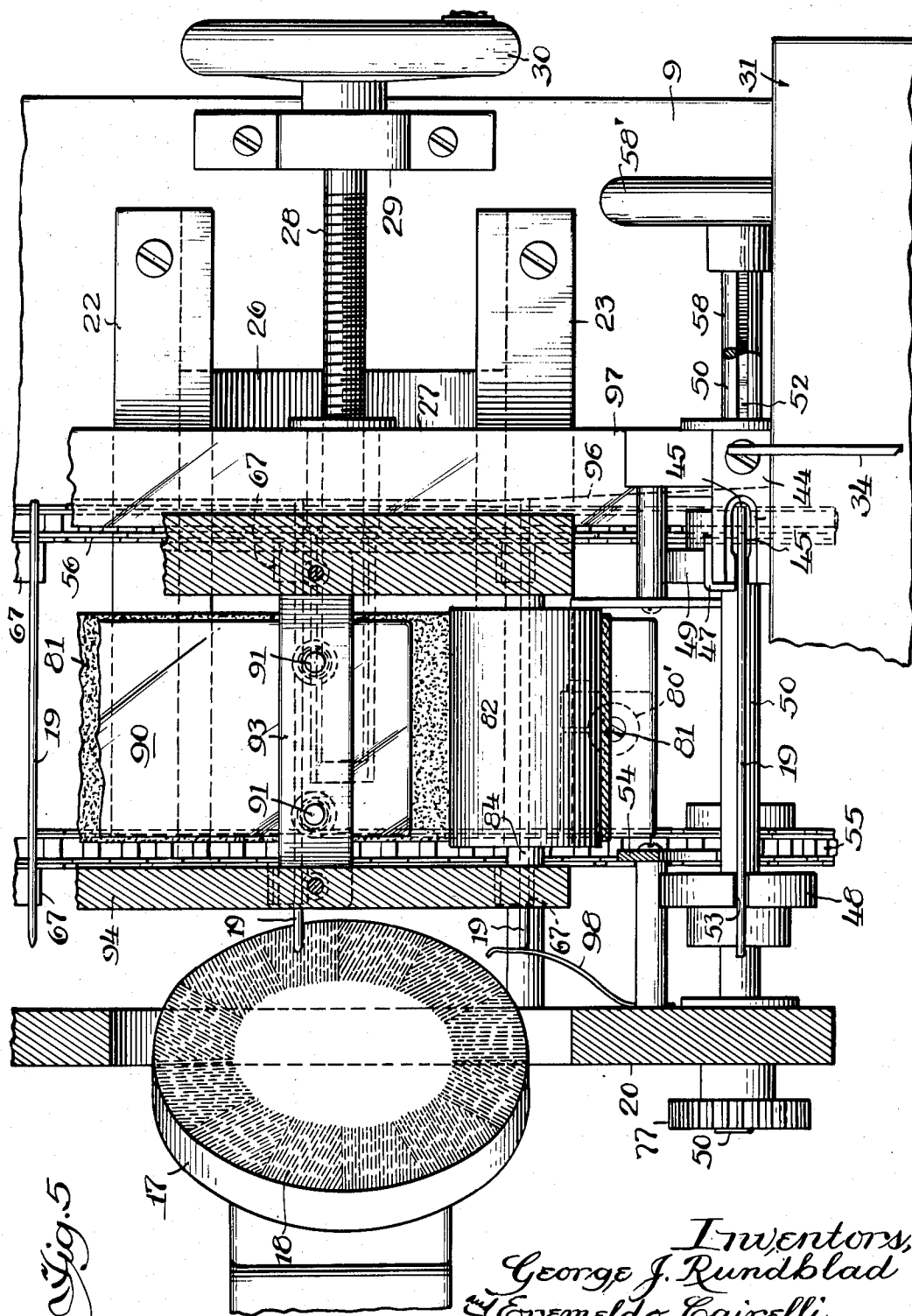
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5 Sheets-Sheet 5



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2,733,552

GRINDING MACHINE

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3 Claims. (Cl. 51—110)

This invention relates to a grinding machine, and is particularly concerned with means for rounding off the sharp corners formed by cutting cylindrical stock transversely.

Although the present invention is specifically intended for rounding off the sharp corners of hinge rods to facilitate positioning them in the hinge lugs, it will be obvious that the structure hereinafter disclosed may be used advantageously to round off sharp corners on any cylindrical stock.

