Feb. 14, 1939. G. B. AMBLER 2,147,227

DRILL SHARPENING MACHINE

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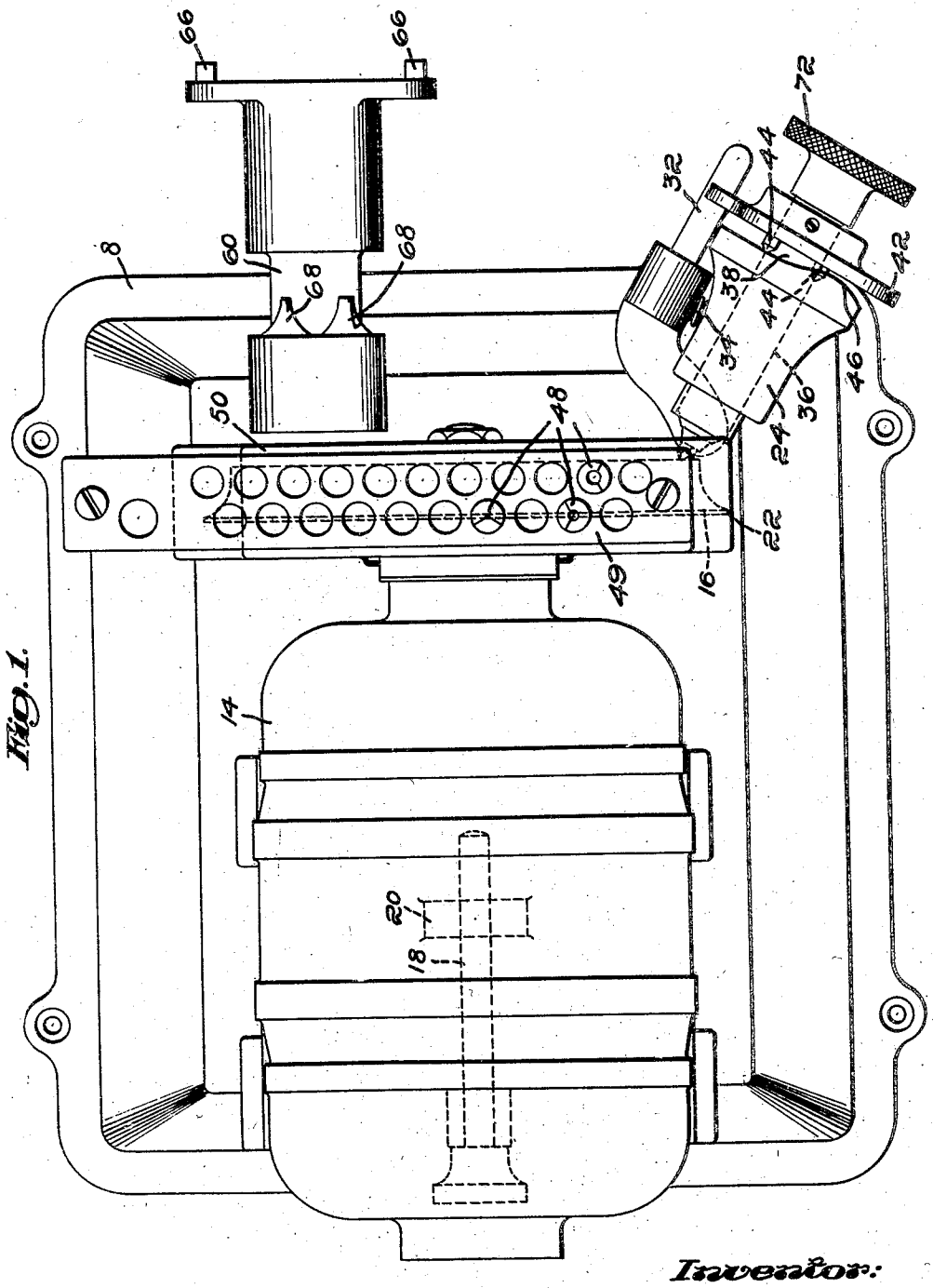

Fig. 1.

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Fig. 2.

