No. 777,247. PATENTED DEC. 13, 1904.

J. J. DAHL.

MACHINE FOR SHARPENING TWIST DRILLS.

APPLICATION FILED APR. 7, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

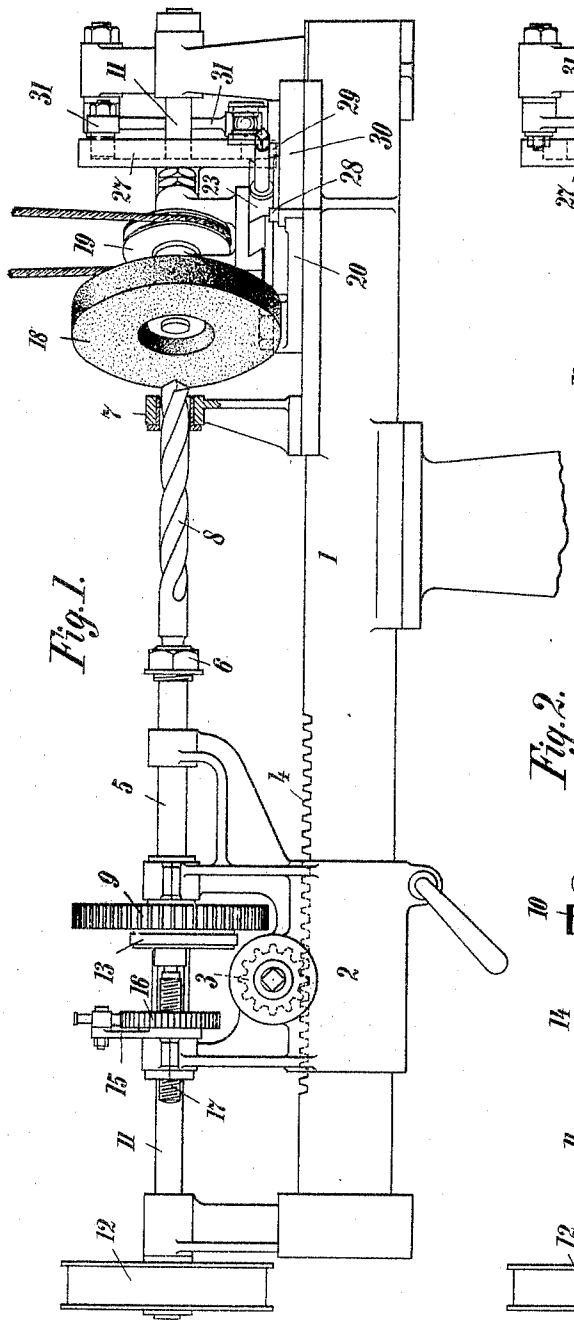


Fig. 1.

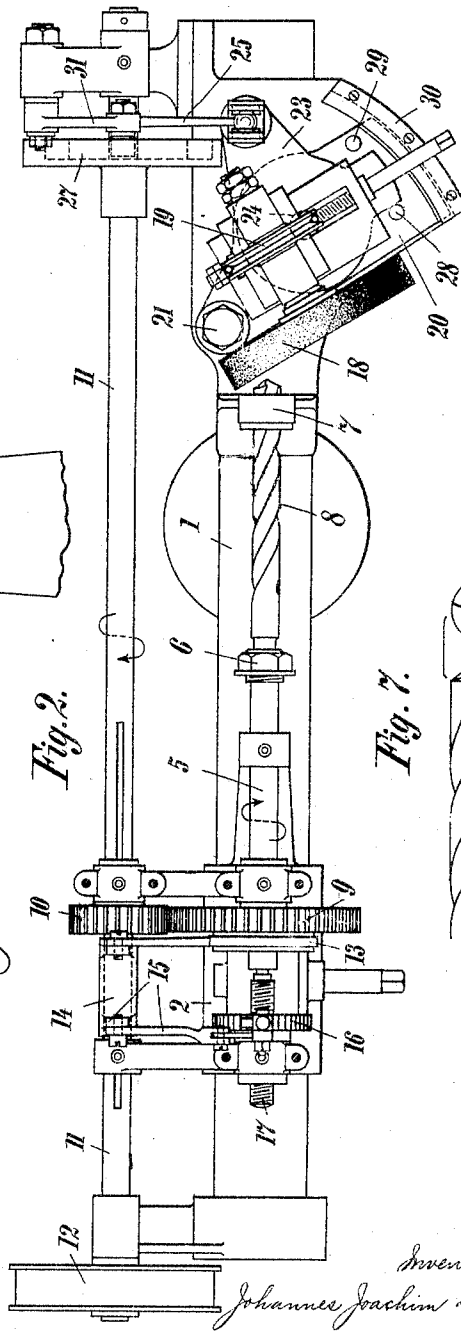


Fig. 2.