Hinge rods are customarily of approximately the same outside diameter as the inside diameter of the hinge lugs into which they fit, being minus a very slight clearance, to prevent excessive looseness in the completed hinge. Accordingly, it is impractical, from a production standpoint, to insert hinge rods in the hinge lugs without first rounding off the entering end of the hinge rods. Heretofore the sharp ends of the rod have been rounded off by an operator holding individual hinge rods against a rotating grinding wheel and rotating the hinge rod manually against the grinding surface to grind the entire periphery of the end of the hinge rod. This operation is comparatively expensive because of its slowness and because of the frequency of flat surfaces when the operator fails to rotate the hinge rod uniformly.

In accordance with the present invention a plurality of hinge rods fed into a hopper are individually pressed against a rotating grinding wheel at a uniform angle and are rotated uniformly while in contact with the grinding wheel so that every rod is uniformly rounded at one end. If both ends of the hinge rods are to be rounded they may be run through the machine a second time.

Other advantages of applicants' machine will be apparent from a reading of the following description, taken in conjunction with the accompanying drawings showing a preferred illustrative embodiment of the invention, in which:

Fig. 1 is a top plan view of a machine embodying our invention;

Fig. 2 is a fragmentary end elevation looking from the left end of Fig. 1;

Fig. 3 is a view, partly in end elevation, and partly in cross section, taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary longitudinal view, partly in elevation and partly in section, taken along the line 4—4 of Fig. 1; and

Fig. 5 is a horizontal sectional view, taken along the line 5—5 of Fig. 4.

Referring to the drawings, the machine is preferably mounted on a base having four vertical posts 2 supporting a horizontal top comprising a pair of end members 3, a pair of longitudinal side members 4 and 4', and a pair of intermediate longitudinal members 5 and 5'. A motor 6 is mounted on any suitable bracket secured to the vertical posts at one end of the machine, and another motor 7 is mounted on a bracket 8 depending from one of the end members 3. Both motors are mounted below the plane of the top of the base member.

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A flat plate 9 is rigidly mounted on intermediate longitudinal members 5 and 5' in any suitable manner. A bracket 10, rigidly mounted on plate 9 pivotally supports a housing 11 for a shaft 12 so that the housing and shaft can be tilted to any desirable vertical angle relative to the plate 9. The housing contains suitable bearings in which the shaft is rotatably mounted. A pulley 13 is fixed on one end of shaft 12 and is driven by a belt 14 which extends around it and another pulley 15 mounted on the output shaft 16 of motor 7 to rotate shaft 12. A grinding wheel 17 is rigidly secured to the other end of shaft 12 and is rotated thereby. The outer face of wheel 17 is provided with a roughened surface 18 for grinding the ends of rods 19 fed thereagainst. The roughened surface 18 may be in the form of abrasive material generally used on conventional grinding wheels, but we prefer to provide a serrated surface similar to the surface of a file. Both parallel faces may be roughened, if desired, so that the grinding wheel may be reversed if one face becomes worn.

An upstanding frame member 20 is mounted on plate 9 adjacent one end. Frame member 20 intersects the plane of the angularly disposed grinding wheel 17 and is provided with a large notch 21 extending downwardly from its upper edge to provide clearance for the grinding wheel. Two longitudinal strips 22 and 23 secured to plate 9 have their inner edges undercut, as indicated at 25 and 24, Fig. 3, respectively, to form a guide for a block 26 slidable longitudinally of the machine. A frame member 27, extending parallel to frame member 20 is rigidly mounted on block 26 and moves therewith. A rod 28, rotatably mounted in a bearing 29, is threaded in frame member 27 and is provided with a hand wheel 30 at its outer end as shown in Fig. 1. The wheel 30 is manually rotated to move frame member 27 towards or away from frame member 20 to adjust the longitudinal distance between them in accordance with the length of the hinge rods 19 to be ground.