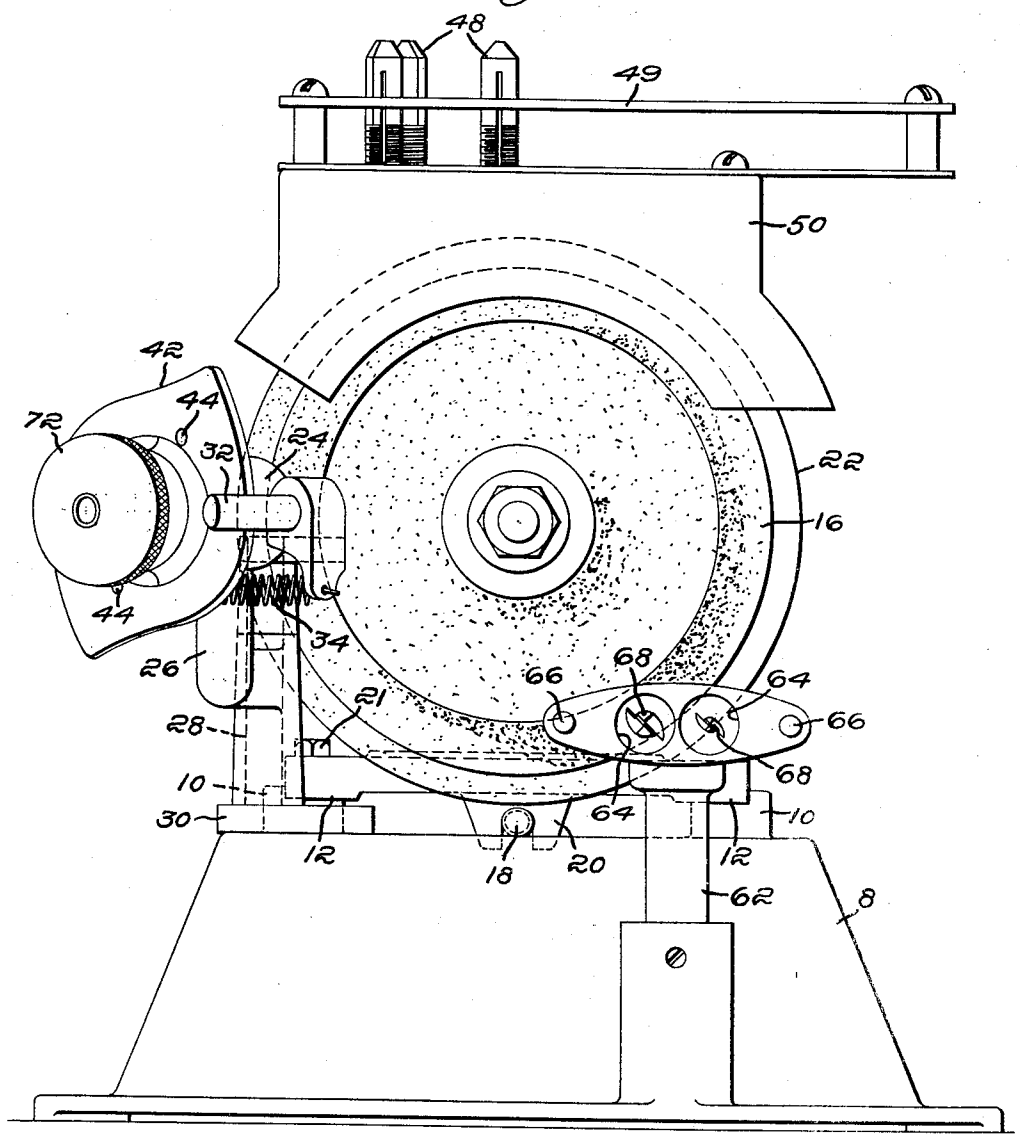

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Fig. 3.

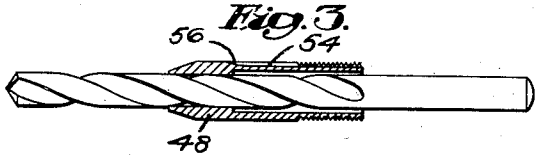


Fig. 4.

