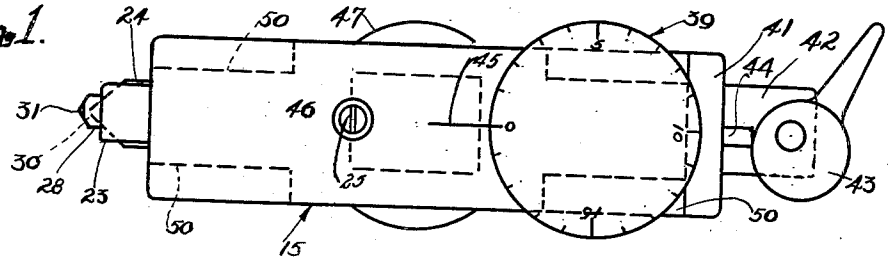
Nov. 19, 1946. L. NACHEMOV 2,411,223

PRECISION GRINDING WHEEL DRESSING DEVICE

Filed Dec. 7, 1944

Fig. 1.



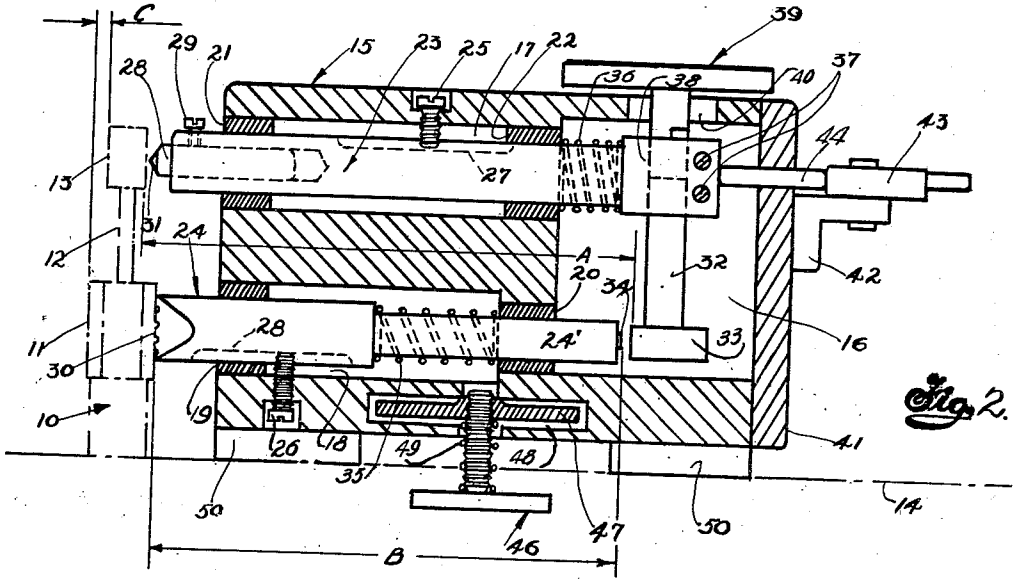


Fig. 2.

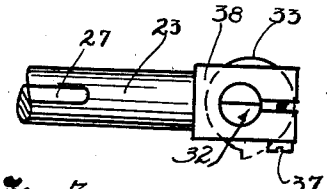


Fig. 3.

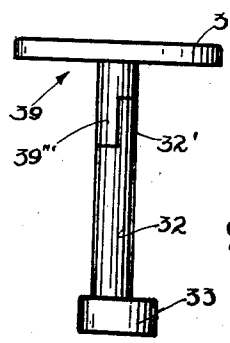


Fig. 4.

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PRECISION GRINDING WHEEL DRESSING DEVICE

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5 Claims. (Cl. 125—11)

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The present invention relates to grinding wheel dressing devices and more particularly for use in the dressing of grinding wheels of precision grinding profiling machines which employ a follower co-operating with a pattern and a grinding wheel performing on the work; the contour of the pattern profile being similar to the contour of the profile to be performed on the work.