A feed table 31 is supported in a horizontal plane by a pair of vertical posts 32 (Fig. 2) projecting upwardly from the longitudinal side member 4 in longitudinally spaced relationship. The plane of the table is approximately the height of the uppermost peripheral portion of the grinding wheel 17, and its inner longitudinal edge overlaps the adjacent edge of frame member 20. Table 31 supports the hinge rods 19 being fed into the machine. A pair of guide plates 33 and 34 are mounted adjacent opposite sides of feed table 31 to facilitate alignment of the hinge rods before they are fed into the hopper. Plate 33 has a stud 35 projecting therefrom through an aperture in a post 36, and a set screw 37 to hold it in any adjusted position. Guide plate 34 has a similar stud 38 projecting through an aperture in a post 39 and a set screw 40 to hold it in adjusted position. The forward end of guide plate 34 is flared outwardly, as indicated at 41, to facilitate preliminary alignment of the hinge rods being fed to the hopper.

A block 42 (Fig. 1) is secured to the upper edge of frame member 20 adjacent the inner longitudinal edge of feed table 31 and is provided with a vertical slot 43 extending from the edge of block 42 closest to frame member 27 and passing through the entire thickness of the block. A similar block 44 is secured to the top edge of frame member 27 and is provided with a vertical slot 45 facing slot 43 in the same vertical plane and aligned longitudinally therewith. The vertical slots 43 and 45 constitute the hopper. The hinge rods 19 are positioned on table 31 to extend longitudinally thereof, with the ends to be ground adjacent guide plate 33. The hinge rods are rolled manually across table 31 in transverse direction. As each hinge rod rolls off the inner longitudinal edge of table 31 its ends fall into the hopper. A vertical plate

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46, secured to block 42, has one edge adjacent the edge of slot 43 and projecting above the upper edge of block 42 to prevent any of the hinge rods from passing over the top of the slot. A similar vertical plate 47 is secured to block 44 to prevent the other end of any hinge rod 19 from passing over the top of slot 45.

The hinge rods are stacked vertically in the hopper with opposite ends of each hinge rod disposed in the slots 43 and 45, and are prevented from falling through the bottoms of the slots by the peripheries of a pair of rollers 48 and 49 keyed to a shaft 50 by the interengagement of projections 51 on the rollers and a longitudinally extending groove 52 in the shaft. The key arrangement permits the roller 49 to move longitudinally with frame member 27 to which it is fixed. The shaft 50 is rotatably mounted in bearings (not shown) carried by frame members 20 and 27. The shaft 50 is anchored to frame member 20 but extends through it for a purpose hereinafter described. The opposite end of shaft 50 extends through frame member 27 so that the frame member 27 may be moved longitudinally relative to the shaft. The shaft 50 is aligned longitudinally with slots 43 and 45 but is in a lower plane so that the peripheral surface of each roller is positioned under the adjacent slot so closely that there is not sufficient space for a hinge rod to move between the circumferential surface of either roller and the bottom of the adjacent block in which the slot is positioned.

Each roller 48, 49, is provided with a pair of diametrically opposite recesses 53 (Fig. 3) each of which is aligned with a similar recess in the other roller. As rollers 48, 49 are rotated a pair of aligned recesses 53 moves into registration with the bottom of slots 43 and 45, and a single hinge rod 19 falls out of the hopper into the aligned recesses 53. The recesses 53 are large enough to receive one hinge rod, but are too small for more than one hinge rod. As shaft 50 rotates the rollers 48 and 49, retainer plates 54 secured to the adjacent frame members with one edge spaced from the periphery of the roller a distance less than the thickness of one of the said hinge rods keeps the rod from falling out of the recesses until the rollers have completed half a revolution.

The hinge rods 19 are moved transversely across the machine by means of a pair of endless conveyor chains 55 and 56 (Fig. 5). Chain 55 extends around a sprocket 57 keyed to a shaft 58 adjacent the feeding end of the machine and another sprocket 59 keyed to a shaft 60 adjacent the discharge end of the machine. The other chain 56 extends around a pair of sprockets 61 and 61' mounted on shafts 58 and 60 adjacent frame member 27. The shafts 58 and 60 are rotatably mounted in frame members 20 and 27 in the same manner as shaft 50. The means for anchoring the sprockets 61 and 61' to frame member 27, which is the same as the means for anchoring roller 49 to frame 27, is shown in Fig. 4. Sprocket 61' is provided with a hub 62 having a circumferential groove 63. A lug 64 rigidly secured to frame member 27 by a bolt 65 is provided with a lip 66 extending into groove 63 so as to prevent longitudinal movement of sprocket 61' away from frame member 27 without interfering with rotational movement of the sprocket.

