March 27, 1928.

1,663,991

L. F. NENNINGER

CENTERLESS WORK GUIDE

Filed May 31, 1927

2 Sheets-Sheet 1

Fig. 1

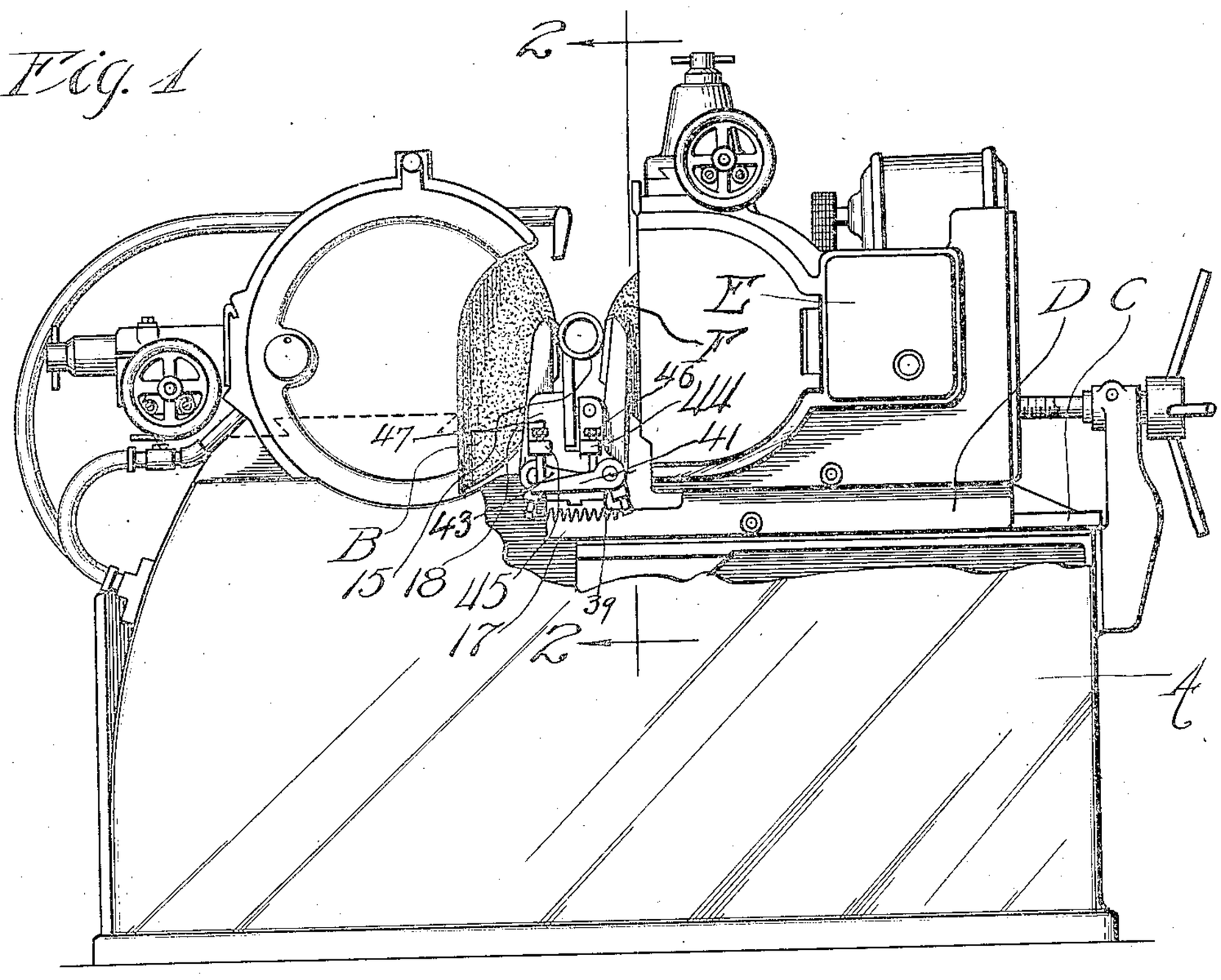
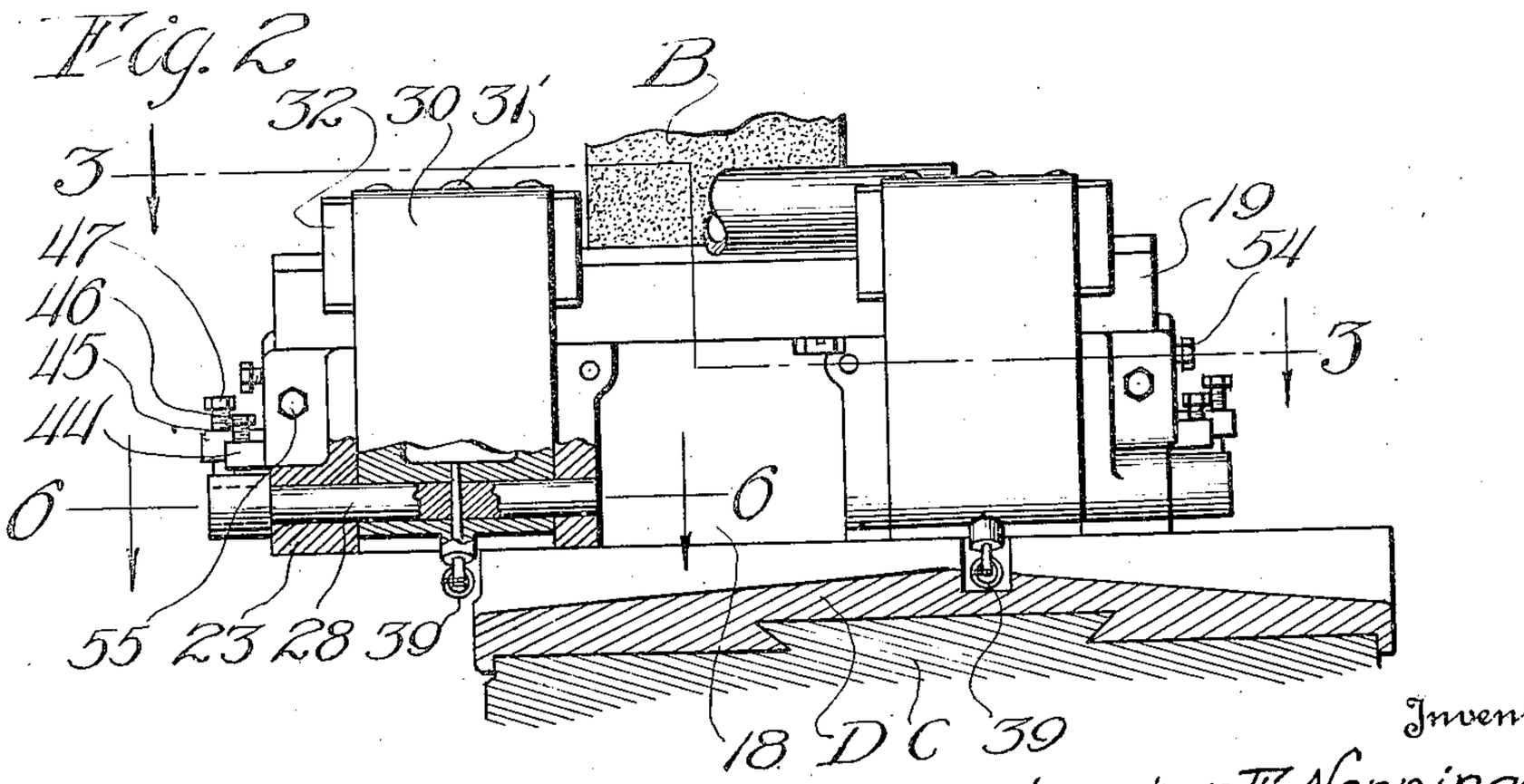


