Feb. 20, 1934. E. POEGGEL 1,948,128

GRINDING AND POLISHING DEVICE

Filed July 23, 1931 3 Sheets-Sheet 1

Fig. 1.

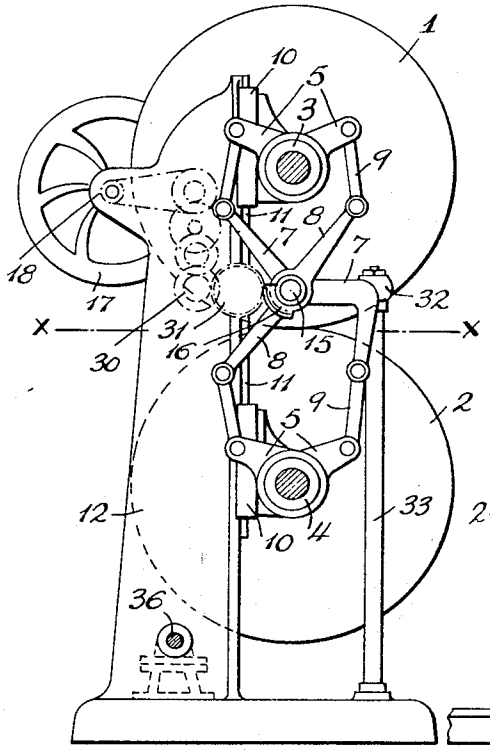


Fig. 2.

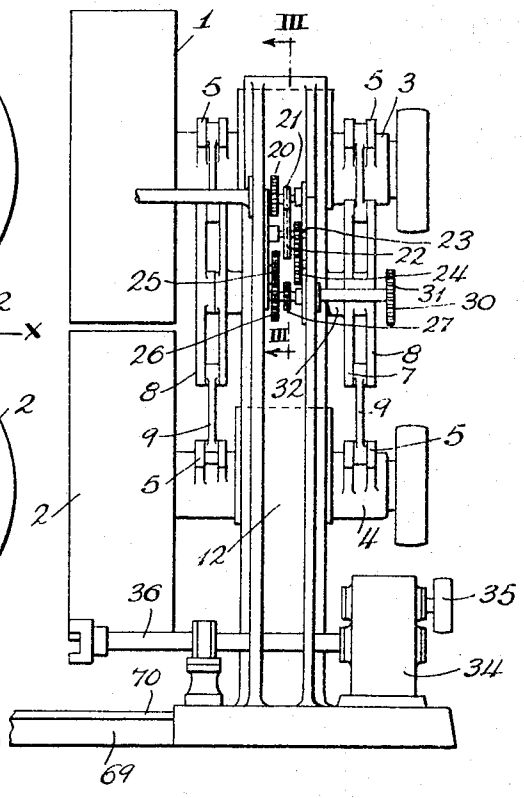
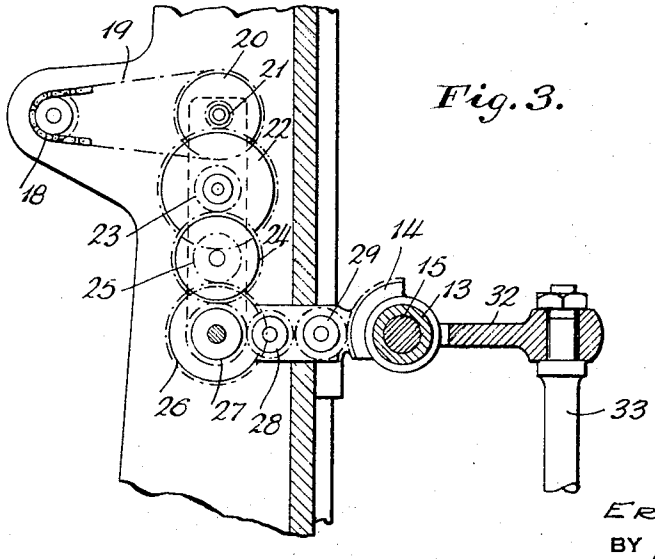


Fig. 3.