The chains 55 and 56 each have a series of transversely aligned retaining yokes 67 secured thereto. As shown in Fig. 4, the yokes are offset towards the grinding wheel on both chains and are open at their top end. Yokes 67 are spaced so that a pair of yokes is positioned directly below the aligned recesses 53 in wheels 48 and 49 every time the recesses are at the bottom of their orbit. Thus, a hinge rod 19 falls from each pair of recesses 53 into a pair of aligned retaining yokes every time the rollers 48 and 49 complete half a revolution. The means for synchronization of the position of the recesses 53 and the retaining yokes 67 will be understood from a description of the gear arrangement by which the hinge rods are carried through the machine.

As previously mentioned shafts 50, 58, and 60 each

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project through frame member 20. As shown in Figs. 1 and 2 a gear 68 and a sprocket 69 are mounted on shaft 60 outside frame member 20. The sprocket 69 is driven by a chain 70 which is driven by the output shaft of motor 6. The sprocket 69 is mounted adjacent a pair of fiber disks 71 and 72 which form a friction clutch, and is free to rotate relative thereto. A spring 73 normally exerts pressure on the disks 71 and 72 to cause the sprocket to rotate shaft 60. An adjusting screw 73' (Fig. 4) is provided to adjust the tension of spring 73. If the machine becomes jammed for any reason, the resistance of the shaft 60 is greater than the friction of spring 73 and the shaft does not rotate with the rotation of the sprocket. The friction clutch permits reversal of chains 55 and 56 in the event that the machine becomes jammed for any reason. A hand wheel 58' secured to one end of shaft 58 may be manually rotated in reversed direction to rotate the chains against the force of the friction clutch. When the chains are backed up the hinge rod which causes the jamming may be manually removed from the machine.

The gear 68 is keyed to shaft 60 and is meshed with a gear 74 mounted on a shaft 75, the purpose of which is hereinafter described. The rotation of shaft 60 moves chains 55 and 56 and thereby rotates shaft 58. Shaft 58 carries a gear 76 on the outside of frame member 27 and rotates shaft 50 through a gear 77 mounted thereon and an intermediate idler gear 78 with which gears 76 and 77 are intermeshed. The gear 78 is mounted on an idler shaft 79 and serves to make the gears 76 and 77 rotate in the same direction, so that rollers 48 and 49 rotate in the same direction as the chains 55 and 56. The relationship between gears 76 and 77 insures the alignment of yokes 67 with recesses 53.

A flat plate 80 (Fig. 3) supported by vertical posts 80' extending upwardly from plate 9 is positioned between chains 55 and 56 with its upper surface at a slightly higher level than the base of the yokes 67. The plate 80 extends past both ends of the grinding wheel 17 so that the hinge rods are firmly supported against downward movement as they are moved past the grinding wheel. An endless belt 81 having its lower reach in contact with the opposite side of hinge rods 19 directly above plate 80 extends around pulleys 83 and 82 mounted on shaft 75 and an idler shaft 84. One end of each of the shafts 75 and 84 is mounted in frame member 20. A plurality of bolts 85 secured to frame member 20 and projecting towards frame member 27 support a plate 86 in which the other ends of shafts 75 and 84 are mounted, as shown in Fig. 4. Each of the shafts 75 and 84 are provided with bearings 87 adjacent opposite edges of pulleys 82 and 83. The intermeshing of gears 68 and 74 rotates belt 81. A bar 88 (Fig. 3) secured to posts 81 extends directly below each chain 55 and 56 to prevent sagging so that the yokes 67 can not move downwardly out of engagement with the hinge rods 19. A pair of flanges 89 mounted on shaft 75 adjacent opposite edges of pulley 83 keeps the belt 81 in proper alignment with the pulleys.

A pressure plate 90 is positioned directly above the lower reach of belt 81 and is provided with a plurality of upstanding studs 91. Springs 92 coiled around each stud 91 exert pressure against the plate 90 to hold belt 81 firmly against the hinge rods as they are moved across the angularly disposed grinding surface. The upper ends of springs 92 bear against metal strips 93 that have openings to fit over studs 91. The metal strips 93 are held in place by a pair of bars 94 that are mounted on the bearings 87 and have openings, as indicated at 94', Fig. 3, to fit across the tops of strips 93. An idler roller 95 is provided on top of the upper reach of belt 81 to take up the slack if this belt stretches.