The dimensions of the pattern are sometimes equal and usually larger than the dimensions of the work to be performed, whereby the diameter of the grinding wheel is respectively equal or must differ by a constant with respect to the diameter of the follower. As the grinding wheel wears, the diameter of the follower to be used need be smaller and is therefore changed from time to time, and being definite at any time, requires that the diameter of the grinding wheel used be, or be made of such dimension whereby the mandatory relationship of the respective diameters of said follower in use and the grinding wheel be maintained.

The principal object of this invention is to provide a novel and improved device for dressing the grinding wheel to the prescribed size it must have with respect to the diameter of the follower used at any time.

Another object is to provide a novel and improved device of the character set forth, which when once set to dress the grinding wheel in proper relation to a follower of particular size, needs no further adjustment to accomplish proper dressing of the grinding wheel with respect to any smaller follower chosen for operation.

A further object of the present invention is to provide a device of the character described, of novel and improved construction, which maintains the required relationship between follower and grinding wheel diameters though mounted on the commonly known, machine at different positions each time it is used with each change of follower, that is, it is not necessary to mount the device at only one particular position on the machine each time it is to be used for dressing the grinding wheel.

Still another object hereof is to provide an improved and novel device of the type mentioned, which is easy to use, simple in construction, reasonably cheap to manufacture, and efficient in carrying out the purposes for which it is designed.

Other objects and advantages will become apparent as this disclosure proceeds.

In the accompanying drawing forming part of this application, similar characters of reference indicate corresponding parts in all the views.

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Fig. 1 is a plan view of a device embodying the teachings of this invention.

Fig. 2 is an elevation thereof shown partly in section.

Fig. 3 is a fragmentary plan view of a component of the device.

Fig. 4 is a side view of a cam means included in the device, and a co-operating key for shifting cam position.

In the drawing, the embodiment chosen for explaining this invention, is one adaptable for use on a single spindle profiling machine wherein the numeral 10 indicates the vertically fixed revolvable spindle carrying a follower wheel which may be a removably mounted ring 11; also, said spindle at its upper end, has removably mounted therein the downwardly extending shank 12 secured in the grinding wheel 13, and said grinding machine also includes a table, indicated diagrammatically by the line 14, and means to raise and lower said table (not shown). The manner of use of this machine is well known in the art, and therefore it will be sufficient to say that a pattern resting on, and free to be slid on the table surface 14, is manually guided towards the follower 11, while the grinding wheel 13 is performing on a piece of work carried atop the pattern, without illustration in the drawing. This specification will concern itself wholly with grinding wheel dressing devices, disclosure of which now proceeds.

A metal block indicated generally by the numeral 15, is hollowed at one end to form chamber 16. The numerals 17 and 18 indicate a pair of parallel bores communicating with said chamber. Force-fitted at the ends of said bores, are the bushings respectively designated by the numerals 19, 20, 21 and 22, which are preferably hardened. Positioned through the bushings 19 and 20, is the freely longitudinally slidable follower contact bar, generally indicated as 24. Positioned through the bushings 21 and 22, is the freely longitudinally slidable grinding wheel dressing bar, indicated as 23. One of the respective ends of each of the members 23 and 24 extend into chamber 16. The other ends of said members 23 and 24, extend out of the block 15, which really serves as the casing or frame of the device. In the device illustrated, the members 23 and 24, being round for convenience of construction, are maintained against axial rotation by the pins or screws 25 and 26, which respectively extend into the grooves or keyways 27 and 28.

The exterior end of bar 23 is provided with a

socket for housing the diamond-pointed element 28, to be secured therein by means of a set screw 29. The exterior end of bar 24 is symmetrically tapered to a forward edge 30, which is preferably serrated and coplanar with diamond point 31; said plane being determined by the axes of the bar members 23 and 24. It is preferred that the distance between the axes of the bars 23 and 24 be such, that when edge 30 is symmetrically positioned with respect to the ring 11, as shown in Fig. 2, diamond point 31, is half way up the surface of the grinding wheel 13.

