L. NACHEMOV
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PRECISION GRINDING WHEEL DRESSING DEVICE FOR PANTOGRAPH MACHINES

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INVENTOR:

Leonard Nachemov

by

his attorney
The present invention relates to grinding wheel dressing devices and more particularly for use in the dressing of grinding wheels for precision grinding profiling machines of the pantograph type, 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.

In this type of machine, the diameter of the pattern follower must bear a definite relationship to the diameter of the grinding wheel. As the grinding wheel wears, the diameter of the follower to be used need be smaller, and 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 to such dimension whereby the mandatory relationship of the respective diameters of the 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 follower used at any time.

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

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

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

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

Fig. 2 is a front elevation thereof.

Fig. 3 is a diagrammatic view of a pantograph profile grinding machine showing the device mounted thereon.

In the drawing, the numeral 10 indicates a base, on which at axis 11, carries a rotatably mounted member designated generally as 12, which presents a cam portion 12' to contact a slide 13, and the periphery of which is a graduated circular arc; readings on which may be read by fixed pointer member 14.

The slide member 13, is within a ways comprising the strips 15 and 16 mounted on the base. The position of the slide 13 may be fixed by screw 17, positioned through slot 18, and threadedly engaged in base 10. The forward edge 19' of slide 13, is concave, and of a curve of radius larger than the radius of the largest follower wheel or disc 19 to be used. Member 20, extending from the top of strip 16, serves as a stop for the shank 21, of the follower wheel 19, and extends from the base to a point beyond any position of the slide 13.

The device just described, designated generally by the numeral 22, is mounted on the pattern table 23, which also holds pattern 24, of the pantograph machine 25. Arm 26 of the pantograph linkage, is adapted to receive the shank 21 of the follower 27. The numeral 28 indicates the grinding wheel, to which the machine mechanism is adapted to impart a continuous rotary motion, and at the will of the operator, movement along the vertical, besides movement along a path determined by the pattern 24, for operating on the work 29, which is mounted in a suitable jig 30, on work table 31. A post 32, provided with a wheel dressing diamond point 33, is secured in position on either said work table or jig, for contact with the grinding wheel 28, when the said grinding wheel is to be dressed. Said device 22, may be provided with slots 34, for mounting same in any suitable manner. In the particular pantograph machine illustrated, the follower wheel 19 when manually moved in any direction in a horizontal plane, will cause movement of the grinding wheel 28 in an opposite direction of such reduction in scope as is determined by the linkage of the machine 25.

The operator is provided with a plurality of followers of the type 27, the shanks 21 of all of which are of identical diameter, while the diameters of the respective follower elements akin to 19, are slightly different from each other.

For any definite pattern 24 for the performance of work 29 of prescribed dimension, the relation between the diameter of the follower disc 19 and that of a grinding wheel 28 is known. So either a grinding wheel of proper size is chosen or made by actual measurement or by test of performance. Device 22, is now mounted on the pattern table so that graduations on 12' read near mid-scale, and slide 13 is secured in contact with cam 18', when shank 19 of the follower 27 chosen, is in contact with stop member 20, and the follower disc 19 is in contact with 13' of the slide 13, and diamond point 33 is in contact with...
grinding wheel 28. Post 32 and base 10 are then secured to maintain their relative positions in the set up.

The operator now goes about his work in the usual manner. He performs a few pieces of work by manipulating the follower 21 in co-operation with the pattern 24, so that the grinding wheel 28 shall perform work 29. Test of the work by gauges therefore provided, will indicate that the "go" gage will not fit when the grinding wheel 28 has worn down. This wearing down of the grinding wheel, obviously has changed the prescribed relationship the grinding wheel diameter should bear to follower disc diameter. The next smaller sized follower 27 is now mounted on arm 26, in place of the one just used. The grinding wheel as worn down is of a size too large with respect to the follower wheel now substituted.