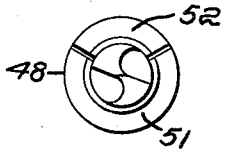


Fig. 5.

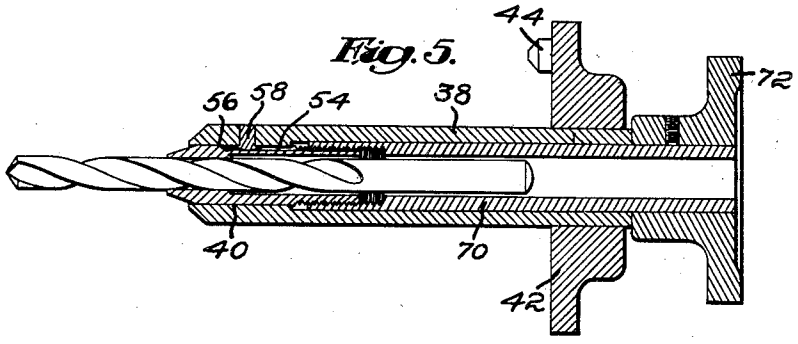


Fig. 6.

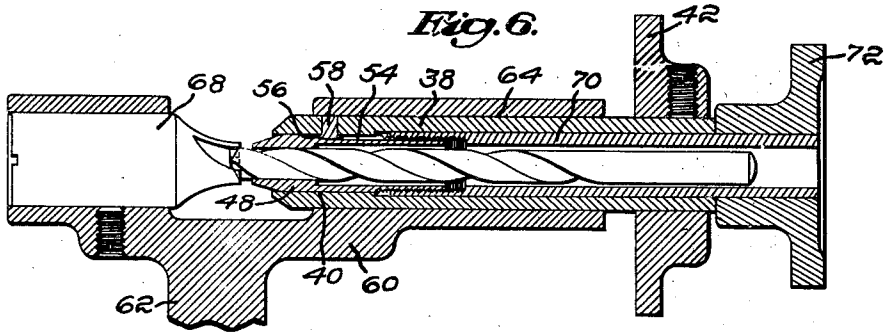
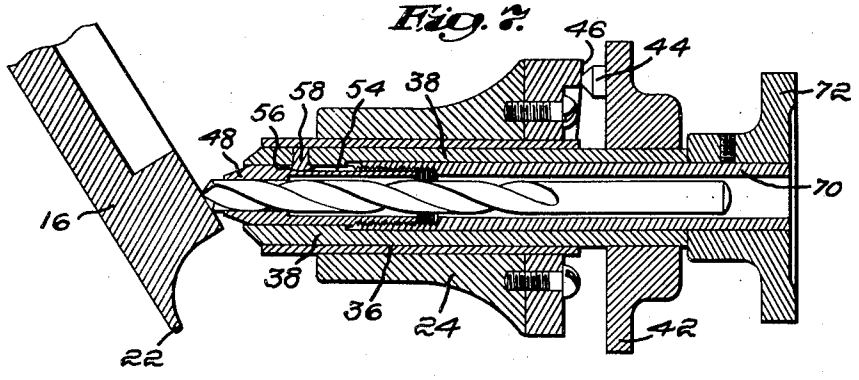


Fig. 7.



Inventor:
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Patented Feb. 14, 1939

2,147,227

UNITED STATES PATENT OFFICE

2,147,227

DRILL SHARPENING MACHINE

George B. Ambler, Natick, Mass., assignor to Black Diamond Saw & Machine Works, Inc., Natick, Mass., a corporation of Maine

Application January 14, 1935, Serial No. 1,655

3 Claims. (Cl. 51—219)

This invention relates to machines for sharpening twist drills and the object is to provide a mechanism simple in construction and convenient in use which will perform the desired work with a high degree of accuracy. It has hitherto been proposed to provide a drill-sharpening machine wherein a holder for the drill is guided in its movement relatively to a grinding wheel to provide for the proper sharpening and shaping of the lips of the drill. My invention contemplates a machine of this general type having features of construction promoting convenience in use and accuracy in result.