Fig. 7.

Witnesses:
B. Hoberg
A. Sommers

Inventor.
Johannes Joachim Dahl.
by Henry Orth & Co.
Attys.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

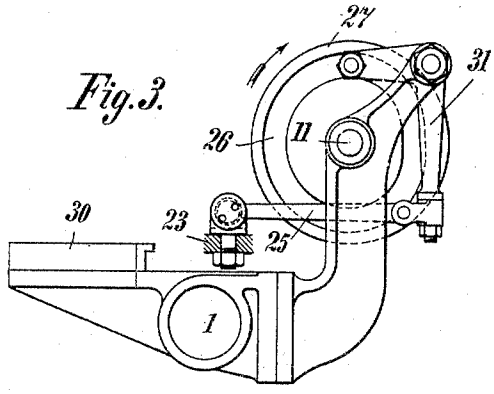


Fig. 4.

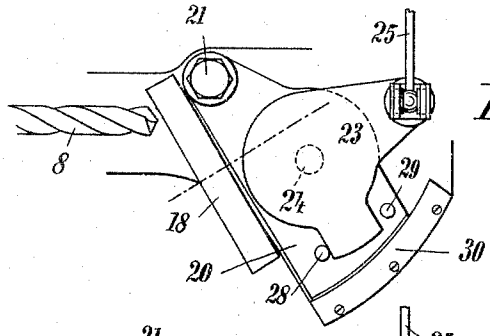


Fig. 5.

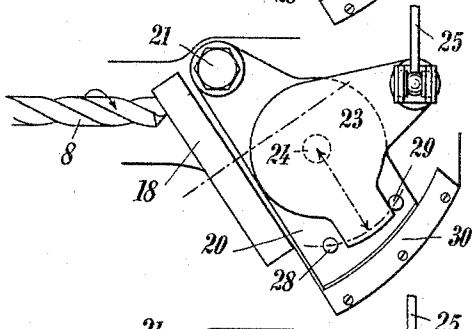
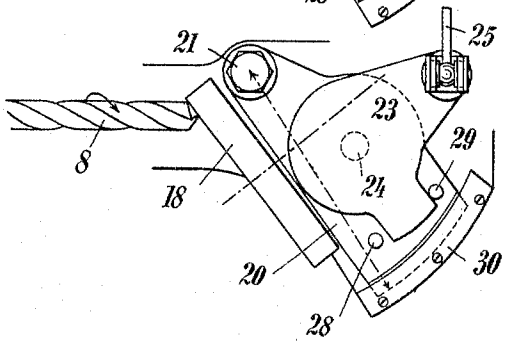


Fig. 6.



Witnesses:
R. F. Ober.
B. W. Sommers

Inventor.
Johannes Joachim Dahl.
by Henry Orth & Son
Attys.

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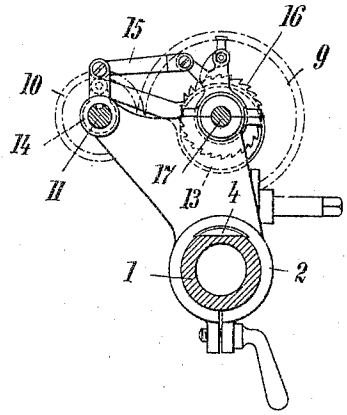
J. J. DAHL.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 8.



Witnesses:
E. F. Ober.
A. Lommers

Inventor.
Johannes Joachim Dahl.
by Henry Orth & Co.
Attys.

No. 777,247. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

JOHANNES JOACHIM DAHL, OF GROSS-FLOTTBECK, GERMANY.

MACHINE FOR SHARPENING TWIST-DRILLS.

SPECIFICATION forming part of Letters Patent No. 777,247, dated December 13, 1904.

Application filed April 7, 1904. Serial No. 202,117. (No model.)