INVENTOR
ERICH POEGGEL
BY Richards & Geier
ATTORNEYS

Feb. 20, 1934. E. POEGGEL 1,948,128

GRINDING AND POLISHING DEVICE

Filed July 23, 1931 3 Sheets-Sheet 2

Fig. 4.

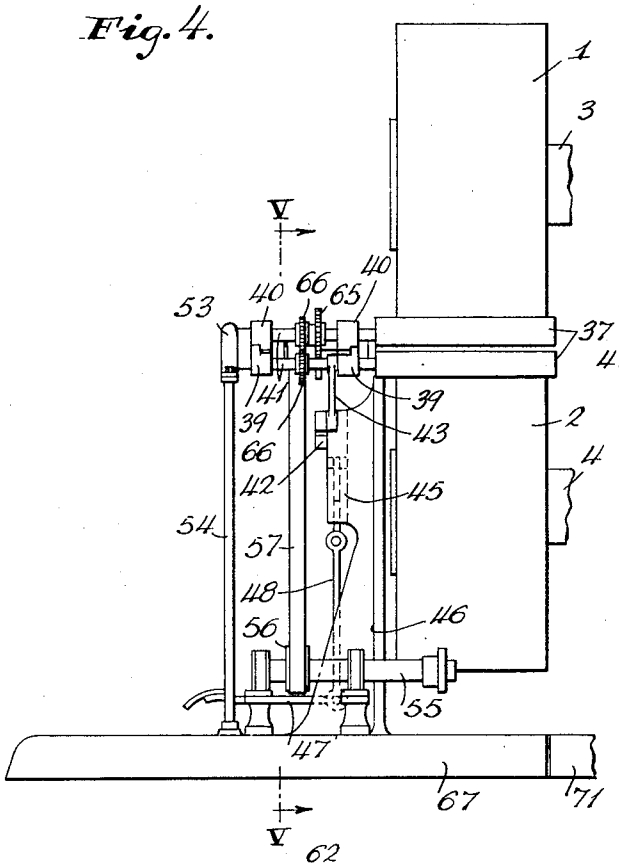


Fig. 5.

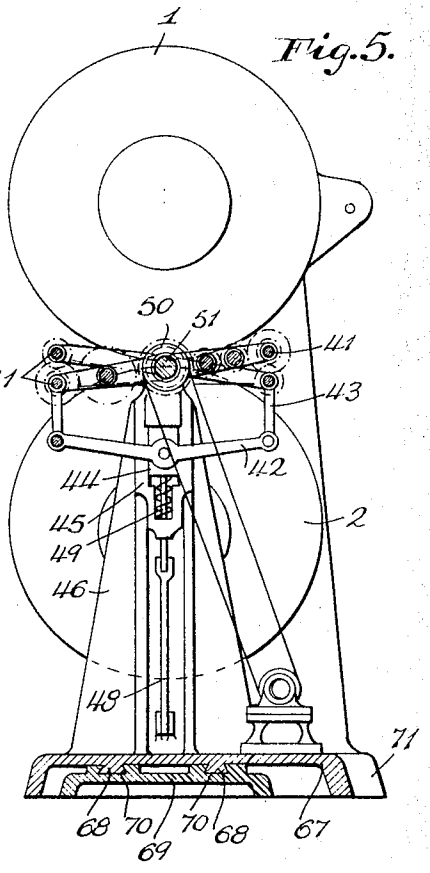


Fig. 6.

