

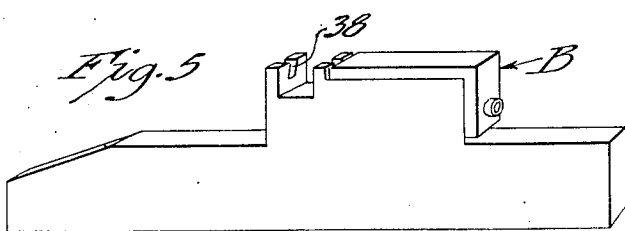
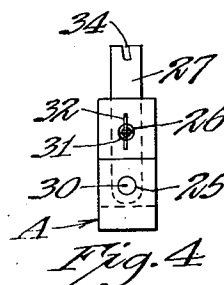
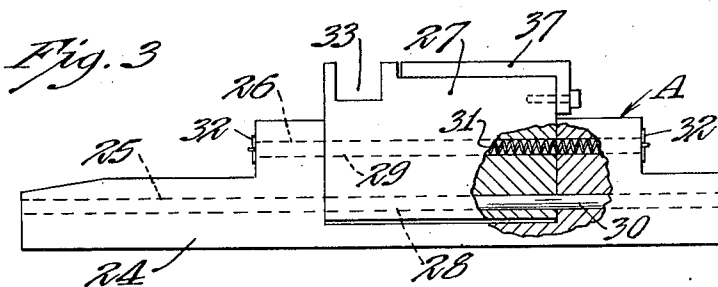
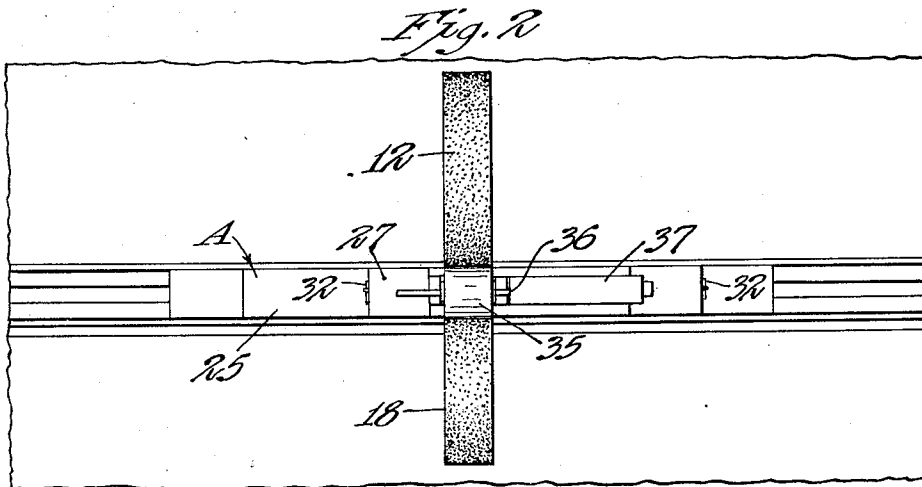
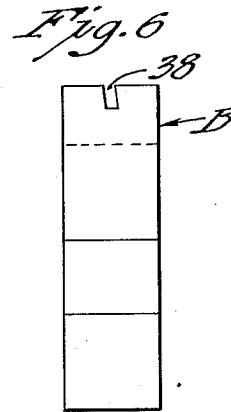
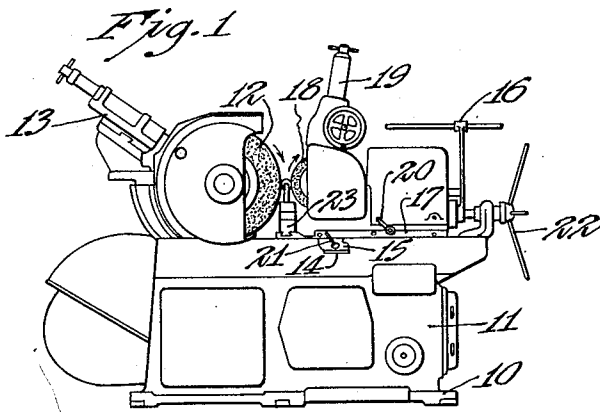
May 22, 1951

S. S. SMOLICH

2,554,423

WORK REST FOR CENTERLESS GRINDING MACHINES

Filed Jan. 29, 1948



Inventor
Sylvester S. Smolich
By *Williamson & Williamson*
Attorneys

UNITED STATES PATENT OFFICE

2,554,423

WORK REST FOR CENTERLESS GRINDING MACHINES

Sylvester S. Smolich, Minneapolis, Minn.

