Sept. 11, 1934. B. E. ROCKHOFF 1,973,177

GRINDING MACHINE

Filed Jan. 19, 1931 5 Sheets-Sheet 1

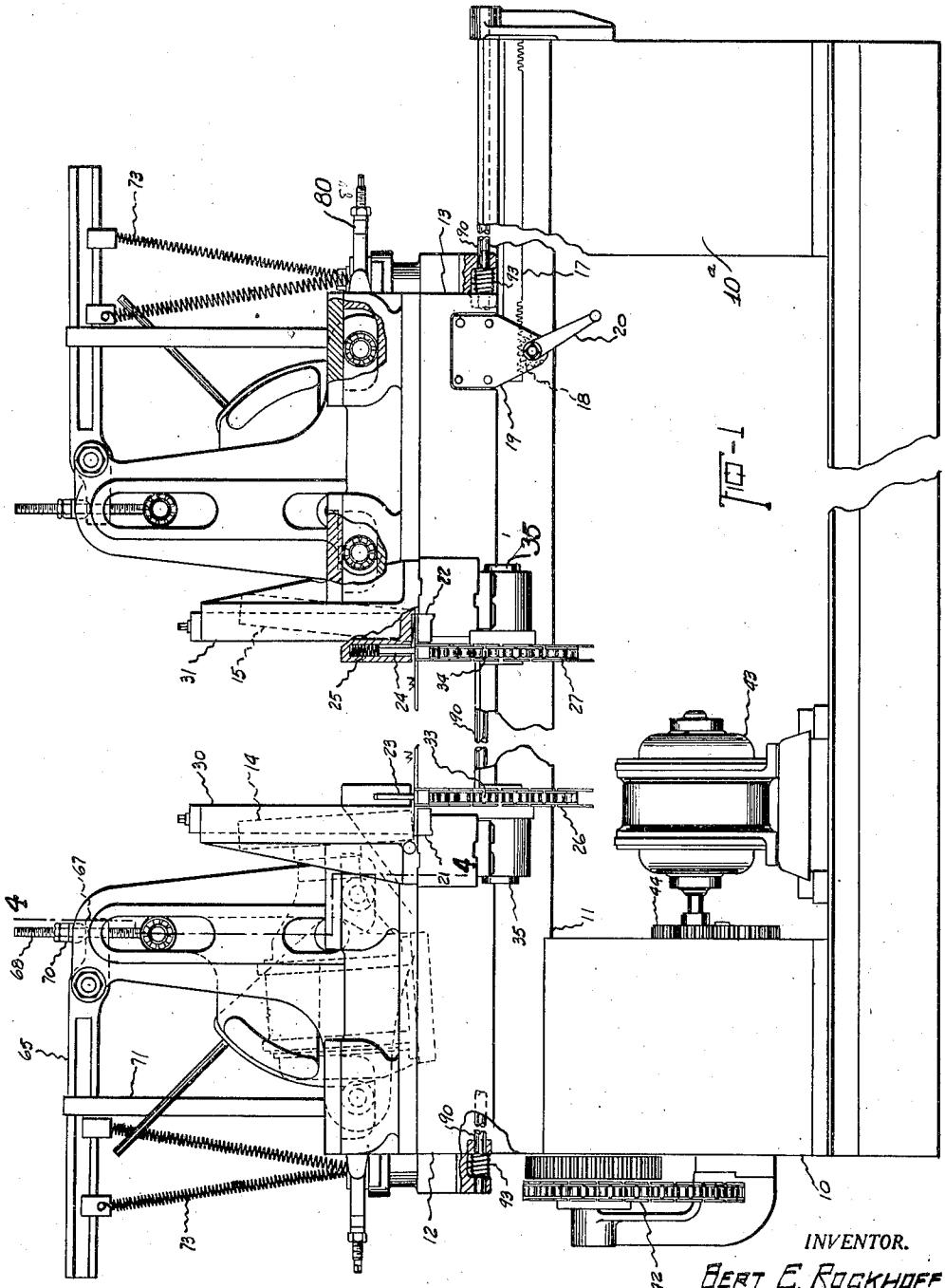


FIG. 1

INVENTOR.
BERT E. ROCKHOFF
BY Whittemore Hulbert
Whittemore & Belknap
ATTORNEYS

Sept. 11, 1934. B. E. ROCKHOFF 1,973,177

GRINDING MACHINE

Filed Jan. 19, 1931 5 Sheets-Sheet 2

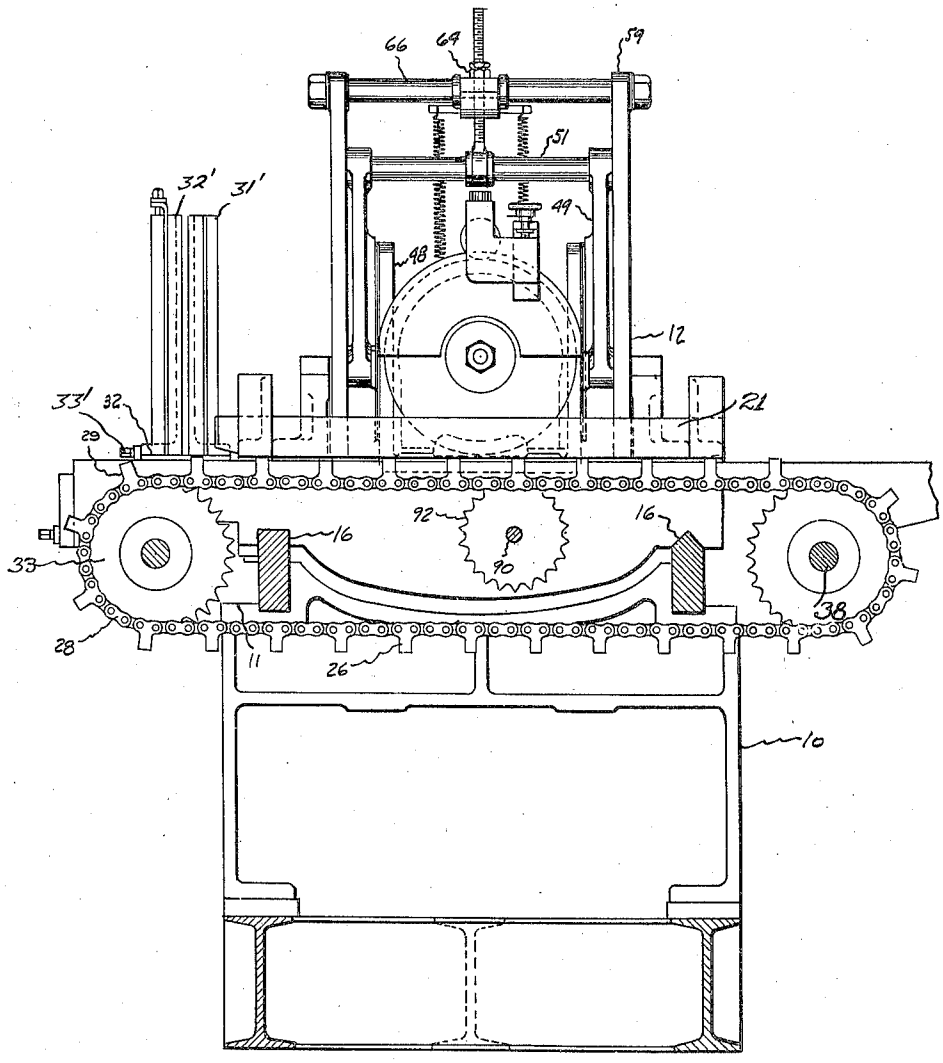


FIG-E

INVENTOR.
BERT E ROCKHOFF
BY Whittemore Hulbert
Whittemore & Belknap
ATTORNEYS

Sept. 11, 1934. B. E. ROCKHOFF 1,973,177

GRINDING MACHINE

Filed Jan. 19, 1931 5 Sheets-Sheet 3

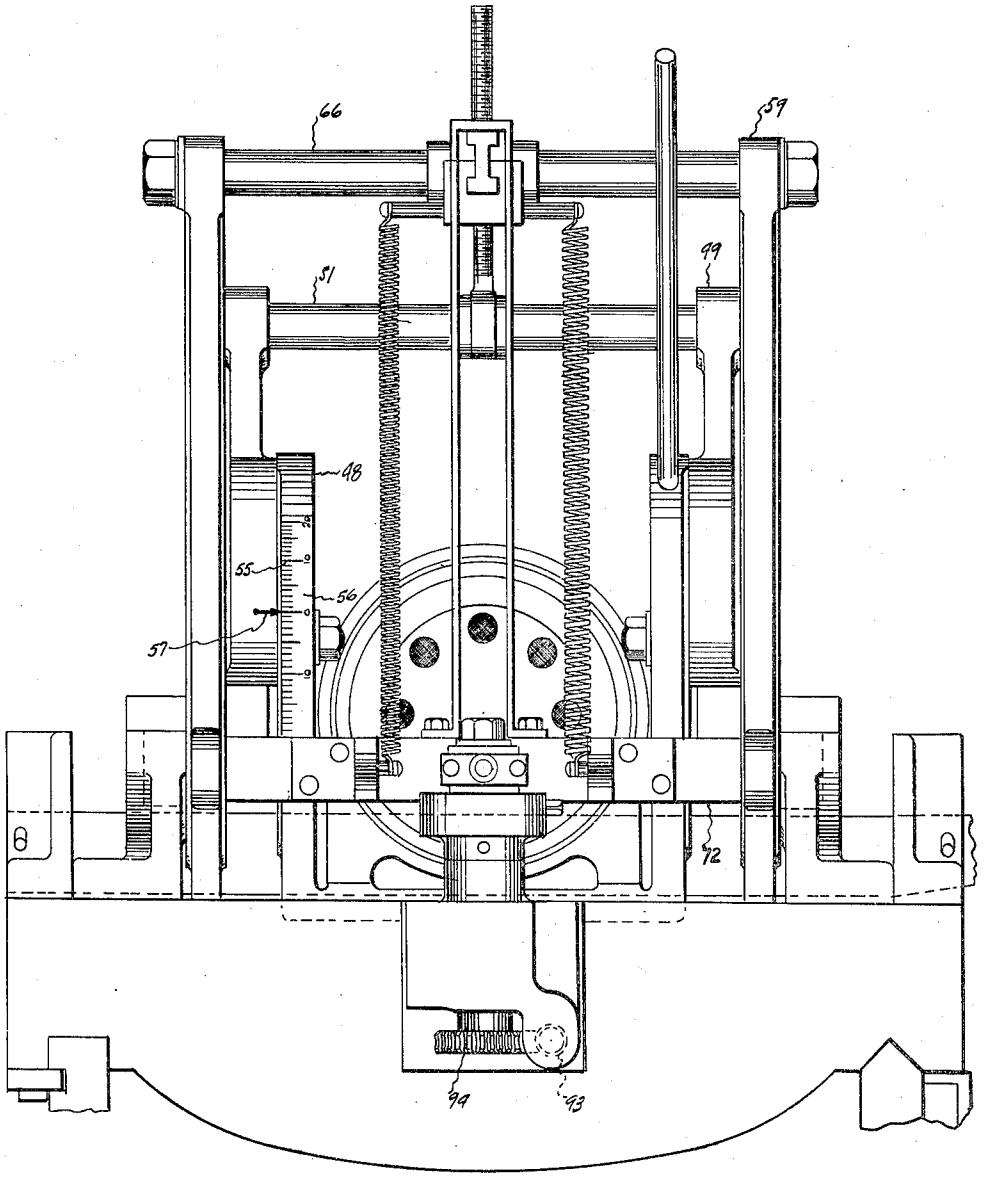


FIG-3

INVENTOR.
BERT E. ROCKHOFF
BY Whittemore Hulbert
Whittemore & Belknap
ATTORNEYS

Sept. 11, 1934. B. E. ROCKHOFF 1,973,177

GRINDING MACHINE

Filed Jan. 19, 1931 5 Sheets-Sheet 4

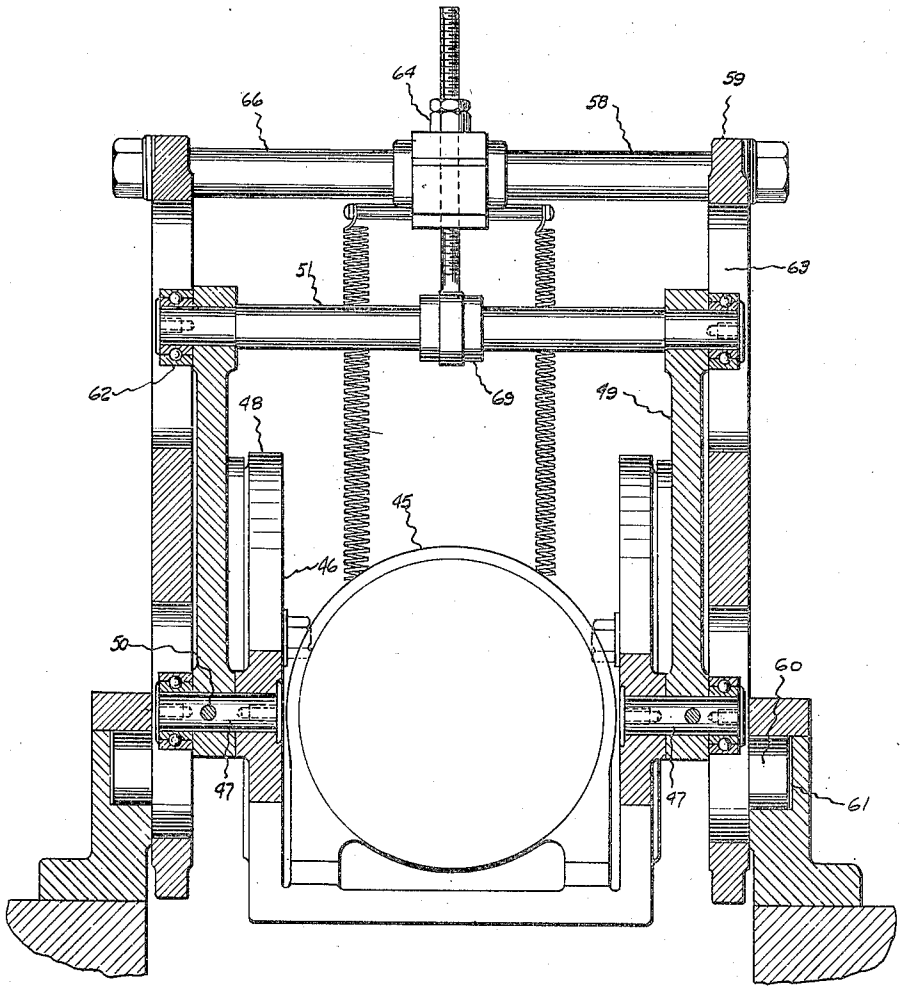


FIG 4

INVENTOR.
BERT E. ROCKHOFF
BY Whittemore Hulbert
Whittemore & Belknap
ATTORNEYS

Sept. 11, 1934. B. E. ROCKHOFF 1,973,177

GRINDING MACHINE

Filed Jan. 19, 1931 5 Sheets-Sheet 5