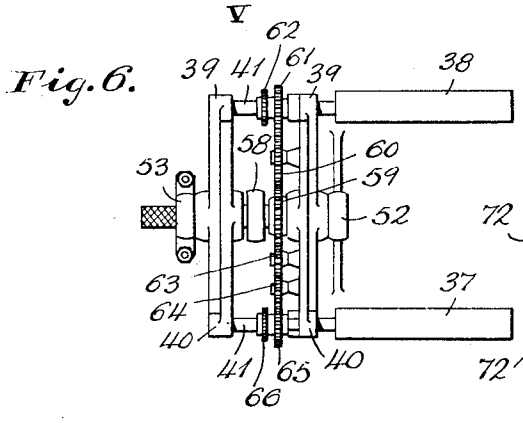
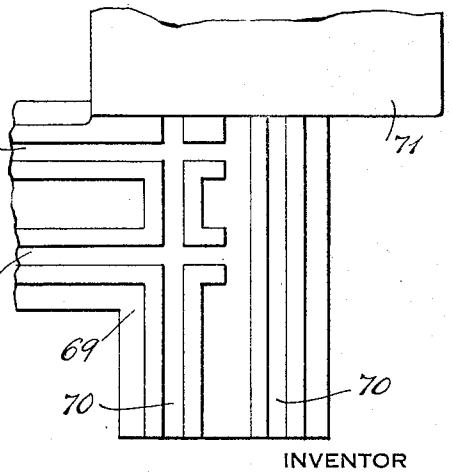


Fig. 7.



INVENTOR
ERICH POEGGEL
BY Richards & Geier
ATTORNEYS

Feb. 20, 1934. E. POEGGEL 1,948,128

GRINDING AND POLISHING DEVICE

Filed July 23, 1931 3 Sheets-Sheet 3

Fig. 8.

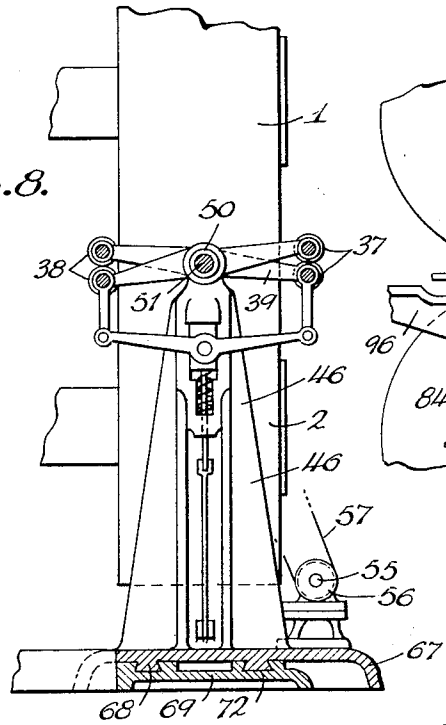


Fig. 10.

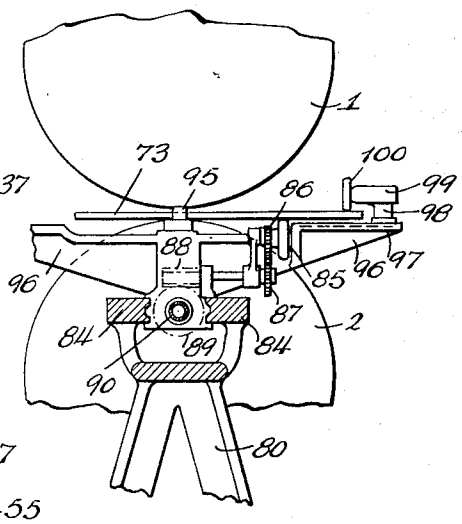
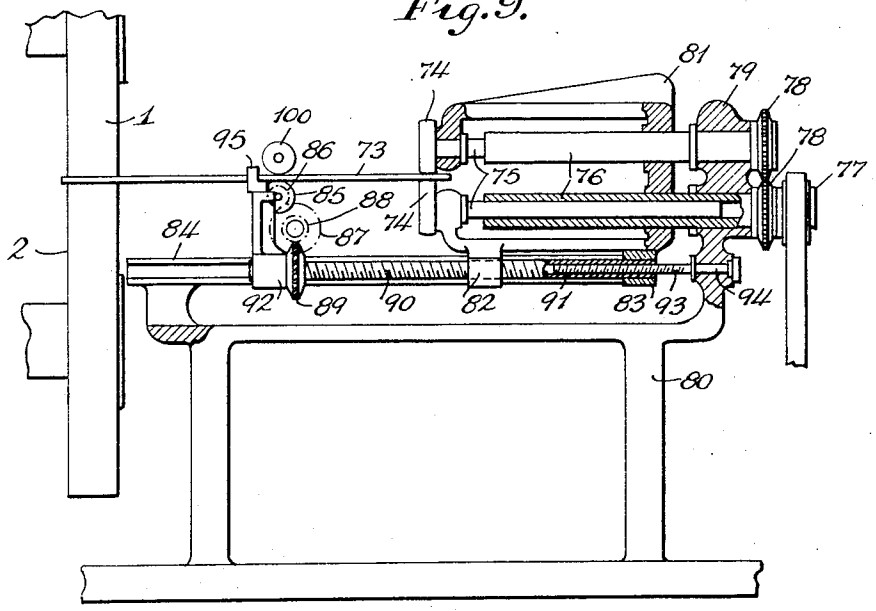