Fig. 2



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Fig. 3

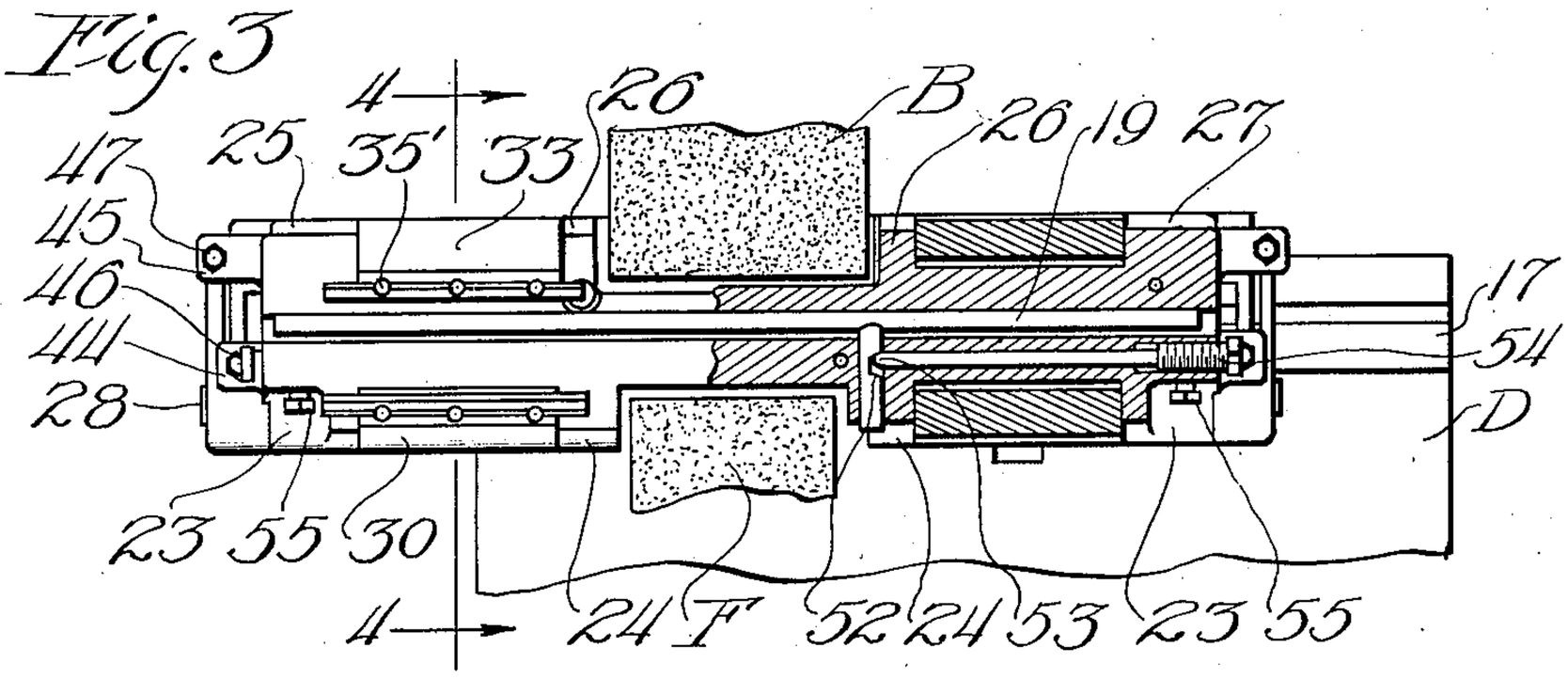


Fig. 4