To all whom it may concern:

Be it known that I, JOHANNES JOACHIM DAHL, a citizen of Hamburg, in the German Empire, residing at Gross-Flottbeck, in the Province of Schleswig-Holstein, German Empire, have invented a new and useful Machine for Sharpening Twist-Drills, of which the following is a specification.

My invention relates to improvements in machines for sharpening twist-drills, in which a rapidly-rotating grinding-disk operates in conjunction with a continuous-rotating drill while it is successively positioned at various angles with respect to the axis of the drill.

There are already known machines for sharpening twist-drills, in which there is imparted to the drill not only a rotary motion around its axis, but also a reciprocatory motion in axial direction and an oscillatory movement around its point, which is applied against the face of the grinding-disk, this oscillatory motion being such that the backing off of the cutting portion, as well as the sharpening of the point of the drill, is effected. With this collective movement of the drill it does not follow as a casual necessity that there be produced conical sharpened faces, the apex of which cones coincides with the axis of the drill, but rather it is very likely that the apex will be somewhat eccentric.

The object of the present invention is to overcome this objection, for which purpose the drill only receives a uniform rotation around its longitudinal axis, and the rotating grinding-disk is presented successively at various angles against the point of the drill, so that the movements of the grinding-disk effect the formation of the point and the backing off of the cutting edges.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, Fig. 2 a plan, and Fig. 3 an end elevation, of the improved machine. Figs. 4 to 6 are plan views showing the grinding-disk and its support in various positions. Fig. 7 illustrates the drill; and Fig. 8 is a cross-section on line 8 8, Fig. 1.

On a tubular bed 1 there is mounted the spindle-stock 2, which may be moved by means of the pinion 3 on the rack or toothed portion 4 of the bed. The spindle 5, which receives in a clamp 6 the rear end of the drill 8, centered at its forward end in a collar-plate 7, is driven through the medium of the gear-wheels 9 and 10 from the shaft 11, actuated by the belt-pulley 12. By means of the eccentric 13 of the sleeve 14, which is thereby set in oscillation, and the ratchet device 15 16 the drill 8 may while in rotation be slowly moved by the screw 17 against the grinding-disk 18, as shown in Figs. 1, 2, and 8. The disk 18 is driven from a rope-pulley 19 and is mounted on a support, the base-plate 20 of which is rotatable around the vertical pivot 21, while the plate 23, carrying the bearing of the shaft of the grinding-disk, is rotatable around the pivot 24. The plate 23 is by means of the link 25 connected to a bell-crank lever 31, pivoted to stationary suspending means, which lever 31 is in operative engagement with the cam-groove 26 on the cam 27, mounted on the shaft 11, as shown in Fig. 3. The movement of the plate 23 is limited by the stops 28 and 29.

In the operation of the machine the drill after being positioned in the clamp and in the collar is by means of the pinion 3 and the rack led against the grinding-disk at the moment when the latter is in the position shown in Fig. 4, or before starting the machine the disk is placed in this position. It is assumed that a double-threaded drill, Fig. 7, is being sharpened, and in this case the gear-wheels 9 and 10 are in the ratio of two to one. In the case of a triple-threaded drill the ratio three to one would be taken. When the machine is set in motion, the cam-path 26, one-half of which is concentric with the axis, is in such position that the grinding-disk first passes from the position shown in Fig. 4 to that in Fig. 5—that is, is pressed against the drill, which is by means of the ratchet mechanism 14 15 moved gradually against the disk. At this point the cam produces only rotation of the upper support 23 around the pivot 24, which rotation continues until the plate strikes against the stop-pin 29. During this time the drill has rotated so far that one-half of