Fig. 9.



INVENTOR
ERICH POEGGEL
BY Richards & Geier
ATTORNEYS

Patented Feb. 20, 1934 1,948,128

UNITED STATES PATENT OFFICE

1,948,128

GRINDING AND POLISHING DEVICE

Erich Poeggel, Remscheid, Germany

Application July 23, 1931, Serial No. 552,703, and in Austria November 22, 1930

10 Claims. (Cl. 51—87)

This invention relates to machines for the grinding and polishing of saw blades of all kinds and similar articles in band and circular form, and consists essentially in the process of grinding or polishing simultaneously and uniformly on both sides such articles between two grinding or polishing discs of the same size, arranged radially to each other and moving in opposite directions, and of the feed arrangements for the individual and various saw blades and other articles to be dealt with by the new machine, as well as the equipment of the grinding machine itself.

By the new process is achieved the simultaneous and uniform grinding on both sides of the articles to be handled in one passage through the machine, the finish of the individual articles being absolutely uniform. The same also applies to the arrangement as a polishing machine. By the adjustment of the stones or polishing discs, which is possible at any time, even while working, and by which means the central plane between the two grinding or polishing discs is always maintained at the same level, wear of the discs is immediately compensated for without any interruption of work. Thereby it becomes possible to fit the grinding and polishing work into the regular flow of the manufacturing process without other special measures.

The enclosed drawings represent an example of a machine according to the new process, also an example of the feeding arrangements for pushing or drawings the articles through the grinding or polishing machine.

Figs. 1 and 2 show the sample drawing of the grinding equipment, seen from the back and from the side respectively.

Fig. 3 shows the raising and lowering equipment for the internal levers of the shears, section III—III through Fig. 2.

Fig. 4 shows the feed device for articles of band form in side view, Fig. 5 in section through V—V of Fig. 4, Fig. 6 a view looking down on the feed device, and Fig. 7 a plan looking down on the slide plate for the feed device.

Fig. 8 shows the application of the feed device as Figs. 4 to 6 in relation to the grinding machine, as it would be used for the back grinding of band type saws.

Fig. 9 gives a side view and part section of the feed device for circular saws, while Fig. 10 shows the forward movement mechanism of the feed device as Fig. 9.