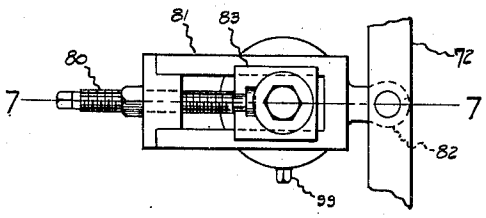


FIG-6

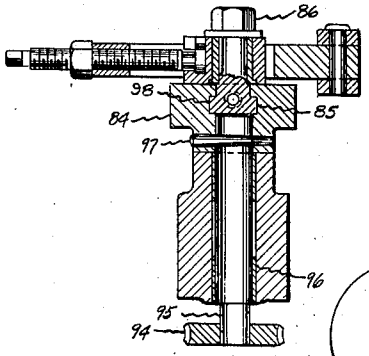


FIG-7

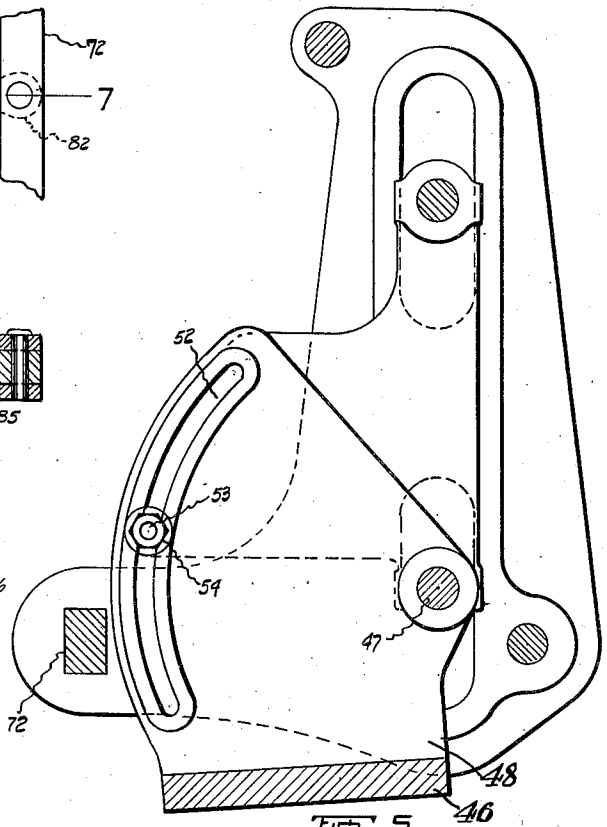


FIG-5

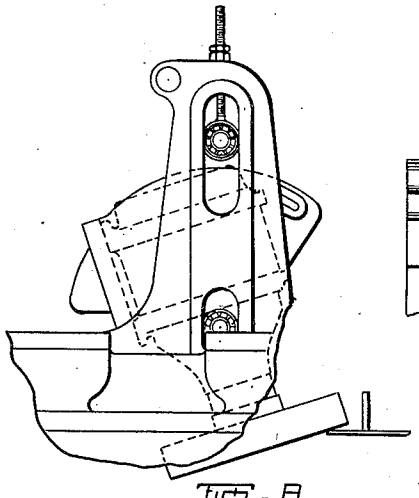


FIG-8

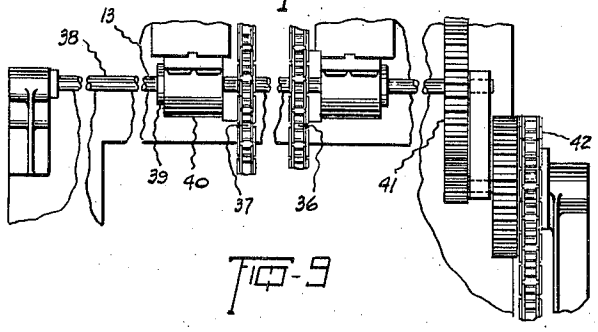


FIG-9



FIG-10

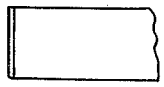


FIG-11

INVENTOR.
BERT E. ROCKHOFF
BY Whittemore Hulbert & Whittemore & Belknap
ATTORNEYS

Patented Sept. 11, 1934 1,973,177

UNITED STATES PATENT OFFICE

1,973,177

GRINDING MACHINE

Bert E. Rockhoff, Detroit, Mich., assignor to Detroit Steel Products Company, Detroit, Mich., a corporation of Michigan

Application January 19, 1931, Serial No. 509,788

11 Claims. (Cl. 51—74)

This invention relates to grinding machines and more particularly to machines of this type especially designed for chamfering or beveling articles of manufacture.

While the machine about to be described may be used for chamfering various articles of manufacture, nevertheless, it finds particular utility when used in the manufacture of vehicle leaf springs for chamfering