The interior end of bar 23, terminates as an enlarged split collar bearing for the shank 32 carrying a cam 33, in the line of movement of the interior end of bar 24, which carries an axially protruding hardened pin 34. The remote interior half of bar 24, indicated as 24', is of reduced section, whereby compression spring 35 carried thereabout within bore 18, acts to cause bar 24 to withdraw from the casing 15; such movement being limited by pin 26 in closed-ended key-way 28. A compression spring 36, positioned about bar 23, within chamber 16, between bushing 22 and clamp collar 38, acts to cause said bar 23 to retract into the casing 15.

Shank 32, when screws 37 are loosened, has a snug turning fit in collar 38, and may be turned by a removably co-operating key 39, insertable through bore 40. Element 39'' as well as the graduated element 39'', are integral parts of the key 39. The co-operating key-elements 39'' and 32', here shown as of semi-circular cross-section, may have any construction suitable to effect rotary movement of shank 32. When key 39 is removed from the device, opening 40, should be preferably plugged by any suitable insert (not shown). Chamber 15 is closed by an end plate member 41. It is to be noted that the casing interior is substantially dust proof. For fine precision, it is desirable that cam 33 and pin 34, be kept free from any foreign particles.

On a bracket 42 secured to the plate 41, is rotatably mounted the cam 43, which acts upon a loose pin 44, slidably mounted through said plate, and adapted to cause movement of bar 23 with respect to the casing 15. A mark indicated by the numeral 45, on the casing, serves as a pointer to read the graduations on the face of 39''.

To mount the device, the head of bolt 46 fits within a T slot in table 14, and nut 47 which is positioned through slot 48 in casing 15, is threadedly engaged on said bolt against the compression spring 49, which is carried about said bolt 46, between its head and said nut. The peripheries of nut 47 and of the graduated disc 39'' may be knurled. The diameter of said nut 47 shall exceed the width of the casing 15, and the same is desirable for the disc 39''. Keys 50, may be provided for the casing, to fit keyways in table 14.

The operator is provided with a plurality of follower rings of the type 11. The bores in all shall be of identical diameter to fit on spindle 10, while their respective outside diameters are slightly different from each other.

For any definite pattern for the performance of work of prescribed dimensions, the difference between the diameter of the follower wheel or ring 11, and that of the grinding wheel 13 to be used, is known. It is desirable that pattern and work dimensions be so related that the diameter of the bore in the follower ring 11, be always greater than the diameter of the grinding wheel 13, to permit change of the follower ring without removal of the grinding wheel.

Starting with one of the larger follower rings 11, a grinding wheel 13 of proper size is chosen or made by actual measurement or by test of performance. The device of Fig. 2, is now ready for adjustment to accomplish proper dressing of the grinding wheel 13, after said grinding wheel has worn and another follower ring need to be used. Screws 37 are loosened; cam 43 is in position to permit member 23 to retract as far as it will go into the casing 15, due to action of spring 36; the follower contact bar 24 has withdrawn from the casing as far as pin 26 will permit, by action of spring 35, and key 39 is inserted to accomplish any required movement of cam 33. Accessibility to screws 37, is had through holes (not shown) in the casing wall.

The device, designated as numeral 9, is now loosely set upon table 14, with the head of bolt 46 positioned within the T slot in said table, and is slid towards spindle 10, until edge 30 of the follower contact bar 24, touches the follower ring or wheel 11. The device is now slid further in the same direction so that said follower contact bar 24, is pushed a little into the casing against action of spring 35. Then the device is secured to table 14, by use of the nut 47. Good contact is thus assured between members 11 and 24. The cam 43 is now operated to push member 23 out of the casing 15, towards the grinding wheel 13, until diamond point 31, contacts said grinding wheel. The key 39 is then used to turn cam 33 into such position that it contacts pin 34. Whereupon screws 37 are tightened. The cam 43 can now be turned to permit bar 23 to retract into casing 15, and out of contact with the grinding wheel 13. The device is now adjusted, for use in the future to dress the grinding wheel, and is now removed from the machine.

