July 11, 1939. M. G. E. PHILIPPE 2,166,020

APPARATUS FOR DRESSING THE GRINDING WHEELS USED FOR GEARING

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Fig. 1

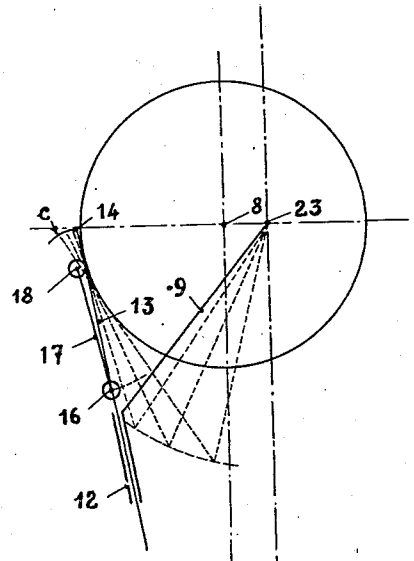
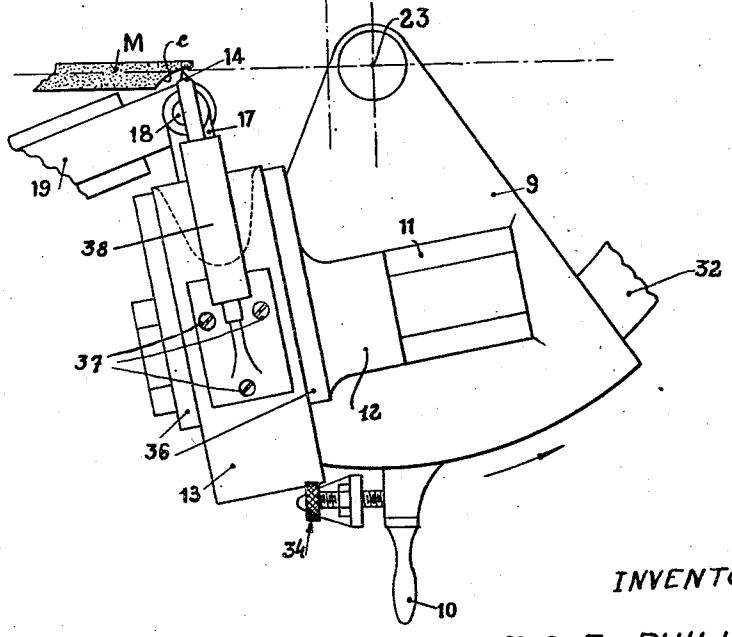


Fig. 2



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Fig. 3

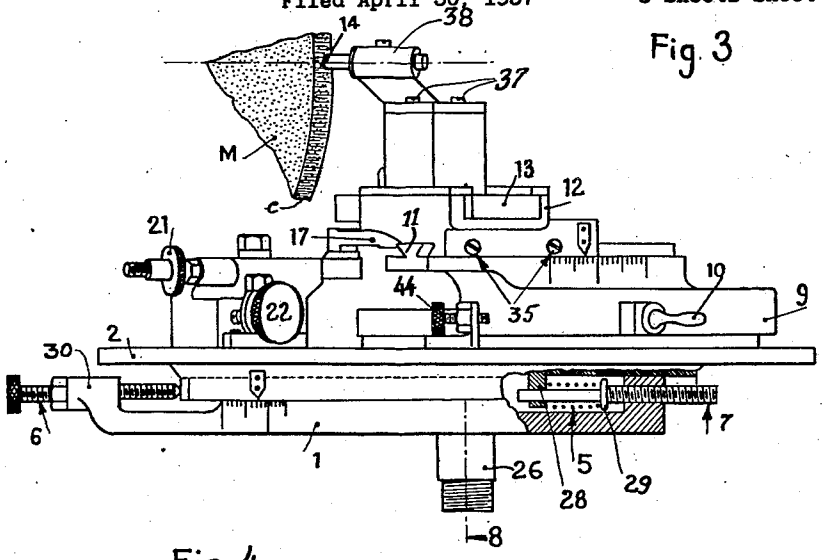


Fig. 4.