opposite ends of the latter and to this end the invention consists in the provision of a machine having abrasive members so arranged with respect to each other as to simultaneously chamfer opposite ends of the spring bars as the latter are continuously moved in a predetermined path.

Another object of this invention resides in the novel means employed for adjusting the relative positions of the abrasive members to compensate for bars of varying length.

A further advantageous feature of the present invention resides in the provision of means operable upon manipulation of suitable adjusting mechanism for reciprocating the abrasive members during the grinding operation.

A still further object of this invention is attributed to the novel means employed for conveying the leaf spring bars to the abrasive members and also the means for automatically feeding the bars to the conveying means.

With the foregoing as well as other objects in view, the invention resides in the particular construction of the grinding machine which will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a sectional side elevation of a machine constructed in accordance with this invention;

Figure 2 is a central transverse section through the machine illustrated in Figure 1;

Figure 3 is a fragmentary end elevation of the machine illustrated in Figure 1;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 1;

Figure 5 is a detail sectional view of a part of the machine illustrated in Figure 1;

Figure 6 is a fragmentary top plan view of the adjustable reciprocating mechanism for the abrasive members;

Figure 7 is a sectional view taken on the line 7—7 of Figure 6;

Figure 8 is a fragmentary side elevational view of a portion of the machine showing one of the abrasive members in a different position;

Figure 9 is a fragmentary side elevational view of the machine showing the means for actuating the work conveyors;

Figure 10 is a fragmentary plan view of one type of spring bar;

Figure 11 is a view similar to Figure 10 showing another type of spring bar.