For the application of the process there are used the grinding or polishing discs 1 and 2, arranged in the same plane, radially to one another, and of the same diameter. In the example illustrated the spindles of these discs are carried in the two bearings 3 and 4, which are guided vertically by means of the slide 10 in the guides 11 arranged on the inside of the standard 12. On the upper side of the bearings 3 and 4 there are provided at both ends two forks 5, into which the raising and lowering scissors are respectfully articulated. The latter are formed of the two scissor levers 7 and 8 and the link pieces 9, the free ends of which engage in the fork 5 of the bearings. By this arrangement the bearings 3 and 4 are counterbalanced with the stones 1 and 2, so that adjustment of the stones is very light and easy, a fact which is of great importance for accurate setting for grinding and polishing, and for the readjustment while the machine is working. The raising and lowering in the example represented are likewise carried out by means of scissors. To this end, the internal levers are fixed on a hollow spindle 13 and the external levers 8 on a spindle 15 passing through the hollow shaft 13. The hollow shaft 13, which at the same time serves as a bearing for the spindle 15, is itself mounted in the bearing plate 32, which is fixed on one side to the standard 12 and on the other side is supported by the column 33; on the hollow shaft 13, which rigidly connects together the two internal levers 7, there is arranged a toothed segment 14, and on the spindle 15, which rigidly connects together the external levers 8 of the scissors, there is a toothed segment 16. Both toothed segments are moved simultaneously, but in opposite directions, by means of suitable transmission gearing, by the hand-wheel 17. The gearing in the example consists of the chain-wheel 18, the chain 19, gear wheels 20 to 29, the last of which engages in the toothed segment 14, for the internal levers, and of the chain-wheel 18, the chain 19, chain-wheel 20, gear-wheels 21 to 26 and 30—31, the last of which engages in segment 16, for the external levers. The raising and lowering of the grinding or polishing discs may also be effected by a screw spindle or spindles or by hydraulic means or any other suitable arrangement. It is only important that the lowering or raising of the lower set of parts shall take place simultaneously and uniformly with the opposing movement of the upper set of parts. As both above and below the same wear of the two discs takes place, owing to the uniform grinding or polishing work of the discs, the position of the centre plane x—x is always at the same level. Therefore a

correct feed-in of the work is ensured by the subsequently described feed device, in such a way that no unilateral pressure against one or the other disc can take place due to bending. The drive of the grinding discs is effected in the example illustrated by belt pulleys: the drive can, however, be by direct coupled motors or by any other method. It is advisable that the speed drives of the two discs should be interdependent, in order to ensure the same speed for both stones or polishing discs. The drive in Fig. 2 with belt pulley and shaft, 34 to 36, serves to actuate the feed devices for the work.

The feed device as shown in Figs. 4 to 6 serves for the pushing or pulling through of the band-shaped articles being worked, such as frame saws, mill saws, cross-cut saws, etc., between the discs 1 and 2. For this purpose the two pairs of pressure rollers 37 and 38 are provided. The rollers are fixed on the spindles 41, having their bearings in the end heads of the levers 39 and 40. The two scissors formed by these levers are dependent on each other as regards their movement. The two external levers 39 are keyed on the spindle 51, while the internal levers 40 are fixed on the hollow shaft 50, which is pushed on to the spindle 51 on which it is free to turn. The ends of the spindle 51 are mounted in the bearings 52 and 53. Movement is imparted to the scissors by the link pieces 43 and the cross piece 42. The latter is rigidly connected with the sliding shoe 44, which moves vertically in the guide 45. The guide 45 is made in one piece with the standard 46. By the depression of the foot lever 47 the sliding shoe 44 is carried downwards by means of the connecting rod 48 and with it also the cross bar 42 is moved down, this causing the rollers 37 and 38 to be forced apart. If the foot lever 47 is released, the pressure rollers are pressed together by the spring 49 which operates under the slide 44, so that here the necessary pressure for the forward feed of the work to the grinding discs is available, in order to push or pull the work through between the stones or polishing discs, notwithstanding the opposing direction of one or other of these discs to the direction of feed, in the plane of grinding x—x. The rotation of the rollers for the feed of the work is imparted by the shaft 55 carrying the belt pulley 56. To this end the shaft 55 is coupled in any suitable way with the shaft 36 (Fig. 2). The motion of the pulley 56 is transmitted by the belt 57 to the belt pulley 58, rigidly connected with the gear wheel 59, and thence by gear wheels 60, 61 and the pair of gear wheels 62 to the pair of rollers 38, and by gear wheels 63, 64, 65 and the pair of gear wheels 66 to the pair of rollers 37. The bearing 52 for the shaft 51 forms at the same time the head of the standard 46, while the bearing 53 is carried by the columns 54.

