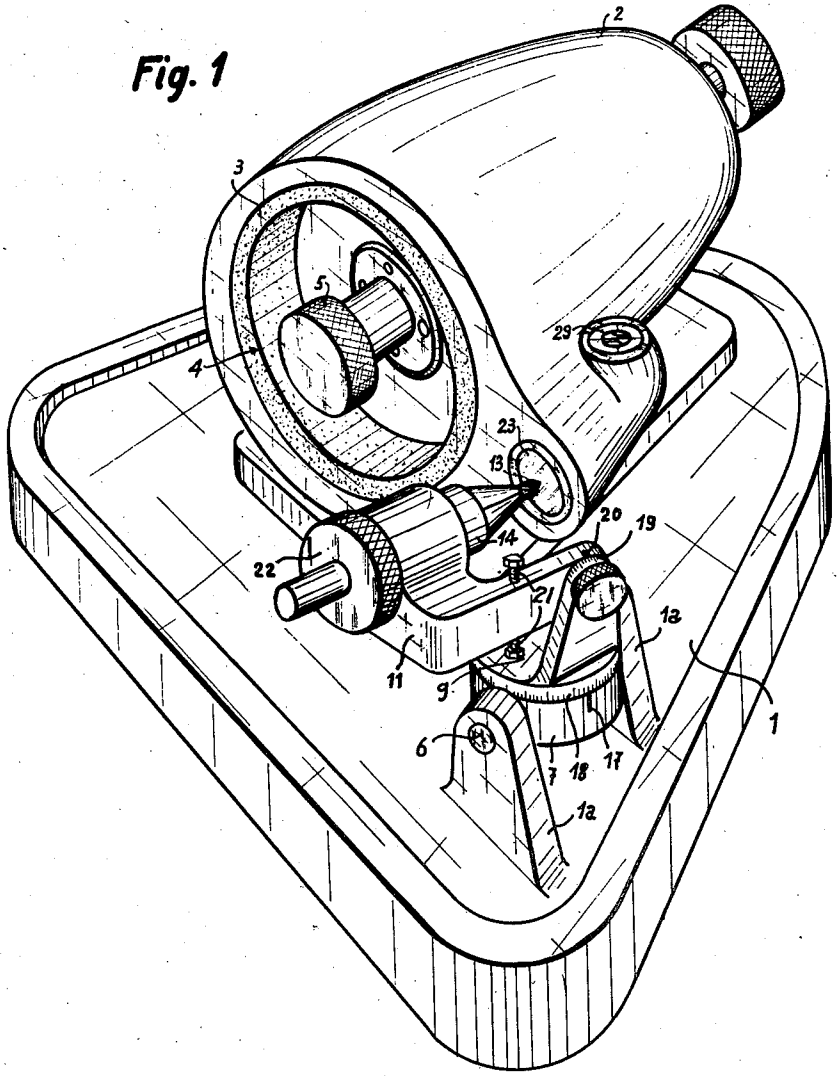
April 12, 1960 A. TATAR 2,932,135

MACHINE FOR SHARPENING FOUR-FACE DRILLS

Filed Dec. 13, 1957 2 Sheets-Sheet 1

Fig. 1



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MACHINE FOR SHARPENING FOUR-FACE DRILLS

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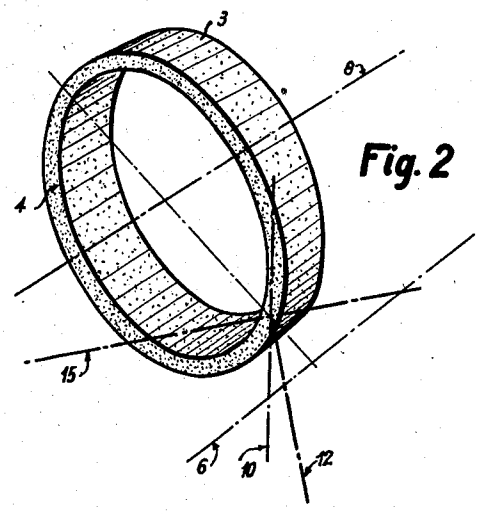


Fig. 2

Fig. 3

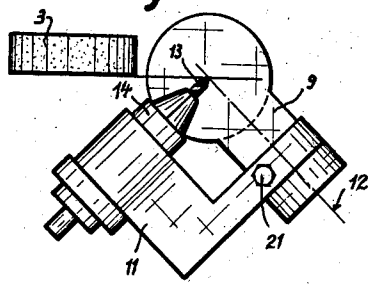
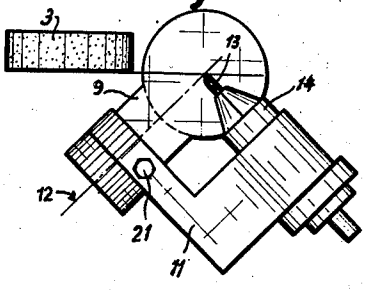