While the machine illustrated herein and about to be described may be used for chamfering various articles of manufacture, nevertheless, it finds particular utility when employed in the manufacture of leaf springs for chamfering the opposite ends of the spring bars. In detail, the machine illustrated herein comprises two frames 10 and 10a adapted to rest upon a suitable support and having a bed portion 11 at the upper end thereof extending longitudinally of the machine and supporting a pair of heads 12 and 13. The heads 12 and 13 are mounted upon the bed for sliding movement relative to each other and carry suitable abrasive members 14 and 15, respectively, in the form of rotatable grinding wheels. The head 12 carrying the grinding wheel 14 is fixed to one end of the bed portion 11, while the head 13 is slidably mounted upon suitable guides 16 for sliding movement toward and from the head 12. For sliding the head 13 relative to the head 12, I provide a rack bar 17 secured to one side of the bed portion 11 of the frame in a position to mesh with a suitable pinion 18 fixed upon a rotatable shaft extending transversely of the frame and having the end portion journaled in a suitable bracket 19 secured to the head 13. If desired, a suitable handle 20 may be secured to one end of the shaft for rotating the latter to effect a sliding movement of the head 13 upon the guides 16. The construction is such as to permit varying the distance between the grinding wheels 14 and 15 to compensate for spring bars of different length.

In the machine illustrated herein the spring bars to be fashioned are continuously moved transversely of the bed portion 11 of the frame between the heads 12 and 13 with the opposite end portions of the bars so positioned relative to the grinding wheels 14 and 15 as to pass beneath the latter. In this connection it is to be noted that the head 13 is so positioned relative to the head 12 that opposite ends of the bars are slidably supported during movement transversely of the frame upon the upper surfaces of the bars 21 and 22 secured respectively to the heads 12 and 13. As shown in Figure 1, the opposite end portions of the spring bars are normally yieldably maintained into engagement

with the supporting bars 21 and 22 by means of a pair of metallic strips 23 and 24 slidably mounted for movement in a vertical plane in the heads 12 and 13, respectively, for engaging the opposite end portions of the bars at points spaced inwardly from the supports 21 and 22. The strips 23 and 24 extend transversely of the frame 11 and the lower ends thereof are normally urged into engagement with the spring bars to be fashioned by means of suitable coil springs 25 acting upon the upper edges of the strips.

For moving the spring bars transversely of the machine, the heads 12 and 13 are provided with conveyors 26 and 27, respectively. The conveyors 26 and 27 are preferably identical in construction and, as shown in Figure 2, comprise flexible linear members 28 in the form of continuous chains preferably of the roller type and adapted to extend transversely of the frame between the grinding wheels 14 and 15. The chains 28 are preferably provided at spaced points with laterally outwardly extending projections 29 which serve to engage the spring bars adjacent opposite ends thereof. As shown in Figure 1, the conveyors 26 and 27 are so arranged relative to their respective heads that the projections 29 engage opposite end portions of the spring bars at points spaced inwardly from the supports 21 and 22, or in other words directly beneath the spring pressed strips 23 and 24 with the result that the latter also serve to maintain the bars in the path of travel of the projections 29. The production of the machine is materially expedited and manual attention is appreciably reduced by feeding the spring bars to the conveying means by gravity. This is accomplished in the present instance by providing a pair of vertically extending magazines 30 and 31 secured respectively to the heads 12 and 13 and cooperating with each other to slidably support the opposite end portions of a plurality of superimposed spring bars. The magazines 30 and 31 are secured to the heads 12 and 13 at one side thereof and directly above the guides 21 and 22, respectively. As shown in Figure 2, the outlet or lower ends 32 of the magazines are spaced above the supports 21 and 22 a distance substantially equal to the thickness of the spring bars with the result that only one spring bar at a time may be moved from the magazines. It will, of course, be understood that by positioning the magazines 30 and 31 directly above the supports 21 and 22 at one side of the machine, the same will serve to deliver the spring bars upon the supports 21 and 22 in operative relation to the projections 29 extending laterally outwardly from the chain conveyors 26 and 27. It will further be apparent from the preceding description that when the head 13 is adjusted to move the magazines 30 and 31 the proper distance apart to accommodate spring bars of corresponding length, the conveying means 26 and 27, together with the supporting bars and spring pressed strips, are automatically adjusted to assume their proper positions relative to the spring bars. In order to compensate for bars of varying widths, the magazines are formed of spaced sections 31′ and 32′ mounted upon the heads for movement relative to each other to diminish or increase the distance therebetween. Adjustment of the sections may be accomplished by manipulating the screws 33′.

Each of the chain conveyors 26 and 27 are supported by a pair of sprockets 33 and 34 carried respectively by the heads 12 and 13. One sprocket of each pair is secured to stub shafts 35 journaled respectively upon the heads 12 and 13, while the other sprockets of each pair designated herein by the reference characters 36 and 37, respectively, are mounted upon a drive shaft 38 extending longitudinally of the machine frame. In detail, the sprocket 36 of the pair 33 is keyed or otherwise secured to the drive shaft 38, while the sprocket 37 carried by the movable head 13 is splined upon the drive shaft 38 for axial sliding movement relative thereto. As shown in Figure 9, the sprocket 37 is secured to a sleeve 39 which in turn is splined upon the shaft 38 and journaled in a bearing 40 carried by the head 13.

From the foregoing construction, it will be observed that the conveyors 26 and 27 are driven by the sprockets 36 and 37 and that the latter sprocket is capable of sliding movement with the head 13. The drive shaft 38 is driven by suitable reduction gearing 41 which in turn is driven by a prime mover 43.