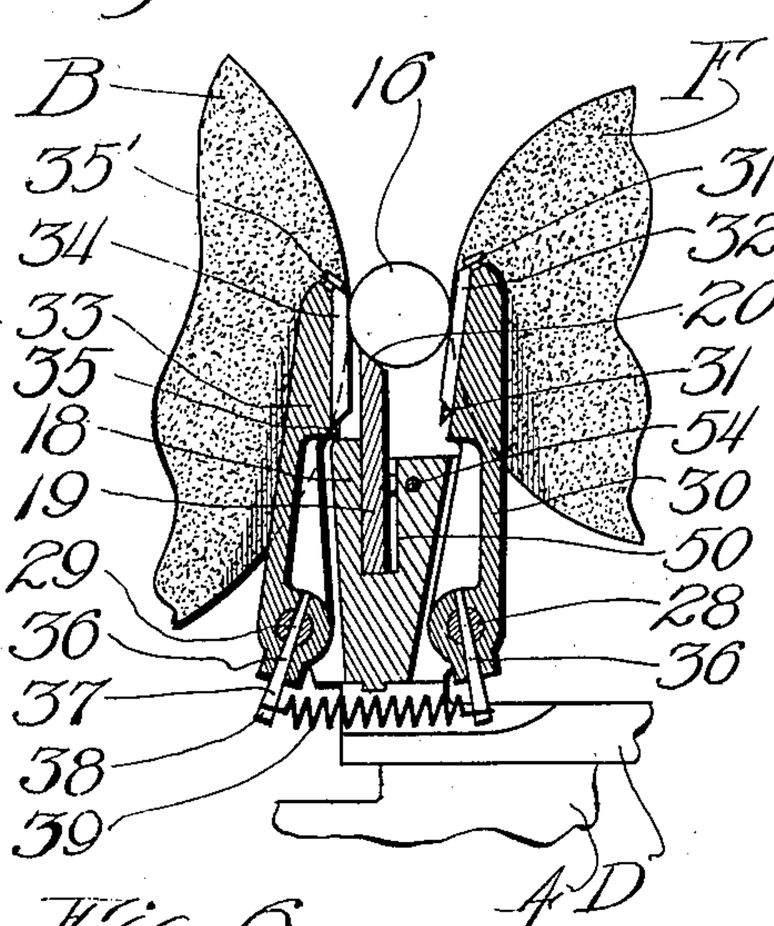


Fig. 5

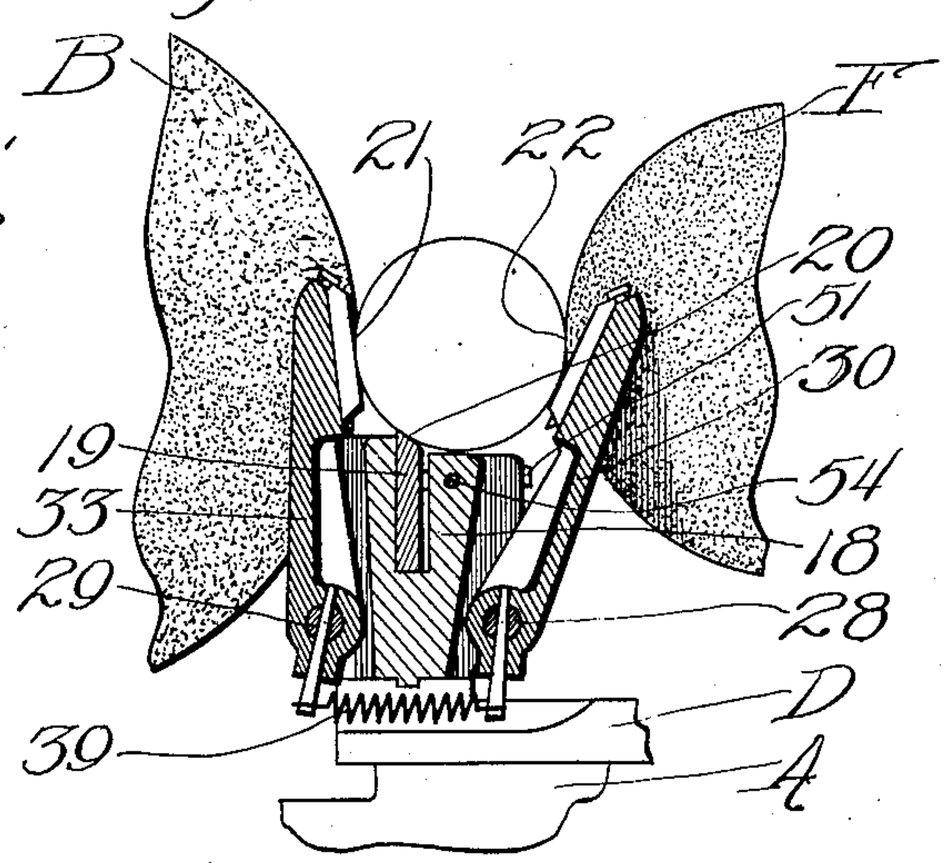
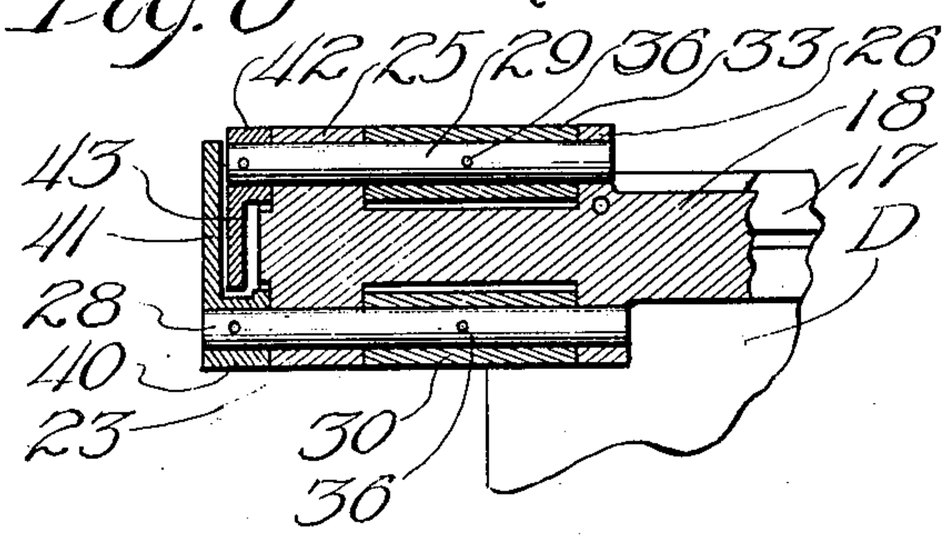