Fig. 4



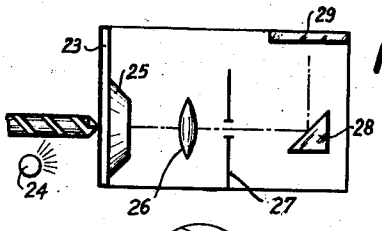


Fig. 5

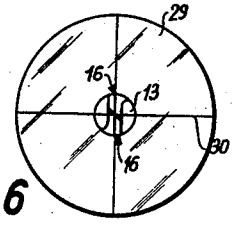
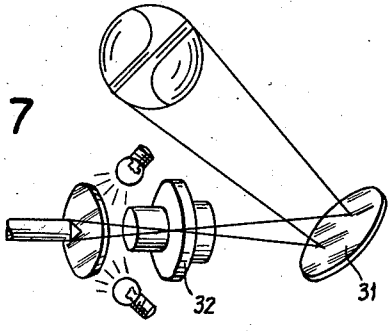


Fig. 6

Fig. 7



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2,932,135

MACHINE FOR SHARPENING FOUR-FACE DRILLS

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Application December 13, 1957, Serial No. 702,601

Claims priority, application Switzerland December 18, 1956

7 Claims. (Cl. 51—165)

The present invention relates to a machine for sharpening four-face drills, which comprises a grinding wheel and a drill-carrying support articulated in such manner that the drill can be displaced opposite the grinding wheel and can be brought into the various positions in which its different faces can be ground.

This machine is characterised by an abutment which is situated in the working plane of the grinding wheel and against which the drill is brought with a view to determining its axial position, and by an optical device intended to collect the image of the drill bearing against the said abutment, the latter being transparent, and to project this image within the view of the operator, this device comprising more particularly a reticle permitting the operator to bring the drill into a specific angular position, the whole arrangement being such as to permit the axial and angular positions of the drill to be adjusted when it has already been placed on its support, and the drill to be checked after the grinding operations have been carried out.

One form of embodiment of the subject of the invention and a variation are illustrated by way of example in the accompanying drawings.

Figure 1 is a perspective schematic view of the machine.

Figure 2 is a perspective view of a grinding wheel itself, in which various working axes of the machine have been indicated.

Figure 3 is a diagrammatic view in plan of part of the machine, adjusted for grinding drills having a right-hand thread.

Figure 4 is a view similar to that of Figure 3 but regulated for grinding drills having a left-hand thread.

Figure 5 is an axial diagrammatic view of the optical device of the machine,

Figure 6 is a plan view of the screen on which the enlarged image of the drill is projected, and

Figure 7 is a diagrammatic view of a variation of the optical device.

The machine illustrated comprises a frame **1** on which is fixed an electric motor **2** driving a grinding wheel **3** whose working plane is designated as **4**. The axial position of the grinding wheel on the shaft of the motor can be adjusted by means of an adjusting screw **5**. The frame **1** comprises two lugs **1a** between which there is articulated, about a pin **6**, a drum **7** belonging to the drill support. The pin **6** is parallel to the axis of the grinding wheel, designated as **8** in Figure 2, and consequently perpendicular to the working plane **4**. The support of the drill comprises also an L-shaped piece **9** which is rotatably mounted at one of its arms on the drum **7**. This piece **9** is also capable of turning about an axis **10** (Figure 2) situated in the working plane **4** of the grinding wheel. The drill support also comprises a second L-shaped piece designated as **11**, which is articulated at one of its arms on the piece **9** about an axis **12** perpendicular to the axis **10**. The drill **13** is gripped by a

clamp **14** which is fixed on the second arm of the piece **11**, the axis **15** (Figure 2) of the drill being then perpendicular to the axis **12**. The clamp **14** does not form part of the present invention and therefore has not been illustrated in detail. It is sufficient to indicate that it comprises on the one hand a mandrel gripping the body of the drill and on the other hand two elastic jaws gripping the drill in the immediate vicinity of its end at two points **16** (Figure 6) diametrically opposite one another, situated on the lips of the drill, that is to say at two points where the drill is ground with great precision, thus ensuring its perfect centering.

The drum **7** carries a mark **17** opposite which moves a graduation **18** on the piece **9**, making it possible to determine the exact relative position of these two members. A locking mechanism (not shown) makes it possible for one member to be locked relatively to the other. Furthermore the piece **9** has a graduation **19** opposite which moves a mark **20** carried by the piece **11**, which also makes it possible to determine their relative position. The piece **11** carries two adjustable abutting screws **21** which limit its rocking movements relatively to the piece **9**. Finally, the clamp **14** of the drill **13** is mounted on the piece **11** of the drill support in such manner that its axial and angular positions can be regulated and then locked by means of an adjusting screw **22**. It is also possible to release the clamp easily in order to allow it to turn on itself through 180°.