Referring now more in detail to the heads 12 and 13, it will be noted that the latter are identical in construction and the grinding wheels 14 and 15 carried thereby are rotated by suitable electric motors 45 arranged within and secured to the base portions of the substantially U-shaped cradles 46. As will be more fully hereinafter set forth, the cradle 46 is mounted for movement in three directions, each direction being transverse to the other two. As shown in Figure 4, suitable pintles 47 are secured to opposite legs 48 of the U-shaped cradles 46 intermediate the ends of the legs and project laterally outwardly beyond the latter for receiving the cradle arms 49. The lower ends of the cradle arms 49 are fixed by means of the pins 50 to the pintles 47 adjacent the legs 48, while the upper ends of the cradle arms are connected together by means of a shaft 51. As shown in Figure 5, the legs 48 of the cradles 46 are provided with arcuate slots 52 adapted to slidably engage suitable bolts 53 projecting laterally inwardly from the cradle arms 49 and having the inner ends thereof threaded for receiving the clamping bolts 54. The clamping bolts 54 serve to engage the inner surfaces of the legs 48 upon opposite sides of the slots 52 for holding the cradle from movement relative to the cradle arms. It will be apparent from Figure 5 that the construction is such as to permit angular movement of the cradles about the pintles 47 relative to the arms 49 and since the grinding wheels 14 and 15 are carried by the cradles with the axes thereof arranged substantially at right angles to the axis of the pintles, it will be apparent that adjustment of the latter as specified above causes a corresponding variation in the angular relation between the grinding surfaces of the wheels and the ends of the spring bars. In other words, the angle at which the ends of the bars are chamfered is regulated by adjusting the cradle relative to the arms 49 about the pintles 47 and in order that the ends of the bars may be chamfered to a predetermined angle, suitable markings 55 may be inscribed upon the outer surfaces 56 of one of the legs of each cradle, representing degrees. The arrangement is such that if it is desired to chamfer the ends of the bars at an angle of 20°, the bolts 54 are merely loosened permitting the cradles to be swung about the pintles 47

until the marking upon the cradle corresponding to 20° assumes a position in registration with stationary marks 57 on the cradle arms. When the desired adjustment has been accomplished, the bolts 54 are again tightened securing the cradles at the desired angles.

Each of the cradles 46 and associated parts thereof are carried by a frame structure 58 comprising a pair of frame members 59 arranged upon opposite sides of the cradles beyond the cradle arms 49 and having anti-friction members 60 journaled thereon and projecting laterally outwardly therefrom for engaging suitable tracks 61. The tracks 61 are in the form of inwardly opening grooves fashioned in the opposite sides of the heads 12 and 13 and adapted to extend longitudinally of the machine frame or in the direction of adjustment of the head 13. The construction is such as to permit moving the grinding wheels 14 and 15 toward and from each other for accurately positioning the same relative to the opposite ends of the spring bars. The particular means employed herein for accomplishing the above adjustment of the grinding wheels 14 and 15 will be more fully hereinafter described.

Journaled upon the opposite ends of the shafts 51 and pintles 47 beyond the cradle arms 49 are suitable roller bearings 62 adapted to project within vertically elongated slots 63 formed in the frame members 59 adjacent the upper and lower ends thereof. The roller bearings 62 are of such diameter as to engage the vertical opposite side walls of the slots 63 which, as previously stated, are elongated vertically to permit movement of the cradle arms 49, cradle 46 and associated parts in a vertical direction. Thus, it will be seen that the grinding wheels 14 and 15 are capable of movement in a horizontal direction, a vertical direction and in an angular direction.

Movement of the cradles 46 and associated parts in a vertical direction relative to the frame members 59 is controlled by suitable adjusting mechanism designated generally by the reference character 64. The adjusting mechanism comprises a pair of arms 65 pivotally mounted intermediate the ends upon shafts 66 arranged above the shafts 51 and extending between the frame members 59 for connecting the upper ends of the latter. The inner ends 67 of the levers 65 are apertured to receive suitable threaded elements 68 having the lower ends thereof journaled upon the shafts 51 intermediate the ends thereof as indicated at 69. Threaded upon the upper ends of the elements 68 are suitable adjusting nuts 70 having portions engaging the free ends 67 of the arms 65 as clearly shown in Figure 1 of the drawings. Movement of the free ends 67 of the levers 65 by the weight of the cradle and associated parts is restricted by means of suitable straps 71 having the upper ends extending over the levers 65 beyond the shafts 66 and having the lower ends secured to a transverse frame bar 72 which in turn is secured to the frame members 59 at the lower ends thereof for securing the same together. From the foregoing it will be observed that in the event it is desired to lower the grinding wheels 14 and 15, the adjusting nuts 70 are merely loosened permitting the cradle arms 49 and cradles to move downwardly relative to the frame members 59. On the other hand, if it is desired to raise the grinding wheels 14 and 15, the adjusting nuts 70 are tightened causing the elements 68 and as a consequence the cradles 46 to move upwardly relative to the frame members 59, since upward movement of the outer ends of the levers 65 is prevented by the straps 71. In the operation of the machine, the grinding wheels 14 and 15 are usually so adjusted vertically that the distance between the grinding surfaces of the wheels and the supports 21 and 22 for the opposite ends of the bars is slightly less than the thickness of the bars with the result that the latter upon traveling beneath the grinding wheels, moves the wheels, together with the cradles and cradle arms, upwardly within the slots 63. The arrangement is such that the weight of the grinding wheels and associated parts such as the cradles and cradle arms serves to insure a grinding pressure for chamfering the ends of the bars. In order to insure a constant grinding pressure and at the same time to control the amount of pressure, I provide counterbalancing springs 73 having the upper ends thereof secured to the levers 65 adjacent the outer ends of the same and having the inner ends thereof anchored in any suitable manner to the heads 12 and 13 with the result that these springs normally assist raising of the grinding wheels 14 and 15 by the bars passing therebeneath.