Fig. 6



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UNITED STATES PATENT OFFICE.

LESTER F. NENNINGER, OF CINCINNATI, OHIO, ASSIGNOR TO CINCINNATI GRINDERS INCORPORATED, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

CENTERLESS WORK GUIDE.

Application filed May 31, 1927. Serial No. 195,409.

This invention relates to improvements in centerless grinding machinery and more particularly to the mechanism for controlling the ingress and egress of the work pieces in connection with such machines.

Centerless grinders as now recognized in the art, comprise a pair of opposed wheels, one for grinding or operating upon the work and the other for regulating the movements of the work in the machine, together with an intermediate work rest for supporting the work in operative position. Such machines are used in the production of automobile parts and other structures of circular form in cross section in which extreme accuracy, as for example, one or two ten-thousandths of an inch is required. An essential for the production of work accurate to this degree is that the work pieces be guided into exact correct position with respect to the grinding throat at the entrant side and also that they be properly guided after they emerge from the machine. Slight deflections in the entrant or emergent guides will cause corresponding deflections in the work pieces with a consequent grinding-off action at their ends producing tapered or inaccurate work.

One of the objects of the present invention, therefore, is the provision of a novel and improved structure of guide mechanisms for use in connection with such grinders which may be readily adjusted with extreme accuracy to properly align the surfaces of the guides with the operative surfaces of the wheels and prevent twisting or displacement of the work piece.

A further object of the invention is the provision of a guide mechanism capable of a wide range of adjustment to care for work varying from a fractional part of an inch to work of several inches in diameter.

An additional object of the invention is the provision of means for rigidly holding the guides against twisting movement out of parallelism with the plane of the work rest.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification taken in connection with the accompanying drawings and it will be understood that any modifications in the specific details of construction falling within the scope of the appended claims may be made without departing from or exceeding the spirit of the invention.

Figure 1 is a side elevation of a centerless grinder with the present improvements applied thereto.

Figure 2 is a fragmentary vertical sectional view on the line 2—2 of Figure 1.

Figure 3 is a transverse section on line 3—3 of Figure 2.

Figure 4 is a vertical section on line 4—4 of Figure 3.

Figure 5 is a similar view illustrating the adjustment for larger diameter work pieces, and

Figure 6 is a fragmentary horizontal section on the line 6—6 of Figure 2.

In the drawings the letter "A" designates the bed of a centerless grinder on which is rotatably supported the grinding wheel "B" The bed in addition is formed with ways "C" for main slide "D" bearing supplemental slide "E" for the regulating wheel "F" which is rigidly or adjustably mounted with its axis at an angle to the axis of the grinding wheel so that the regulating wheel will exert a lateral thrust or feed component tending to move the work pieces axially through the machine. These parts constitute the commercial Cincinnati centerless grinder and as so known do not require further detailed description.