As each rod is moved forwardly in yokes 67 its opposite ends are positioned between frame members 20 and 27 with plenty of clearance at each end. As shown at 96 in Fig. 5, the frame member 27 is flared outwardly to facilitate entry of the hinge rods. A flat strip 97, secured

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to the upper edge of frame member 27, projects inwardly over the adjacent end of the hinge rods to prevent them from moving upwardly before they are confined to the plane between the upper surface of plate 80 and the lowermost surface of belt 81. A flat leaf spring 98 secured to frame member 20 extends towards frame member 27 and engages one end of each hinge rod 19 to force it firmly against the frame member 27 so that after the grinding operation the rods will be of uniform length. The end of spring 98 is positioned close to the circumferential edge of the angularly disposed grinding surface 18 of grinding wheel 19 so that the end of the hinge rod will engage the grinding surface immediately after moving out of engagement with the spring. Each hinge rod is ground uniformly at one end as it is carried past the grinding wheel with its end in engagement with the grinding surface of the rapidly rotating grinding wheel. The angularity of the wheel 17 may be adjusted to provide any desired taper to the ground end of the hinge rods. After each hinge rod is ground on one end it is dumped from the yoke 67 on to an apron 99, secured in any suitable manner to the discharge end of the machine. The apron 99 may be shaped to hold the hinge rods, or to direct them to any desired receptacle.

From the foregoing it will be seen that we have devised a simple and efficient machine for rapidly grinding the ends of a plurality of hinge rods or other cylindrical stock uniformly with any desired taper at the ground end. Although we have illustrated a preferred embodiment and described it in considerable detail, it will be understood that the description is intended to be illustrative, rather than restrictive, as many details of the structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, we do not desire to be restricted to the exact structure described, except as limited by the appended claims.

We claim:

1. A grinding machine for rounding off an end of a piece of transversely cut cylindrical stock comprising a grinding wheel having an angularly disposed flat grinding surface, a motor for rotating said grinding wheel, a conveyor for moving said stock past said grinding wheel, a fixed plate supporting said stock in a horizontal plane as it is moved by said conveyor, a spring pressed plate engaging the upper surface of said stock to prevent said stock from moving vertically as it passes said grinding wheel, and an adjustable guide engaging one end of said stock to hold the opposite end thereof in contact with said angularly disposed grinding surface as said stock is moved past said grinding wheel.

2. A grinding machine for rounding off an end of each of a plurality of hinge rods comprising a rotatable grinding wheel having an angularly disposed grinding surface, means for rotating said grinding wheel, a pair of spaced shafts, a sprocket fixed to each of said shafts, an endless chain mounted on said sprockets, a friction clutch on one of said shafts, a motor for driving said one shaft through said friction clutch, a plurality of open top yokes secured to said chain in uniformly spaced relationship, said chain being adapted to move said hinge rods past said grinding wheel, means to hold one end of said hinge rods against said grinding surface as they are moved past said grinding wheel, and means for manually reversing said chain while said motor is in operation.

3. A grinding machine for rounding off an end of each of a plurality of hinge rods comprising a rotatable grinding wheel having an angularly disposed grinding surface, means for rotating said grinding wheel, a conveyor for moving said hinge rods past said grinding wheel, said conveyor comprising a pair of endless chains in parallel relationship, a plurality of open top yokes secured to each of said chains, said yokes being aligned in pairs spaced uniformly throughout the length of said chains, a hopper positioned above said conveyor for holding a plurality of hinge rods in stacked horizontal arrangement, means for feeding an individual hinge rod from said hopper into each pair of aligned yokes as said chains move said yokes under said hopper, means for aligning said hinge rods longitudinally to bring one end thereof into engagement with said angularly disposed grinding surface as said rods are moved past said grinding wheel, means for simultaneously moving one of said chains, one part of said hopper, and said aligning means to accommodate hinge rods of varying lengths, and means for preventing vertical movement of said hinge rods as they are moved past said grinding wheel.

References Cited in the file of this patent

UNITED STATES PATENTS

184,348	Dayton et al.	Nov. 14, 1876
188,569	Beers	Mar. 20, 1877
319,735	Loring et al.	June 9, 1885
593,067	Gowen	Nov. 2, 1897
647,485	Eberling	Apr. 17, 1900
859,262	Stewart	July 9, 1907
2,272,651	Waldron et al.	Feb. 10, 1942