Referring now to the operation of the machine as thus far described and assuming that it is desired to chamfer opposite ends of bars of the type illustrated in Figure 10 having the side walls of the opposite end portions converging, it will be apparent that the first operation is to adjust the head 13 relative to the head 12 for moving the same the proper distance apart to accommodate bars of predetermined length. The bars are then positioned in superposed relation with the ends thereof in the magazines 30 and 31 and the grinding wheels 14 and 15 are accurately adjusted to position the grinding surfaces thereof in operative relation to the converging end portions of the spring bars. In this connection it will be noted from the preceding description that the wheels 14 and 15 are vertically adjusted relative to the ends of the spring bars by manipulating the adjusting means 70 and are angularly adjusted to chamfer the ends of the bars to a predetermined angle by manipulating the adjusting nuts 54. In addition to the vertical and angular adjustments of the grinding wheels 14 and 15, the latter may be adjusted in the direction of their axes by moving the frames 58 carrying the cradles and grinding wheels longitudinally relative to the heads 12 and 13 upon the tracks 61. This latter adjustment is accomplished by suitable threaded elements 80 carried by the heads 12 and 13 and having intermediate portions threadedly engaging suitable yokes 81 which in turn are pivotally connected at the inner ends thereof to the transverse frame bars 72 of the frames 58 as at 82. The inner ends of the threaded elements 80 extend within the yokes 81 and are secured to blocks 83 having a sliding engagement with the yokes for guiding the same during adjustment thereof longitudinally by the threaded elements 80. The blocks 83 are seated upon the upper ends of suitable bushings 84 carried by the heads 12 and 13 and are held from movement longitudinally with the yokes 81 by means of suitable stub shafts 85 extending upwardly from the bushings 84 through the blocks 83 for engaging suitable clamping nuts 86 which serve to clamp the blocks upon the bushing. Thus, from the

foregoing it will be observed that manipulation of the threaded elements 80 causes the yokes 81 to move longitudinally and since the yokes are connected to the frames 58, the latter will also be moved upon the tracks 61 to vary the positions of the grinding wheels 14 and 15. The foregoing adjustment permits accurately positioning the grinding surfaces of the wheels relative to the ends of the spring bars.

In grinding spring bars of the type illustrated in Figure 10, the width of the grinding wheels or the grinding surfaces is preferably substantially equal to the length of the converging end portions of the bars with the result that as the bars are moved beneath the grinding wheels, the latter need not necessarily be reciprocated during the grinding operation. The arrangement is such that as the converging end portions of the bars are moved beneath the grinding wheels by the conveyors, the grinding surfaces of the wheels function to progressively chamfer the upper edges of the converging end portions. It being understood from the previous description that the grinding pressure is produced by the weight of the wheels and associated parts as controlled by the counterbalancing springs 73.

In the event it is desired to chamfer opposite ends of a spring bar of the type illustrated in Figure 11 having a straight end portion, it is desirable to reciprocate the grinding wheels so as to permit utilizing the entire grinding surfaces of the wheels during the grinding operations and thereby effect an even wear of the grinding surfaces. The foregoing is accomplished in the present instance by providing a shaft 90 extending longitudinally of the machine frame and centrally through suitable openings in the heads 12 and 13. The shaft 90 is driven by a suitable sprocket 92 secured thereto in a position to be driven by the conveyer chain 26 carried by the stationary head 12 and the outer ends of the shaft 90 are splined for sliding engagement with suitable worms 93 journaled within the heads 12 and 13. The worms 93 are adapted to mesh with suitable worm wheels 94 secured to the lower ends of vertical shafts 95 which in turn are journaled within suitable bushings 96 carried by the heads 12 and 13. The upper ends of the shafts 95 are secured to the bushing supports 84 by means of the pins 97. Thus, from the above description it will be apparent that during operation of the conveyor 26, the shaft 90 and shafts 95, together with the supporting bushings 84, rotate as a unit. As shown in Figures 6 and 7, the supporting members 84 are provided with slots 98 therein shaped to have a slidable interlocking engagement with the lower ends of the stub shafts 85. The slots 98 extend in a direction at substantially right angles to the direction of movement of the yokes 81 with the result that movement of the stub shafts 85 and blocks 83 carried thereby within the slots 98 will not appreciably interfere with the longitudinal adjustment of the yokes 81. In other words, adjustment of the blocks 83 in the direction of the slots 98 merely causes the yokes 81 to move about their pivotal connections 82 with the frames 58. On the other hand, the arrangement is such that the yokes may be adjusted irrespective of the position of the blocks 83. The blocks 83 are adjusted in the direction of the slots 98 by means of the threaded elements 99 threadedly engaging the supporting members 84 and having the inner ends secured to the lower ends of the stub shafts 85. With the construction as thus far described, it will be apparent that when the stub shafts 85 are in axial alignment with the shafts 95, rotation of the latter shafts will not effect movement of the frames 58 and as a consequence, the grinding wheels 14 and 15. On the other hand, if it is desired to impart a slight reciprocatory movement to the grinding wheels 14 and 15, the adjusting elements 99 are merely manipulated to move the stub shafts 85 within the slots 98 to disalign the axes of the shafts 85 and 95. When the aforesaid parts are moved as indicated above, it will be apparent that the stub shafts 85 and blocks 83 carried thereby will assume a position on the supporting bushings 84 eccentrically relative to the axis of rotation of the latter bushings and since the blocks 83 are connected to the frames 58, the latter will be reciprocated in accordance with the degree of eccentricity of the stub shafts 85. It will, of course, be understood that the degree of reciprocation of the grinding wheels 14 and 15 carried by the frame 58 may be accurately regulated by manipulating the adjusting elements 99.