the conical surface (between the two helical grooves) has been treated. When the plate 23 strikes against the pin 29, the plate 20 now begins to turn around the pivot 21, which rotary movement did not previously take place, because the plate 23 turns much more readily than the plate 20, which offers considerable friction in its bearing in the guide 30. By means of this rotation around the pivot 21 the grinding-disk is presented at a different angle against the drill, and thereby the edge of that thread now being presented is backed off or beveled. From the commencement of the operation the drill has been rotated through ninety degrees, the cam through one hundred and eighty degrees, and the bell-crank lever 31 has assumed the position indicated in Fig. 3. The pin on the said lever now engages the concentric part of the cam-path 26, so that no movement of the bell-crank lever or the link 25 takes place during the next half-rotation of the cam, while during the quarter-turn of the drill corresponding thereto the end presented to the grinding-disk passes over one helical groove; but shortly before entering this phase, by means of the corresponding formation of the part of the cam preceding the concentric part, the support is again turned round and brought to the position shown in Fig. 4. The position shown in Fig. 6 is maintained only for a very short period. During the next half-rotation of the drill the cam makes a complete rotation and the movements of the support are repeated, so that now the other half of the drill-point is treated. It is obvious that the sharpening of the point is not completed after one rotation of the drill; but when the point is ground as above described a number of rotations are necessary, the drill being moved gradually against the grinding-disk.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine of the character described, the combination with a drill-holding device, of a grinding element, and means for automatically positioning said element at different angles to the axis of the drill.

2. In a machine of the character described, the combination with a drill-holding device, of means for rotating the same, a grinding element, and means for successively positioning said element at various angles to the axis of the drill.

3. In a machine for sharpening twist-drills, the combination with a drill-holder, of means for imparting a continuous and uniform rotation thereto, a rotary grinding-disk, and means for successively positioning the disk at various angles to the axis of the drill.

4. In a machine for sharpening twist-drills, the combination with a drill-holder, of mechanism for imparting a continuous and uniform rotation thereto, a grinding element and means operated by the rotating mechanism for successively positioning the grinding element at various angles to the axis of the drill.

5. In a machine for sharpening twist-drills, the combination with a drill-holder, of mechanism for imparting a continuous and uniform rotation thereto, means operated by said mechanism for moving the drill longitudinally, a grinding-disk, means for rotating the latter, and mechanism operated by the rotating mechanism for successively positioning the grinding-disk at various angles to the axis of the drill.

6. In a machine for sharpening twist-drills, the combination with a drill-holder, of driving mechanism therefor, a screw on said holder, a ratchet device on said screw, and an eccentric operated by the driving mechanism adapted to operate the ratchet, for the purpose specified.

7. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, the speed of the holder being uniform and inversely proportionate to the number of grooves in the drill.

8. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, a grinding-disk, and mechanism to present the disk to the drill-point a number of times during one revolution of the drill directly proportionate to the number of grooves in the drill.

9. In a machine for sharpening twist-drills, the combination with a drill-holder and a grinding-disk, of means for imparting a continuous rotation to said holder and disk, and means for automatically changing the position of the disk in proportion to the speed of rotation of the drill-holder.

10. In a machine for sharpening twist-drills, the combination with a drill-holder, of mechanism for rotating the same, a rotary grinding-disk, a pivoted support therefor, a rotary cam and means connecting the support and cam, for the purpose specified.

11. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, a rotary grinding-disk, a pivoted support therefor, a cam mounted on the driving-shaft and a link connected to the support adapted to be operated by the cam.

12. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, a rotary grinding-disk, a pivoted support therefor, a pivoted plate carrying the support, a cam on the driving-shaft and a link connected to the support, adapted to be reciprocated by the cam, for the purpose specified.

13. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, a rotary grinding-disk, a pivoted support therefor, a pivoted plate

carrying the support, means for rotating the support, and means for rotating the plate, for the purpose specified.

14. In a machine for sharpening twist-drills, the combination with a driving-shaft, of a drill-holder geared thereto, a grinding-disk, a horizontal shaft therefor, means for rotating the shaft, a pivoted support for said shaft, a pivoted plate carrying the support, a cam on the driving-shaft, a lever operated by the cam, and a link connecting the lever and support, substantially as and for the purpose specified.

15. In a machine for sharpening twist-drills, the combination with a driving-shaft, having a gear mounted thereon, of a drill-holder, a gear thereon in mesh with the aforesaid gear, a screw in contact with the holder, a ratchet to advance the screw, a cam for operating the ratchet carried by the gear on the tool-holder, a grinding-disk, a horizontal shaft therefor, means for rotating the shaft, a pivoted support for said shaft, a pivoted plate carrying the support, a bell-crank lever, a link connecting the lever and support, and a cam on the driving-shaft adapted to reciprocate said lever, substantially as and for the purpose specified.

JOHANNES JOACHIM DAHL.

Witnesses:
MAX KAEMPFF,
E. H. L. MUMMENHOFF.