The machine is regulated by modifying the relative positions of the various parts of the drill support; by rotating the L-shaped piece **9** relatively to the drum **7** about the axis **10** situated in the working plane of the grinding wheel, the angle of the drill point is modified. On the other hand, by rotating the L-shaped piece **11** relatively to the piece **9** on the axis **12** perpendicular to the axis **10** and to the axis **15** of the drill, the cutting angle and clearance angle of the drill are modified. In one of the positions of the piece **11** bearing against one of the abutting screws **21**, one of the two faces—tool face and back edge—of the drill is ground whereas in the other position, wherein the piece **11** is bearing against the other abutting screw **21**, the other face is ground. The position of said abutting screws is adjustable whereby the dihedral angle formed by the tool face and back edge of a drill can also be regulated. In order to grind the second pair of faces of the drill, it is necessary to cause the clamp **14** carrying the drill to rotate on itself through 180°. Thus the complete grinding of a drill is carried out in four passes, obtained by rocking the whole support about its pin **6** whereby it is articulated on the frame; the two first passes are effected in a given angular position of the clamp **14**, each in two different positions of the piece **11** relatively to the piece **9**, and the two other passes after having caused the clamp to rotate through 180°, in the two same positions of the piece **11** relatively to the piece **9**.

It is indispensable that the initial position of the drill be exactly determined in the axial and angular senses. To this end, the machine comprises a transparent plate **23** (Figures 1 and 5), which is situated in the working plane **4** of the grinding wheel and against which the drill **13** is made to abut when it is positioned with its clamp **14** on the support. The end of the drill is illuminated indirectly by a light source **24** (Figure 5) which is not illustrated in Figure 1 and whose rays are reflected by a frustoconical mirror **25** onto the drill. The mirror **25** could be dispensed with and the light source or sources could be arranged inside the frame of the machine behind the transparent plate **23**. An optical device, comprising a lens **26**, a diaphragm **27** and a prism **28**, projects the enlarged image of the drill on a mat screen **29** (Figures 5 and 6). This screen carries a reticle **30** by means of

which it is possible to adjust the angular position of the drill until its central edge coincides with one of the lines of the said reticle, as shown in Figure 6. The drill is then locked on its support, its angular and axial positions being thus correct. The optical device enables moreover to check the drill after the grinding operations have been carried out.

The optical device incorporated in the frame of the motor **2** of the grinding wheel could be of a different type (Fig. 7): lighting could be from behind; the prism **28** could also be replaced by a mirror **31**. In this latter case, the mat screen could be dispensed with and observation could be carried out by means of an eye-piece **32** provided with a magnifying glass, directly onto the said mirror. The latter, and also the abutment plate **23**, could then carry the reticle.

It should be noted that the machine can equally well be employed for grinding drills having a right-hand thread and also drills having a left-hand thread. To change over from one to the other there is no need for any dismantling or for replacing one part of the machine by another. As will be seen from Figures 3 and 4 wherein the machine has been illustrated diagrammatically for grinding right-hand thread drills and left-hand thread drills respectively, it is sufficient to rotate the piece **9** on the drum **7** through an angle of 90° and to cause the piece **11** to rotate on the piece **9** through an angle of 180° in order to change over from one type of drill to another.

The advantages of the machine described and illustrated are many: its various elements form a compact whole, free from vibration, and having no overhanging parts detrimental to precision of working. It permits rapid adjustment of the point angle, the cutting angle and clearance angle, so that the drills can be ground in accordance with the characteristics of the work to be effected. It is easy to manage and does not require any specially trained personnel. In this respect, the optical device greatly facilitates the initial positioning of the drill and reduces the risks of error more particularly since the angular and axial positions of the drill are regulated when it is already in position on the support. Finally, good visibility of working operations is ensured whatever the face of the drill being worked, and this applies equally well to drills with a left-hand thread and to drills having a right-hand thread.

What I claim is:

1. In a machine for grinding four-face drills, comprising a frame, a grinding wheel and a drill-carrying support rockably mounted on said frame, around an axis parallel to the axis of the grinding wheel, so that the drill can be displaced opposite the grinding wheel and can be brought into various positions which permit its various faces to be ground, a transparent abutment which is situated in the working plane of the grinding wheel and against which the drill is brought with a view to determining its axial position, an optical device which is intended to collect the image of the drill made to bear against the said abutment and to transfer this image to within the operator's view, and a reticle in said optical device permitting the operator to bring the drill into a predetermined angular position, the whole in such manner as to permit the axial and angular position of the drill to be regulated when it is already in position on its support, ready for being ground, and the drill to be checked after the grinding operations have been carried out.

2. In a machine as claimed in claim 1, the feature that the optical device is such that it presents to the operator an enlarged image of the end of the drill.

3. In a machine as claimed in claim 1, a mat screen in said optical device on which the image of the point of the drill is projected.

4. In a machine as claimed in claim 1, a mirror and an eye-piece in said optical device, said eye-piece enabling to observe the image of the drill reflected by said mirror.

5. In a machine as claimed in claim 1, the feature that the axis of the optical device is refracted.

6. In a machine as claimed in claim 1, a light source in said optical device, said light source illuminating the end of the drill.

7. In a machine as claimed in claim 1, a light source and a frustoconical mirror in said optical device, said frustoconical mirror reflecting on to the end of the drill the rays of said light source which thus indirectly light up the end of the drill.

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