Application January 29, 1948, Serial No. 5,000

4 Claims. (Cl. 51-238)

1

This invention relates to centerless grinding machines and particularly to a device for producing and maintaining concentricity when grinding on a centerless machine.

Centerless grinding machines are primarily used for grinding the outer surfaces of cylindrical members by merely locating the work to be ground by its outer peripheral surface. My invention provides a novel and improved work blade which is mounted in the conventional manner on such a machine but which will axially position the work to maintain and produce concentricity thereof during the grinding operation.

It is an object of my invention to provide a device adapted to be attached to a centerless grinding machine to hold and axially support a work piece for concentric grinding thereof.

It is another object to provide a work supporting member adapted to be mounted on a centerless grinding machine to initially support a work piece between the grinding and regulating wheels and being adapted to thereafter progressively shift said work piece toward said regulating wheel to maintain contact therewith during the grinding operation.

It is still a further object of my invention to provide a work blade having a pair of work receiving slots formed therein and adapted to be interposed between the grinding wheel and regulating wheel of a centerless grinding machine with said slots sloping downwardly toward said regulating wheel and adapted to axially receive and support a work piece therein to progressively shift the same toward said regulating wheel to maintain contact therewith during the grinding operation.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a side elevational view of a conventional centerless grinding machine showing my work blade mounted thereon for concentrically grinding a work piece therein;

Fig. 2 is a top plan view showing the relation of my work blade with a work piece supported therein and the grinding and regulating wheels in grinding position;

Fig. 3 is a side elevational view of one form of work blade embodying my invention;

Fig. 4 is an end elevational view of the work blade shown in Fig. 3;

Fig. 5 is a perspective view of a second form of my invention; and,

2

Fig. 6 is an end elevational view of the work blade shown in Fig. 5.

A conventional centerless grinding machine such as the Cincinnati Number 2 Centerless Grinding Machine made by the Cincinnati Grinders, Inc., Cincinnati, Ohio, is illustrated in Fig. 1.

This machine has a base 10 with a supporting structure 11 mounted thereon. A rotary grinding wheel 12 is journaled on said supporting structure 11 for rotation on a transverse horizontal axis and has an adjustment mechanism 13 attached thereto. This rotary grinding wheel 12 is made from any suitable abrasive material and suitable power means are provided for driving the same at high speeds. Longitudinal ways 14 are mounted on supporting structure 11. A lower slide 15 is slidably mounted on said ways 14 for longitudinal shifting movement thereon and there is a suitable mechanism provided for progressively shifting said lower slide 15 on said ways 14 and operating control lever 16 actuates this mechanism and controls the rate of shifting movement of said lower slide 15. An upper slide 17 is slidably mounted on lower slide 15 and has a regulating wheel 18 journaled thereon for rotation on a horizontal axis disposed substantially parallel with the axis of rotation of said grinding wheel. A suitable regulating wheel adjustment mechanism 19 is attached to said regulating wheel for truing and adjusting the same. Clamping means are provided on the upper and lower slides and are respectively operated by the upper slide clamping lever 20 and the lower slide clamping lever 21. Suitable mechanism, operated by the hand wheel 22 is provided for moving the upper slide 17 on lower slide 15.

A conventional transversely disposed work rest 23 is attached at the forward end of slide 15 as by a dovetail mortise and tenon joint. This work rest 23 is adapted to receive a transversely extending work blade at the top thereof and to securely clamp the same in fixed relation thereto for movement with said lower slide 15. The foregoing description includes the related elements of the conventional centerless grinding machine illustrated in Fig. 1.

A work blade embodying one form of my invention and designated by the letter A is illustrated in Figs. 3 and 4.

A block 24 forms the lower portion of form A of my invention and has a pair of longitudinally disposed vertically spaced and vertically aligned parallel openings 25 and 26 bored therethrough. The central portion of the block 24 is cut away a slight distance above the bottom thereof form-

ing a recess adapted to receive a work support 27 therein. The work support 27 has a pair of vertically spaced parallel openings 28 and 29 respectively bored therethrough and said openings 28 and 29 are adapted to be respectively aligned with openings 25 and 26. A shaft 30 of such size as to closely fit within the aligned passages 25 and 28 is inserted therethrough to pivotally connect said work support 27 with block 24, the close fit of shaft 30 preventing play in the connection. Slightly yieldable means are provided for connecting the intermediate portions of the work support 27 and block 24 such as the extremely high tension spring 31 inserted into the aligned openings 26 and 29 and having retaining pins 32 at the respective ends thereof for holding said spring 31 in tightly stretched position within said openings. The top portion of the work support 27 is cut away to form a work receiving recess 33 and a pair of opposed shaft receiving slots 34 are formed at the respective ends of recess 33.