To exchange the discs 1 and 2, the space in front of the machine must be freed, therefore the feed device for the work must be withdrawn from the machine. For this purpose the foundation plate 67 is provided with slide rails 68, carried in grooves 70 in the slide plate 69. The slide plate 69 is rigidly connected with the foundation plate 71. By means of this device the feed device can be rapidly brought back into correct position after the exchange of the discs 1 and 2 has been effected.

Fig. 7 shows the foundation plate 69 with the slide grooves for the feed device from above. In this case the plate also serves for the setting up of the feed device as Fig. 8. The plate 69 therefore has, in addition to the slide grooves 70, vertical grooves 72 for this purpose, into which the feed device with the slide rails 68 is inserted, when the grinding device is to be used for back grinding. Back grinding of saws serves to taper off the back so that the saw will cut freely. In order to achieve this tapered grinding, the saw in the new process, is pushed or pulled through between the two grinding discs in the axial direction vertical to the plane of the discs, the back of the saw reaching almost to the centre plane passing through the two spindle axes. This explains also the position of the feed device for the feeding of the work into the grinding device in Fig. 8. As the feed device is the same as that in Figs. 4 to 6, no description need be given. In order that the work should not be obstructed in being fed through the machine and in being hauled off the machine by the scissors levers for lowering or raising the grinding discs 1 and 2, which would otherwise be in the way, the lever 7 of both scissors is made as may be seen in Fig. 1.

The feed of the work in the processes indicated above can also be effected in other ways: the only important feature is that the feed through the grinding path of both stones or polishing discs shall be uniform and reliable.

For the grinding and polishing of circular saws and other circular articles it is necessary to push the work through between the grinding or polishing discs with a rotary motion, the work being at the same time pushed further into the grinding or polishing device, so that beginning at the periphery and ending at the centre the whole surface may be uniformly ground. In order to save time, it is important that the farther the disc being worked penetrates into the machine the higher shall be the speed of rotation of the disc, i. e. the speed of rotation of the work must be dependent on the radius of the circular area at the moment being worked. Further, in order that the grinding or polishing machine shall, so far as possible, be always uniformly loaded, the feed of the work into the machine at each revolution of the circular disc must always be the same. Hereby it is achieved that the output of work of the grinding or polishing machine is approximately the same at any setting of the circular saw blade between the grinding discs. The arrangement illustrated in Figs. 9 and 10 is an example of a feed device operating in this way.

The rotary movement of the circular article being worked, 73, is imparted by the two pressure rollers 74 keyed on the ends of the shafts 75. These shafts are movable but do not rotate in the hollow shaft 76, so that the rotation imparted by the belt pulley 77 and the pair of gear wheels 78 to the shafts 76 is transmitted to the pressure rollers 74. The telescopic shafts 75—76 are bushed in the bearing head 79 of the standard 80 and also in the adjustable segments 81. The segment 81 is guided by means of the two sliding jaws 82 and 83 in the slide guides 84 made in one piece with the standard 80. If the circular disc 73 is set in rotation by the pressure rollers 74, the friction roller 85 is also rotated. This is rigidly connected with the gear wheel 86, which transmits its movement to the gear wheel 87. The latter drives the worm 88, by which in turn is driven the worm wheel 89. The worm wheel 89 is keyed on the shaft 90, the near end of which is pivoted in the slider 92. The first portion of the shaft 90 is screwed, and engages with the slide jaw 82 arranged as a nut. The other end 91 of the shaft is smooth, and pivots and slides in the