The wheels "B" and "F" form therebetween as at point 15 a grinding throat adapted to receive a work piece or series of work pieces at 16. As previously mentioned the important feature is that these work pieces be supported in exact alignment with the grinding throat prior to their introduction into the machine by guides lightly but accurately engaging the work piece and so spaced as to receive the rough blank, and that in addition guides having a definite adjustment be provided at the opposite side so that they will properly engage and maintain in correct axial position the emergent work piece of a reduced diameter. To accomplish these results the slide "D" is provided with a seat 17 for the work rest-supporting block 18 which has suitably secured thereto and extending thereabove the stellite or other hardened work rest 19 having a beveled upper edge 20 supporting the work piece 16. The slide "D" makes it possible to laterally adjust this work rest with re-

spect to the grinding wheel for work of different diameters as will be apparent by comparison of Figures 4 and 5. At the same time the manner of mounting of the work rest facilitates interchangement of work rests of different heights according to the diameter of work being operated upon and the vertical position in the throat at which it is desired to have the contact points 21 and 22 between the work and the engaging wheels.

In addition block 18 has the laterally extending perforate ears 23—24 and 25—26 arranged in pairs at the entrant side of the machine and a corresponding set at the exit side of the machine. As these sets are duplicates one of the other the arrangement at one end only of the machine will be specifically described. Journaled in the ears 23—24 is a rock-shaft 28 and in the ears 25—26 a second rock-shaft 29, these being accurately machined to have their axes extending in plane parallel to each other and to the intermediate plane of work rest 19. Secured upon rock-shaft 28 intermediate its supporting ears is guide 30 extending upward above the maximum height of the work rest surface 20 and having removably retained on its face as by screws 31—31′ the hardened face plate 32 for engagement with the work piece. Rock-shaft 29 similarly bears guide plate 33 having the facing 34 removably retained by screws 35—35′. Attention is invited to the fact that this attachment is made by beveling off the edges of the hardened facing so that it is unnecessary to drill same. Screws 31—35 have tapered heads tending to draw the face plates against their respective guide plates while screws 31′—35′ are of the fillister-head type and are supported on beveled upper ends of the guide plates so that they exert a tendency both to draw the face plate backward against the guide plate and in addition to press it downward into tight engagement with screws 31—35.

To secure the guide plates against rotation relative to the supporting rock-shafts therefor, use is made of the taper pins 36 having the depending portions 37 formed with grooves 38 to receive the ends of spring 39. This spring, therefore, exerts a tension tending to swing the guide plates apart or into position of maximum separation and exerts an equal or balanced pressure against two plates so that both can be adjusted at any time with equal facility and without undue pressure against either due to the general variance in position of one or the other of the guide plates. To accomplish such adjustment, rock-shaft 28 has secured thereto hub 40 of rock arm 41 while shaft 29 bears hub 42 of rock arm 43, the two arms being disposed in overlapping relation as most clearly illustrated in Figures 3 and 6.

To control the position of the two rock-arms and thus of the guide members, the block 18 is formed with bracket lugs 44 and 45 respectively receiving the adjusting screws 46 and 47 for contact with the free ends of arms 41 and 43. Adjustment of these set screws will depress the free ends of the arms rocking the guide plates inward, while relieving the downward pressure on said arms allows the spring 39 to rock the guides in a reverse or opening direction.

It will be noted that the work rest 19 is shown as supported in recess 50 of block 18, being suitably and removably secured as by the pins 51 each having a taper recess 52 to receive the taper end 53 of lock screw 54. Loosening of the screw without withdrawal from recess 52 will free the pin 51 sufficiently to permit removal of the work rest while on the contrary tightening of screw 54 will cause its end 53 to wedge against the inclined wall of recess 52 forcing pin 51 back into clamping engagement with the rest.

This device may be advantageously employed for securing the central portion of the work rest and preventing lateral or springing movement while the outer end may be held by an ordinary clamp screw 55. This permits of a readily interchangement and replacement of the work rest proper by placing the controlling means therefor, like the controlling means for the guide adjustment, at a point exteriorly of the grinding throat and accessible without separation of the wheels or variation in position of the work supporting block and slide.

From the foregoing description the structural details of the guide members and their manner of adjustment should be readily understood and it will be noted that there has been provided a construction in which the work rest and guide members as an entirety are carried by a supporting block which is laterally adjustable through movement of the main slide "D", while the several guides are themselves each individually adjustable through variance in position of an individual adjusting screw engaging the arm of the guide plate rock shaft. In this manner each of the four main guide plates may be individually adjusted into exact correct relationship to the operative face of the adjacent work engaging wheel dependent on the diameter of the work piece being guided into or out of the machine thereby. Also on account of the manner of mounting of the work piece guides they are rigidly held against distortion from proper planes parallel with the desired line of movement of the work piece.