These slots 34 slope outwardly at the bottom thereof as best shown in Fig. 4. The purpose for this slope will hereinafter be brought out and is extremely important to the successful operation of my invention.

The operation of form A of my invention is as follows. The block 24 is initially clamped in the work rest 23 and extends upwardly therefrom into position between the grinding wheel 12 and the regulating wheel 18. The lower slide is then clamped by setting clamping lever 21 and the regulating wheel shifted toward said grinding wheel and into closely spaced relation to work blade A. The work blade A is placed in work rest 23 so that the slots 34 slope toward the regulating wheel 18. A work piece such as the rotor 35 illustrated in Fig. 2 with a shaft 36 extending therethrough in substantially concentric relation thereto is placed in recess 33 with the end portions of the shaft 36 respectively received in the slots 34, the slots 34 being of such size as to closely fit with the end portions of shaft 36 and journal the same for steady rotation therein. The work piece 35 is engaged by the regulating wheel 18 as the same is shifted toward said grinding wheel and the regulating wheel is shifted far enough to hold the shaft 36 in the upper portions of the slots 34. The upper slide clamping lever is then locked and the regulating wheel rotated at a relatively slow speed, suitable driving means for the slow speed rotation of said regulating wheel being provided. The contact between the periphery of the work piece and the regulating wheel initially drives said work piece in a counter-clockwise direction as viewed in Fig. 1. The grinding wheel as well as the regulating wheel is rotated in a clockwise direction. With the work piece 35 in driving contact with the regulating wheel, the stop lever 21 for the lower slide is released and the lower slide including the regulating wheel and work piece 35 mounted in work support 27 are moved as a unit toward said grinding wheel 12 by pulling down on lever 16.

As the grinding wheel reduces the size of the part being ground, said part will slide downwardly in the sloping slots 34 and contact with the regulating wheel will thus be maintained. The spring 31 is strong enough to prevent pivotal movement of the work support 27 and to hold the work piece in driving contact with the regulating wheel with sufficient force to maintain the part in the upper portion of the slots 34. However, if the initial size of the part being ground should be so large that it reaches the bottom of

the slots 34 before the grinding thereof is complete, then and only then, will the pivoted work support 27 be swung about shaft 30 as an axis. If the part reaches the bottom of the slots 34, contact with the regulating wheel will be maintained by the pressure on lever 16 forcing the part against the grinding wheel which in turn applies a reacting force which moves the part back toward the regulating wheel and swings the upper portion of the work support 27 a slight distance toward the regulating wheel against the resilient force of spring 31. With the normal adjusted setting of the wheels 12 and 18, the work will tend to be drawn therethrough; therefore, I have found it advisable to provide an end stop 37 as best shown in Fig. 3 to prevent longitudinal displacement of the shaft 36 during the grinding operation. As soon as the part is ground to the desired size, the handle 16 is released and the lower slide 15 will move away from the grinding wheel and the part may be easily removed from the slots and a new part inserted therein without subsequent adjustment of the spaced relation between the periphery of the new part and the regulating wheel. It is extremely easy and a high degree of speed can be obtained by inserting parts into an open topped groove or slot such as the slots 34.

The vertical position of the shaft 36 within slot 34 before the grinding operation is begun will be slightly below the top of the slots 34 and need not be in any particular position within said slots 34. In the removal of the part from the slots 34, the slope of said slots will guide the part away from the regulating wheel as said part is raised therein.

Also, in the normal grinding procedure for an operation such as this, the part to be ground should be located slightly above a plane through the substantially parallel axes of rotation of the grinding and regulating wheels 12 and 18 respectively. This position of the part will also tend in combination with the sloping slots 34 to progressively provide more clearance between the part and the regulating wheel as it is raised to be removed.

Form B of my invention is illustrated in Figs. 5 and 6 and an integral solid work blade is provided. This solid work blade B has the sloping slots 38 which are substantially the same as the slots 34 and which operate in a similar manner to said slots 34. The block B and slots 38 thereof are placed in fixed relation relative to regulating wheel 18 when the lower slide 15 is securely locked to the upper slide 17 by clamping lever 20. The operation of form B of my invention will be exactly the same as form A of my invention, as previously described, until the shaft 36 of the work piece 35 reaches the bottom of the slots 38. At this point, any further grinding on the periphery of the part will reduce the size of the part to prevent contact between the part and the regulating wheel.