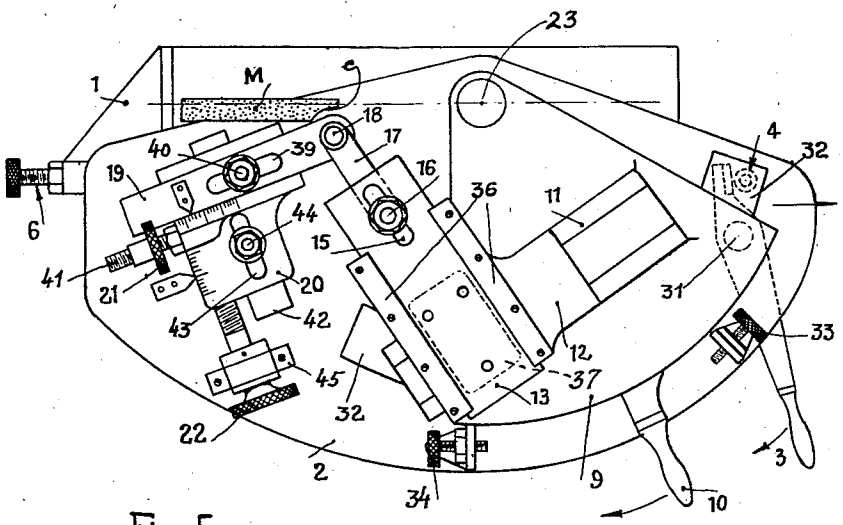
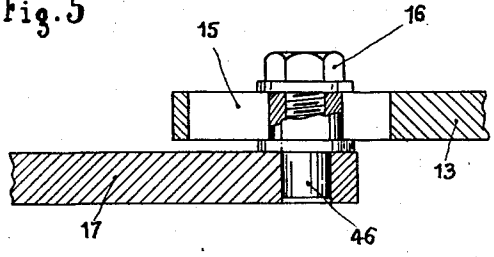


Fig. 5



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Fig. 6

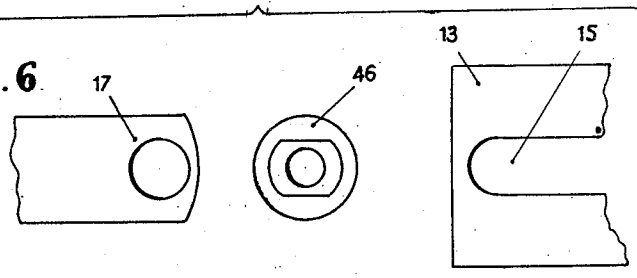


Fig. 7

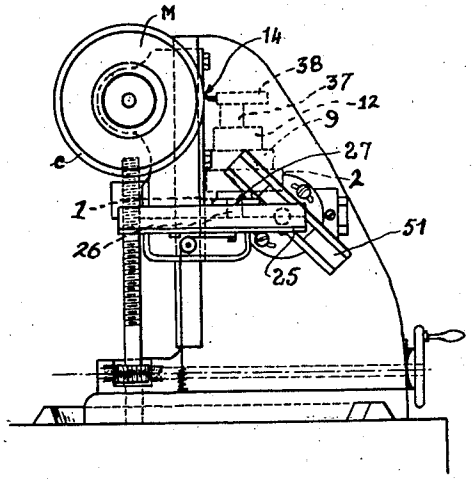
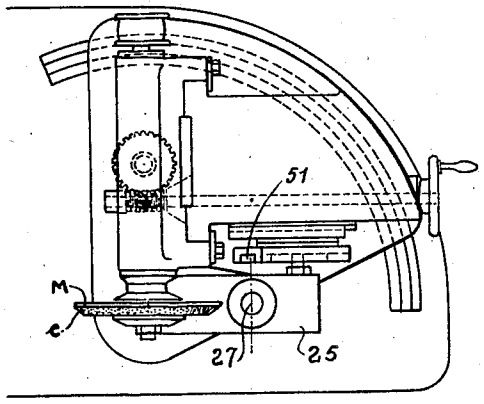


Fig. 8



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Patented July 11, 1939 2,166,020

UNITED STATES PATENT OFFICE

2,166,020

APPARATUS FOR DRESSING THE GRINDING WHEELS USED FOR GEARING

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Application April 30, 1937, Serial No. 140,071
In France May 13, 1936

4 Claims. (Cl. 125—11)

The present invention has for its object an apparatus for dressing the grinding wheels used for gearing teeth. Apparatus of this type have heretofore been proposed and the purpose of these was to render, after a determined period of use, the grinding wheels their original profile. As the grinding of gears has to be done often, with a very high precision, for example to a thousandth of a millimetre, the mechanism which effects the dressing of the grinding wheels must be extremely precise and must be easily manipulated, in order to obtain the microscopic displacements of the hard point which works upon the grinding wheels.

The apparatus known hitherto either did not produce the desired precision, an account of the fact that they comprise many parts each being susceptible to a clearance or the microscopic displacements of the tool to be dressed can only be obtained by operations which are very difficult to carry out, thereby necessitating particularly clever persons.

The apparatus of the present invention has been combined in order to present as few pieces as possible in order to avoid the clearance between these pieces and consequently a lack of precision.