In operation, to dress the grinding wheel 28 to proper size, the follower disc 19 is brought into contact with edge 13' of the slide member 13, and slid gently therealong so that shank 21 of the follower 27 approaches the stop member 20, whereupon the grinding wheel 28 is fed into contact with dressing point 33 while there is caused to occur relative vertical reciprocatory movement between the grinding wheel 28 and the diamond point 33 by the operator. When shank 21 is in contact with stop 26, and disc 19 is in contact with slide 13, and grinding wheel 28, is then dressed to uniform cross-section, its diameter is of proper dimension for use with the follower substituted. Every time the grinding wheel 28 wears down, a next smaller sized follower is substituted, and the dressing down operation repeated. During continuance of the production of the pieces 29, should a grinding wheel need replacement, it is initially dressed down by use of its nearest sized related follower, using the undisturbed set up of the device 22 on machine 25.

During initial set up, fine adjustment of slide position, meaning of member 13, is effected by aid of slight movement of the cam wheel 12. Proper continued working of the device presumes that there is no wear on the diamond point 33. In practice, however, some such wear does occur. The test gages on the work 29 immediately after a dressing of the grinding wheel 28, will show whether the proper relationship is being maintained between the grinding wheel and the follower used. If found at fault, and the setting had not been disturbed, the discrepancy is due because of wear of the diamond point 33. To adjust for this, the position of the slide is slightly altered with the aid of cam 12. Experiment and test with the gages will determine the extent of cam movement, and the number of work pieces performed will determine the frequency and scope of such adjustment. Discrepancies in initial adjustment, or variations due to any cause in the associated machine, are likewise corrected by manipulation of the cam wheel 12, and slide member 13, which of course shall always be maintained in contact with said cam.

As a matter of information, it might here be noted that the diameter of the pattern follower must differ by a constant from some predetermined multiple, or fractional part, of the diameter of the grinding wheel; said multiple being equal to the pantograph ratio to which the pantograph is set.

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 as to the patent shall comprise 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.

1. A precision dressing device for the work grinding wheel of a profiling machine of the pantograph type including a pattern follower wheel on a shank carried by the pantograph linkage, a work holding table and a pattern holding table, the combination of a mounting member adapted to be secured on the pattern holding table, a stop member secured on the mounting member, a pattern follower wheel guide member movably mounted on the mounting member in a direction along the stop member, means to secure the guide member in any predetermined position on the mounting member, means to finely adjust the position of the guide member when the guide member is free to move; said guide and stop members being at different levels with respect to the pattern holding table; the pattern follower wheel being adapted to be guided uniquely in contact with and along an edge of the guide member; said edge determining the movement of the grinding wheel in a given direction, a grinding wheel dressing member fixed on the work holding table in the line of movement determined by said edge of the guide member; the stop member presenting an edge transverse said edge of the guide member; the shank of the pattern follower wheel being adapted to contact said edge of the stop member when the grinding wheel has been dressed to a predetermined diameter by the dressing member.

2. A device as defined in claim 1, wherein the guide member adjustment means includes a graduated member adapted to indicate guide member movement accomplished by the adjustment means.

3. In a device as defined in claim 1, wherein the guide member adjustment means comprises a cam rotatably carried on the mounting member, and in contact with the guide member.

4. In a device as defined in claim 1, wherein said guide member is slidably mounted on the mounting member, and has its longitudinal axis parallel to the shank contacting edge of the stop member.

5. In a device as defined in claim 1, wherein the guide member adjustment means comprises a cam rotatably carried on the mounting member, and in contact with the guide member; a portion of the edge of said cam member being circular and graduated with markings indicative of extent of guide member movement and a fixed pointer on the mounting member adjacent said circular portion.

6. In a device as defined in claim 1, including graduated means adapted to indicate guide member movement accomplished by the adjustment means.

7. In a device as defined in claim 1, characterized in that the path offered the pattern follower wheel along the mentioned edge of the guide member is comparatively long, and the distance between normals to the mentioned edge of the stop member from the points of commencement and end of said path, is comparatively short, whereby the dressing member of the grinding wheel is easily and finely controlled.

LEONARD NACHEMOW.