When the grinding wheel needs dressing; the reason being it has become worn, the next smaller sized follower ring of the type as 11, is mounted on the spindle 10, in place of the follower ring previously used. The device 9, is mounted securely on table 14, so that edge 30 contacts the follower ring substituted, and bar 24 is pushed into the casing 15 against action of spring 35, but pin 34, should not contact cam 33. The dressing point bar 23, is now slowly fed against the rotating grinding wheel 13, by use of the cam 43, while the table 14 is successively raised and lowered so that diamond point 31, shall act upon the entire periphery of the grinding wheel 13. The limit of travel of the point 31 towards the axis of the spindle 10, is of course determined when cam 33 contacts the stop pin 34, whereupon cam 43, can push bar 23 no further. The grinding wheel is now dressed to its proper size in relation to the substituted follower wheel.

For every subsequent redressing of the grinding wheel 13, a smaller follower wheel of ring 11 is substituted for the one last in use, and the operation described is repeated. After each dressing of the grinding wheel, the device 9, is removed from the machine. It is to be specially noted, that regardless of the position of the casing 15 on table 14, the constant difference required of the grinding wheel and follower ring diameters, is maintained, because the respective lengths "A" and "B" remain constant for any definite setting of cam 33. Graduations on member 39, may indicate the distance along the horizontal, between edge 30 and the forward tip of diamond point 31, and cam 33 should be so designed. Then, the device can be initially set to maintain any required constant difference between grinding and

follower wheel diameters, for the reading on member 39, is all that would need setting.

Proper continued working of the device 9 presumes that there is no wear on the diamond point 31. In practice however, some such wear does occur. Test of the work by gages immediately upon a redressing of the grinding wheel, will show whether the proper relationship is maintained between the grinding wheel and the follower used. If found at fault, and the setting had not been disturbed, the discrepancy may be due to wear of the diamond point 31. To adjust for this, slight adjustment is made by turning wheel 39 a bit to reduce the radial distance of cam 33, where it contacts stop 34. Experiment and test with gages upon the work performed by the machine, or by gage or other suitable measurement of distance "C," will determine the scope of such adjustment, and the number of work pieces performed will serve to indicate the frequency of such adjustment. Discrepancies in initial adjustment, or variations due to any cause in the associated machine, are likewise corrected by manipulation of wheel 39.

This invention is capable of various forms and numerous applications without departing from the essential features herein disclosed. It is therefore intended and desired that the specific embodiment herein be deemed illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth and taught; reference being had to the following claims rather than to the particular description and construction herein to indicate the scope of this invention.

I claim:

1. In a precision dressing device for the work grinding wheel of a profiling machine including

a pattern follower wheel and a table for holding the work and a pattern, the combination of a frame, means for detachably securing the frame to said table, a grinding wheel dressing member movably mounted on the frame, adapted for movement to contact the grinding wheel, spring means to urge said dressing member away from the grinding wheel, a follower wheel contact member movably mounted on the frame, adapted to contact the follower wheel, spring means to urge said contact member towards and maintain it against the follower wheel, a stop means carried on one of said members in the line of travel of the other of said members; and means to manually shift the dressing member towards and into contact with the grinding wheel, until the stop means comes into contact with said other member.

2. A device as defined in claim 1, wherein the grinding wheel dressing member and the follower wheel contact member are bars slidably mounted on the frame.

3. A device as defined in claim 1, wherein the stop means is carried on the dressing member.

4. A device as defined in claim 1, wherein the stop means comprises a cam.

5. A device as defined in claim 1, wherein the grinding wheel dressing member and the follower wheel contact member are bars slidably mounted on the frame, and wherein the stop means comprises a cam positioned in the path of one of said members, mounted on a pin extending from and revolvably mounted on the other of said members; said pin being adapted to be engaged and turned by a key, and a removable key for turning said pin, and graduated means to indicate the position of the cam.

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