It will be seen that I have provided an extremely simple, highly efficient work blade for a centerless grinding machine mounted in the conventional manner thereon but having a novel and improved means for supporting and holding a work piece therein to maintain with a high degree of accuracy the concentricity between relative portions of said work piece during the grinding of the work piece. The rotor 35 has a shaft 36 fixed therein but it would be an easy matter to insert an arbor through a hollow work piece merely for the grinding operation and by so do-

ing maintain concentricity between the inner and outer peripheries of said hollow member.

Slots of various sizes may, of course, be used depending upon the amount of material to be normally removed from the parts to be ground and the speed with which said material can be ground.

The angularly sloping slots perform two functions. One is to displace a part being ground toward the regulating wheel of the grinding machine to maintain contact therewith during the grinding operation. The amount of actual displacement toward said wheel during the grinding operation will be exactly equal to the normal reduction of the radius of the part being ground. The other function of the sloping slots is to permit extremely easy and quick removal of the part after completion of the grinding operation and thus materially increase the speed with which a large number of parts may be successively ground on a grinding machine.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention.

What I claim is:

1. A work supporting member for centerless grinding machines of the type having a supporting structure, a rotary grinding wheel journaled on said structure with means for driving the same, a rotary regulating wheel journaled on said structure in opposed spaced relation to said grinding wheel, means for driving said regulating wheel, and means for controllably varying the spaced relation between said wheels; said work supporting member comprising a work blade adapted to be fixed in various predetermined relations to one of said wheels, said work blade having a pair of opposed spaced parallel slots formed therein and directed downwardly and sloping inwardly toward the wheel mounted in fixed relation thereto, said slots being adapted to receive a trunnioned work piece therein and permitting said work piece to be progressively shifted toward said last mentioned wheel as material is ground from said work piece during the grinding operation.

2. A work supporting member for centerless grinding machines of the type having a supporting structure, a rotary grinding wheel journaled on said structure with means for driving the same, a rotary regulating wheel journaled on said structure in opposed spaced relation to said grinding wheel, means for driving said regulating wheel, and means for controllably varying the spaced relation between said wheels; said work supporting member comprising a blade carrying block adapted to be fixed at various predetermined relations to one of said wheels, a working blade pivoted on a longitudinal horizontal axis to said block, a highly resistant resilient element connecting said blade to said block and normally resisting pivotal movement on said axis, a work piece support with opposed trunnion receiving and guiding elements directed generally downwardly and inwardly toward one of said wheels whereby said work piece is progressively shifted toward the wheel mounted in fixed relation thereto to maintain contact therewith as the work piece is diminished in size by the grinding operation, said resilient element

permitting displacement of said work piece toward said wheel only when said downwardly and inwardly directed elements are rendered inoperative by excessive grinding of the work piece.

3. A work supporting member for centerless grinding machines of the type having a supporting structure, a rotary grinding wheel journaled on said structure with means for driving the same, a rotary regulating wheel journaled on said structure in opposed spaced relation to said grinding wheel, means for driving said regulating wheel, and means for controllably varying the spaced relation between said wheels; said work supporting member comprising a blade carrying block adapted to be fixed in various predetermined relations to one of said wheels, a work blade pivotally connected thereto for pivotal swinging movement on a longitudinal horizontal axis in substantially parallel relation to the axis of rotation of said wheels, highly resistant resilient means to normally hold said work blade in substantially fixed relation to said wheel mounted in fixed relation to said block, said work blade having a pair of angularly disposed opposed spaced parallel slots directed downwardly and inwardly toward said last mentioned wheel and adapted to receive a trunnioned work piece for journaling the same therein, whereby said work piece is progressively displaced toward said wheel as it shifts downwardly in said slots to maintain contact with said wheel during the grinding operation, said resilient means yielding to permit pivotal movement of said blade only when the trunnions of said work piece reach the bottom of said slots when more than a normal amount of material has been ground from said work piece thus maintaining contact between the wheels and said work piece.

4. A work supporting member for centerless grinding machines of the type having a supporting structure, a rotary grinding wheel journaled on said structure with means for driving the same, a rotary regulating wheel journaled on said structure in opposed spaced relation to said grinding wheel, means for driving said regulating wheel, and means for controllably varying the spaced relation between said wheels; said work supporting member comprising a work blade adapted to be mounted in various predetermined precisely fixed relations to one of said wheels, a pair of opposed spaced parallel angularly disposed slots formed in said work blade to receive a trunnioned work piece therein said sloping slots being directed downwardly and inwardly toward said last mentioned wheel to form the sole means for shifting said work piece mounted therein progressively toward said wheel to maintain contact therewith as material is ground from said work piece during the grinding operation.

SYLVESTER S. SMOLICH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,791,713	Caster et al. -----	Feb. 10, 1931
1,814,361	Booth -----	July 14, 1931
2,440,402	Horberg -----	Apr. 27, 1948