This apparatus is also provided with driving means of which the relatively large displacements being easily effected by hand, correspond to microscopic displacements of the hard point for dressing the grinding wheels.

Further characteristics of the invention will be set forth in the following description with reference to the accompanying diagrammatic drawings in which like parts throughout the several views will be designated by like reference characters.

Fig. 1 is a diagram relating to the construction of dressing apparatus according to the invention.

Fig. 2 is a partial top plan view of the device comprising the present invention operable in a manner similar to the diagram of Fig. 1.

Fig. 3 is an elevational view of the device.

Fig. 4 is a top plan view of the device shown in Fig. 2 with the diamond supporting members removed therefrom.

Fig. 5 is a cross sectional view of a detail of construction of said device.

Fig. 6 is a top elevation of the members shown in Fig. 5 unassembled.

Fig. 7 is a side elevation of the frame of the machine tool on which is mounted the apparatus according to the present invention, and

Fig. 8 is a top plan view of said frame.

Referring to Fig. 1, the apparatus herein represented consists, in principle, of a member 13 having directly connected thereto and carrying therewith diamond 14, which diamond is adapted to describe, while cutting the grinder, the curve c serving as the generatrix, which in this case is a portion of an evolute of the gear-wheels, to be ground.

For this purpose, the said rod can be given two different movements. On the one hand, it is connected by a pivot joint 16 to a link 17 which is pivoted at its other end to a fixed point 18; on the other hand, it is slidable in a guide 12 formed in a radial member 9 which is pivoted at the centre of grinding 23, this being different from the centre 8 of the gear wheel to be ground. These two centres are variable according to the diameter and the characteristics of the gear wheel.

In Figure 4, the apparatus has been shown with the support of the hard point 14 withdrawn.

Referring to Figs. 2, 3 and 4, the apparatus shown therein consists of a horizontal rectangular plate 1 which is secured to the machine frame by a vertical axle 26 and carries a guide into which is fitted a second horizontal plate 2. By the action of a spring 5 situated between the lug 28 of the plate 2 and a supporting washer 29 mounted on an adjustable screw 7 which is screwed into the plate 1, the plate 2 is always held in contact with an adjustable screw 6 mounted on a support 30 secured to said plate 1.

As better shown in Fig. 4, a lever 3, which is pivotally mounted on an axle 31 secured to the plate 1, bears against a roller 4 mounted below the plate 2. By turning the lever 3 from right to left, the plate 2 will be displaced in its guide from left to right and will thereby compress the spring 5 which will then bring the plate 2 against a stop-screw 7. A circular sector 9, hereinafter called the operating sector, is pivotally mounted on an axle 23 secured to the plate 2 and movably mounted in a circular guide 32 which in its turn is secured to the plate 2. The angular displacements of the sector 9 are obtained by moving the handle 10 carried thereby and they are limited on either side by adjustable stops 33 and 34 mounted on said plate 2. Said operating sector 9 carries a rectangular slide 11 in which is slidably mounted a member 12. Member 12 is held for regulating purposes in a given position by means of two screws 35.

The member 12 is itself provided with a rectilinear guide 11 adapted to receive a ruler 13 which slides without play and is held at the top by two strips 36 screwed to the member 12.

To the top of ruler 13, Fig. 2, is secured by screws

37 a tool holder 38 carrying a diamond 14 or like tool having a hard point. The ruler 13, Figs. 4, 5 and 6, is provided at one end with a slot 15 adapted for the insertion of an axle 46 provided with a shoulder having a flat portion in order to prevent it from turning. The said axle, which is threaded in the interior, is held fast after it has been adjusted on the ruler 13 by means of a screw 16 provided with a shoulder. The axle is pivotally mounted through an end of link 17, permitting the ruler 13 to pivot about its fixing point. The opposite end of said link 17 has pivotally mounted therethrough an axle 18 which is further secured to a ruler 19. Said link 17 may be made in a single piece, as shown in Fig. 4, or in several pieces in order to vary the distance between the centers of the axles 16 and 18.

Said ruler 19 is provided with a slot 39 and is slidably mounted in a cut out part of a member 20. Said ruler 19 can be secured to said member 20 after adjustment by a set-screw 40. The displacement of the ruler 19 relative to the member 20 is effected by a milled nut, the edge of which is fitted into a notch in the ruler 19, while the nut 21 is movable along a screw 41 which is mounted on the side of said member 20. Said member 20 has a cut out part having a guide 42 secured to the operating plate 2 engaging therewith for ensuring the straight movement of said member. A slot 43 formed through member 20 and having a screw 44 situated therein and mounted upon member 42 provides a means for holding the member 20 relative to guide 42 by tightening the nut upon screw 44. The displacement of the member 20 with reference to the guide 42 is effected by a micrometer screw 22 which bears at one end upon the plate 2 by means of a strap 45 and is screwed at the other end into the member 20.