While in describing the present invention particular stress has been placed upon the use of the grinding edges of the wheels 14 and 15 to chamfer the ends of the spring bars, it will be noted from Figure 8 that the degree of angular adjustment of the cradles 46 permits moving the cradles to a position wherein the grinding faces of the wheels may be employed for effecting the chamfer operation. Moreover, while in describing the operation of the invention reference is made to several types of spring leaves having differently shaped ends, it is to be noted that the machine is by no means limited to any particular shape of the end portions.

What I claim as my invention is:

1. In a machine of the class described, the combination of a pair of relatively movable heads carrying grinding wheels, means carried by each of the heads for engaging opposite end portions of a bar to respectively support the latter ends in operative relation to the grinding wheels on the heads, means for moving the heads relative to each other to compensate for bars of varying length, and means for effecting relative linear movement of the bar and grinding wheels in a direction transverse to the direction of movement aforesaid for grinding opposite ends of said bar.

2. In a machine of the class described, the combination of a pair of heads mounted for sliding movement relative to each other and carrying grinding wheels, means carried by each head for engaging opposite end portions of articles to support the latter ends in operative relation to the wheels, a conveyor also carried by each head for engaging portions of the articles adjacent the ends thereof to move the same in a rectilinear path relative to the wheels, and means for adjusting the heads relative to each other to vary the distance therebetween and thereby compensate for articles of different lengths.

3. In a machine of the class described, the combination of a pair of heads mounted for sliding movement relative to each other and carrying grinding wheels, means carried by each head for engaging opposite end portions of articles to support the latter ends in operative relation to the wheels, a conveyor also carried by each head for engaging portions of the articles adjacent the ends thereof to move the same

in a rectilinear path relative to the wheels, means for supporting a plurality of articles to be ground in superposed relation above the conveyors for feeding the articles to the latter by gravity including a work holding device mounted upon each head and cooperating to engage the opposite end portions of the articles.

4. In a machine of the class described, the combination with means for supporting an article to be ground, of a grinding wheel positioned to chamfer one end of the article, means for conveying a plurality of articles in operative relation to the wheel, and means operable by said last-mentioned means for reciprocating said wheel in the direction of the axis thereof.

5. In a machine of the class described, the combination of a pair of rotatable grinding wheels spaced from each other to engage opposite ends of an article to be ground, means engaging opposite end portions of the article to support the latter with the opposite ends of the same in operative relation to the grinding wheels and movable transversely to the axes of rotation of the wheels to convey the article past the grinding surfaces of the wheels, means operated by the aforesaid means for reciprocating the grinding wheels in the direction of their axes, and means for varying the reciprocatory movement of each wheel independent of the other from zero to a predetermined maximum.

6. In a machine of the class described, the combination of a pair of rotatable grinding wheels spaced from each other to engage opposite ends of an article to be ground, means engaging opposite end portions of the article to support the latter with the opposite ends of the same in operative relation to the grinding wheels and movable transversely to the axes of rotation of the wheels to convey the article past the grinding surfaces of the wheels, and means for independently reciprocating each of the grinding wheels connected to the aforesaid means for operation thereby.

7. In a machine of the class described, the combination of a pair of spaced relatively movable supporting members carrying grinding wheels, a conveyor carried by each supporting member for moving articles to be ground past the grinding surfaces of the wheels with the opposite end portions of the articles in operative relation to said grinding surfaces, and means for relatively moving the supporting members to compensate for articles of varying length.

8. In a machine of the class described, the combination of a pair of spaced relatively movable supporting members carrying grinding wheels, a conveyor carried by each supporting member for moving articles to be ground past the grinding surfaces of the wheels with the opposite end portions of the articles in operative relation to said grinding surfaces, means carried by each supporting member and connected to the conveying means for operation thereby to independently reciprocate the grinding wheels associated with the supporting members, and means for relatively moving the supporting members toward and away from each other to compensate for articles of varying lengths.

9. In a machine of the class described, the combination of a pair of spaced relatively movable supporting members carrying grinding wheels, a conveyor carried by each supporting member for moving articles to be ground past the grinding surfaces of the wheels with the opposite end portions of the articles in operative relation to said grinding surfaces, common means for driving both of said conveyors, and means for relatively moving the supporting members toward and away from each other to compensate for articles of varying length.

10. In a machine of the class described the combination of a pair of spaced rotatable grinding wheels, a conveyor associated with each grinding wheel for engaging opposite ends of an article to be ground to move the article past the grinding wheels with the aforesaid opposite ends thereof in operative relation to the grinding surfaces of the wheels, and means for relatively moving the grinding wheels and associated conveyors toward and away from each other to compensate for articles of different length.

11. In a machine of the class described, the combination of a pair of spaced relatively movable supporting members carrying grinding wheels, conveyor means carried by each of the supporting members for moving an article to be ground past the grinding wheels with the opposite ends thereof in operative relation to the grinding surfaces of the wheels, means also carried by each supporting member for independently adjusting the wheels relative to the articles to be ground, and means for relatively moving the supporting members in directions toward and away from each other to compensate for articles of varying length.

BERT E. ROCKHOFF.