correspondingly bored slide jaw 83. The shaft 90 and 91 is formed as a hollow shaft, and is threaded internally at the end 91: in the threaded end engages the screwed rod 93, which is fixed so as not to rotate with the trunnion 94 in the bearing head 79. The pitch of the external thread on the shaft 90 is the same as that of the thread on the rod 93. However, if the thread on the shaft 90 is a right hand thread, that of the threaded rod 93 must be left hand. Thus if the shaft 90—91 is rotated to the right by the worm wheel 89, the segment 81 with the rollers 74 is thereby turned towards the slider 92, since the thread on the shaft 90 is screwed into the slide jaw 82. At the same time, however, the hollow shaft 90—91 is also moved by the left hand screw on the threaded rod 93 at the same speed and in the same direction as imparted to the slide jaw 82 on the shaft 90. Thus the segment 81 is moved at twice the speed of the slider 92 with the trunnion 95. By this means the rollers 74 are displaced on the work towards the centre thereof to the same extent as the forward feed of the work in the grinding device takes place. The trunnion 95 is flattened on the grinding disc side, so that the work can be ground right up to the trunnion hole. On both sides of the slider 92 there is arranged a guide arm 96, in the slide 97 of which there is arranged movably a slider 98, carrying an overhung bearing 99 in which the roller 100 is mounted. This roller which is radially adjustable to suit the size of the saw blades being worked, by means of the sliding piece 98, has as its purpose to guide the work before and behind the entry into and the exit out of the grinding zone. On the other hand, however, the necessary counter pressure for the friction disc 85 is also provided hereby.

If the feed device 85—89 is arranged detachably and additionally for hand drive, the whole device can be quickly turned back by this after the grinding or polishing process.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. Apparatus for grinding and polishing saw blades and similar articles, comprising an upper grinding and polishing disc, a lower grinding and polishing disc, means for supporting the upper disc, means for supporting the lower disc, a pair of links pivotally connected with the first-mentioned means, another pair of links pivotally connected with the second-mentioned means, a plurality of members, each one of said members being connected with one of said links, and means connected with said members for moving the same, two of said members connected with two links forming one of said pairs of links being moved in opposite directions by the last-mentioned means.

2. Apparatus for grinding and polishing saw blades and similar articles, comprising an upper grinding and polishing disc, a lower grinding and polishing disc, means for supporting the upper disc, means for supporting the lower disc, a link connected with the first-mentioned means, another link connected with the second-mentioned means, means connected with said links for moving the same; a feed device cooperating with said discs and comprising a pair of feed rollers, a support, a pair of levers rotatably mounted in said support, each one of said rollers being carried by a separate lever, a shoe sliding in said support, means connecting said sliding shoe with one of said rollers, a foot lever, means connecting said foot lever with said sliding shoe, and resilient means pressing against said sliding shoe.

3. Apparatus for grinding and polishing saw blades and similar articles, comprising an upper grinding and polishing disc, a lower grinding and polishing disc, means for supporting the upper disc, means for supporting the lower disc, a link connected with the first-mentioned means, another link connected with the second-mentioned means, means connected with said links for moving the same; a feed device for the back grinding of saw blades comprising two pairs of feed rollers, each one of said pairs being situated at one side of said discs, the axes of said rollers being perpendicular to the axes of said discs, a support, a pair of double-armed levers rotatably mounted in said support, each one of said levers carrying two feed rollers belonging to different pairs, a shoe sliding in said support, means connecting said sliding shoe with two of said feed rollers belonging to different pairs, a foot lever, means connecting said foot lever with said sliding shoe, and resilient means, pressing against said sliding shoe; and means for moving said feed device with respect to said discs.

4. Apparatus for grinding and polishing saw blades and similar articles, comprising an upper grinding and polishing disc, a lower grinding and polishing disc, means for supporting the upper disc, means for supporting the lower disc, a link connected with the first-mentioned means, another link connected with the second-mentioned means, means connected with said links for moving the same, and a feed device for circular blades cooperating with said discs, and comprising a pair of pressure rollers, said pressure rollers being adapted to come in contact with a circular blade on both sides of the latter, means for rotating said pressure rollers, a threaded shaft, means for rotating said shaft, the last-mentioned means being actuated by said circular blade, and a member engaging said threaded shaft and carrying said pressure rollers.