I claim:—

1. A work guide for a centerless grinder including a support, a work rest carried by the support, spaced rock shafts carried by the support, guide members rising from the shafts on opposite sides of the work rest, and

means for rocking the shafts to vary the position of the guides with respect to the work rest.

2. In a centerless grinder the combination with a bed, of a grinding wheel supported thereby, a slide on the bed, a regulating wheel mounted on the slide for adjustment with and relative to the slide, a support carried by the slide and disposed intermediate the grinding and regulating wheels, a work rest intermediately mounted on the support, a pair of rock shafts carried by the support at opposite sides of the work rest and extending parallel therewith, guides on the rock shafts projecting upwardly above the work rest, individual means for rocking the shafts in one direction to vary the position of the guides carried thereby and means for jointly urging the shafts in the opposite direction against the action of the individual adjusting means therefor.

3. A work rest member for a centerless grinder including a support, a work rest plate intermediately mounted on the support, rock shafts laterally spaced from said work rest plate, guides on the shafts, and members for securing the guides to their shafts, said members having exteriorly projecting portions for actuating the shafts to separate the guide members.

4. A work rest member for a centerless grinder including a support, a work rest plate intermediately mounted on the support, rock shafts laterally spaced from said work rest plate, guides on the shafts, members for securing the guides to their shafts, said members having exteriorly projecting portions, means jointly engaging said projecting portions for actuating the shafts to separate the guide members, and means for individually rocking the shafts to move the guide members inwardly.

5. A work rest member for a centerless grinder including a support, a work rest plate intermediately mounted on the support, rock shafts laterally spaced from said work rest plate, guides on the shafts, and members securing the parts together, said members having exteriorly projecting portions, means jointly acting upon said projecting portions for actuating the shafts to separate the guide members, rock arms on the shafts, and means engaging the individual rock arms for varying the position of the arms and thus of the guides carried by their respective rock shafts.

6. In a centerless grinder the combination with opposed grinding and regulating wheels forming a work receiving throat therebetween, of a support disposed intermediate said wheels having a work rest portion projecting into the grinding throat and having a plurality of rock shafts disposed exteriorly of said throat, certain of said shafts being located at one side and additional shafts at the opposite sides of the wheels, individual work guides carried by the several shafts and means for individually rocking the shafts to vary the position of the several guides.

7. A work rest for a centerless grinder including a supporting block, individually adjustable guide members laterally secured to the block and adjusting devices for said members terminally mounted on the block whereby said adjusting members are rendered readily accessible.

8. A work guiding and supporting device for a centerless grinder including a supporting block, work guides laterally pivoted to the block for in and out swinging movement, resilient means for jointly outwardly urging the guide plates, and means terminally secured to the block and operatively associated with the guide plates for individually inwardly shifting said guide plates.

9. A work guiding device for a centerless grinder including a supporting block, guide plates laterally pivoted to the block in spaced opposed pairs and capable of wide angle of movement relative to the supporting block, individual control arms operatively associated with the guide plates and exteriorly disposed with respect thereto, and means for engaging said arms to individually vary the position of the guide plates, said adjusting arms being of less length than the length of the plates, whereby a limited movement of the arms will produce a wide variation in position of the operative portion of the guide plates.

10. A work guiding device for a centerless grinder comprising a main supporting block, work guide plates laterally pivoted to the block, rock shafts individually secured to said plates, over-lapping control arms carried by the rock shafts and disposed adjacent one to the other, and adjusting devices mounted on the support for engagement with the arms to vary the position of their guide plates.

11. A work guiding device for a centerless grinder comprising a main supporting block, work guide plates laterally pivoted to the block, rock shafts individually secured to said plates, over-lapping control arms carried by the rock shafts and disposed adjacent one to the other and adjusting devices mounted on the support for engagement with the arms to vary the position of their guide plates, said adjusting devices being disposed on the opposite side of the support from the rock shaft controlled thereby, whereby maximum range of adjustment with minimum overall space is attained.

In testimony whereof I affix my signature.

LESTER F. NENNINGER.