The operation of the apparatus is as follows. The handle 10 being in its starting position against the stop 33 is moved in the direction of the arrow in order to bring it against the stop 34. During this movement, the axle 16 is described a circular arc about the axle 18, the rigid device consisting of the sector 9 and the member 12 describes the circular arc about the axle 23, and the rigid device consisting of the ruler 13 and the diamond 14 is urged in such a manner as to describe, on the one hand, a circular arc about the axle 18, and on the other hand, to slide in the guide of the member 12 while pivoting about the axle 46. The result of these movements is a curve, the effective part of which coincides with the portion of the evolute which is used in forming the teeth of gear wheels.

When the handle 10 is in the position shown in Fig. 2 against the stop 34 and the lever 3 is in the position shown in Fig. 4, the lever 3 is turned to the left and thus the plate 2 and the members which it carries will recede to the right. The point of the diamond 14 will thus describe a straight line starting from the beginning of the evolute, that is, the pitch circle, and proceeding toward the center of the gear wheel. This will afford a cut out part at the bottom of the tooth of the gear wheel, which is useful in the case of a small number of teeth.

To place the axle 18 in its initial position, members 21 and 22 are rotated.

The distance between the axle 23 and the diamond point 14 will depend upon the diameter of the gear wheel to be ground and this distance is determined by the position of the member 12 on the guide 11 and the position of the axle 46 on the ruler 13. By suitably adjusting the position of the members 12, 13, 46, 19 and 20, the diamond point 14 can be made to describe a curve corresponding to the outline of any desired gear wheel.

It will be observed that owing to the relative position, it is necessary to effect a considerable displacement of the regulating members in order to obtain a very slight variation in the outline. For this reason, the apparatus produces results which are remarkably precise.

The apparatus according to the present invention may be placed on a frame of a grinding machine or gearing teeth. As shown in Figs. 7 and 8, the gear to be ground is mounted on an axle 24 while the apparatus according to the present invention is mounted on the carriage 25. The axle 26, shown in Fig. 3 of said apparatus, is engaged in a suitable opening 27 of the carriage 28. This carriage is especially displaceable towards the grinding wheel M in order to bring the diamond 14 into contact with said grinding wheel M. In Fig. 7, there has been diagrammatically shown in dotted lines a possible position of the apparatus according to the present invention on the frame of a machine for grinding gearing teeth.

It is obvious that the forms of construction herein described and represented are given solely by way of example, and that it is feasible to modify, in any suitable manner, the number, size, shape, nature and assembling of the several parts, without departing from the spirit of the invention. Principally, the sector 9 may be replaced by any other member which may be controlled in any possible manner. The sliding of the diamond holder may be effected in any manner desired. The length of the link may be adjustable in order to facilitate the adaptation of the apparatus to the characteristics of the different gear wheels to be ground. The adjustment of the fixed point of the link can be effected by any suitable means. Verniers may be mounted at any points at which they may be necessary. The sliding members may be arranged in any suitable manner. They may be provided with ball bearings, devices for lubricating, matching, and the like.

I claim:

1. Apparatus of precision for dressing grinding wheels used upon gearing teeth, comprising a carriage, an oscillating support mounted on said carriage in such a manner that its axis of oscillation does not coincide with that of the gear to be ground, said support having a slide formed therewith, a member bearing the hard pointed tool adapted for dressing the grinding wheel mounted upon said slide, said tool being capable of sliding in said member, a link and a fixed member connected by said link to said tool and whose position with respect to the axis of oscillation of said support may be adjusted by hand through the intermediary of screws in order to give the hard point microscopic displacements.

2. Apparatus of precision for dressing grinding wheels used upon gearing teeth as claimed in claim 1, a handle provided on said carriage bearing said oscillating support for the displacements of the hard point on the dressed part of the grinding wheel, which hard point is to draw a right line directed towards the bottom of the teeth and means of adjustment for regulating the initial position of said carriage.

3. Apparatus of precision for dressing grind-

ing wheels used upon gearing teeth as claimed in claim 1, said oscillating support having the shape of a sector, a handle for operating said support and an adjusting screw adapted to regulate the initial position of said support.

4. Apparatus of precision for dressing grinding wheels used upon gearing teeth as claimed in claim 1, means for adjusting the position of said fixed or adjustable member comprising two perpendicular slides provided with screws which permit them to be displaced in their respective direction.

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