5. Apparatus for grinding and polishing saw blades and similar articles, comprising an upper grinding and polishing disc, a lower grinding and polishing disc, means for supporting the upper disc, means for supporting the lower disc, a link connected with the first-mentioned means, another link connected with the second-mentioned means, means connected with said links for moving the same, and a feed device for circular blades cooperating with said discs, and comprising a pair of pressure rollers, said pressure rollers being adapted to come in contact with a circular blade on both sides of the latter, a roller adapted to be rotated by said circular blade, a hollow shaft having internal and external threads, a wheel rigidly connected with said shaft, means for transmitting the motion of the last-mentioned roller to said wheel, a member carrying said pressure rollers and engaging the external thread of said shaft, and a threaded rod engaging the internal thread of said shaft.

6. In an apparatus for grinding and polishing saw blades and similar articles, a pair of grinding and polishing discs, separate means supporting each of said discs, a pair of two-armed levers, a plurality of links, each link connecting a separate end of one of said levers with one of said supporting means, and means supporting said levers intermediate their ends and adapted to oscillate the same simultaneously in opposite direc-

tions and thereby adjust the relative positions of said grinding and polishing discs.

7. In an apparatus for grinding and polishing saw blades and similar articles, a pair of grinding and polishing discs, separate means supporting each of said discs, a pair of two-armed levers, a plurality of links, each link connecting a separate end of one of said levers with one of said supporting means, a hollow spindle connected with one of said levers, another spindle situated within said hollow spindle and connected with the other one of said levers, toothed segments connected with said spindles, and a gear mechanism for rotating said spindles, said gear mechanism comprising gear-wheels meshing with said toothed segments.

8. In an apparatus for grinding and polishing saw blades and similar articles, a pair of grinding and polishing discs, separate means supporting each of said discs, a pair of two-armed levers, a plurality of links, each link connecting a separate end of one of said levers with one of said supporting means, means supporting said levers intermediate their ends and adapted to oscillate the same simultaneously in opposite directions and thereby adjust the relative positions of said grinding and polishing discs, and a removable feeding device cooperating with said discs and comprising a pair of feed rollers adapted to come in contact with the article to be treated on both sides of the latter.

9. In an apparatus for grinding and polishing saw blades and similar articles, a pair of grinding and polishing discs, separate means supporting each of said discs, a pair of two-armed levers, a plurality of links, each link connecting a separate end of one of said levers with one of said supporting means, means supporting said levers intermediate their ends and adapted to oscillate the same simultaneously in opposite directions and thereby adjust the relative positions of said grinding and polishing discs, and a removable feeding device cooperating with said discs and comprising two pairs of feed rollers, each pair being adapted to come in contact with the article to be treated on both sides of the latter, a pair of two-armed levers, each lever carrying a separate feed roller at each of its ends, means oscillatably supporting said levers intermediate their ends, means connected with said levers for simultaneously oscillating the same in different directions, and means for rotating said feed rollers.

10. In an apparatus for grinding and polishing saw blades and similar articles, a pair of grinding and polishing discs, separate means supporting each of said discs, a pair of two-armed levers, a plurality of links, each link connecting a separate end of one of said levers with one of said supporting means, means supporting said levers intermediate their ends and adapted to oscillate the same simultaneously in opposite directions and thereby adjust the relative positions of said grinding and polishing discs, and a removable feeding device cooperating with said discs and comprising a pair of feed rollers adapted to come in contact with a disc-shaped article on both sides of the latter, means for rotating said feed rollers, the rotation of said feed rollers being transmitted to the disc-shaped article, and means for radially moving said feed rollers with respect to the disc-shaped article during the rotation thereof.

ERICH POEGGEL.