My invention will be well understood by reference to the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a plan of the machine;

Fig. 2 is an end elevation as seen from the right of Fig. 1;

Fig. 3 is a section showing a drill to be sharpened inserted in a carrying sleeve;

Fig. 4 is an end view of the same on an enlarged scale;

Fig. 5 is a longitudinal section showing the sleeve and drill of Fig. 3 inserted in a holder;

Fig. 6 is a longitudinal section showing the holder of Fig. 5 inserted in gaging mechanism for properly positioning the drill therein; and

Fig. 7 is a section showing the holder in position in a movable support to position it relative to the grinding wheel.

Referring now more particularly to Figs. 1 and 2 of the drawings, the machine there shown comprises a suitable base 8 having ways 10 receiving the base 12 of an electric motor 14, the rotor shaft of which carries a grinding wheel 16. An adjusting screw 18 (Fig. 1) cooperating with a segmental nut 20 on the bottom of the motor casing provides for longitudinal adjustment of the motor and the wheel. This arrangement provides for initial positioning and for compensating wear of the wheel. In the ordinary use of the machine the wheel 16 revolves in a fixed plane and may be secured by clamping bolts 21, one of which is seen in Fig. 2. Herein the radial face of the wheel 16 is utilized to sharpen the drill but I have shown the wheel as provided with a radially extending portion 22 adjacent its rear radial face providing a narrow peripheral edge which may be utilized for thinning out the webs of the drills when they are shortened by repeated grinding.

The means for holding and guiding the drill while its end is being sharpened comprise a support 24 carried (see Fig. 2) by a bracket arm 26 adapted to swing about a post 28 formed on a base 30 secured to the main base 8 of the machine and so oriented relative to the vertical line passing through the point of contact of the drill and the wheel in use as to provide under the control of the mechanisms hereinafter to be described a proper angle to the cutting lips of the drill, having in view the material in which it is to be used. Also carried by the post and projecting rearwardly at one side of the holder is an arm 32, best seen in Fig. 1, which is adapted to cooperate with the edge cam 42, hereinafter to be described, a spring 34 normally tending to swing the support 24 towards the arm 32. The support 24 is provided with a cylindrical opening 36 therethrough, herein defined by a hardened bush (see Fig. 7) forming a bearing in which the drill holder hereinafter to be described is adapted to slide and turn.

The drill holder, as illustrated in Fig. 5, has a cylindrical body portion 38 adapted to fit the bearing bush 36 and is provided with a longitudinal opening therethrough presenting at least in part an accurate, coaxial, cylindrical bearing 40. This body 38 is adapted to be inserted into the bearing opening 36 of the support 24 from the rear, that is, from the side remote from the wheel 16, as illustrated in Fig. 7. At the outer end of the body there is secured a double-rise edge cam 42, best seen in Fig. 1, which cooperates with the arm 32, and on the forward face of this cam are provided at diametrically opposed points pins 44 which may cooperate with a face cam 46, best seen in Fig. 7, secured to the rear face of the support 24. When the holder is inserted in the support from the rear, as shown in Fig. 7, and pressed forwardly towards the wheel and at the same time rotated, the cooperation of a pin 44 with cam surface 46 will advance the drill towards the wheel while at the same time the cooperation of a rise of the edge cam 42, which is held by the spring 34 towards the fixed arm 32, causes the angular relation of the drill to the face of the wheel to be suitably controlled so that the lip of the drill is properly backed off. One lip of the drill is ground during a half rotation of the holder and the drill is then withdrawn by the action of cam 46 and the other lip is similarly ground by cooperation of the other pin 44 with the cam 46 and of the other rise of cam 42 with arm 32.

A further description of elements of the machine by which an accurate centering of the drill in the holder and an accurate angular positioning of the same relative to the cams which control its motion are provided may perhaps be most readily

understood if I describe the steps of grinding a drill, referring as the description proceeds to the various mechanical parts.

For each size of drill I provide a supporting sleeve 48 and, as best seen in Fig. 2, a supply of these sleeves 48 may be conveniently stored in a suitable rack 49 supported on the guard 50 of the grinding wheel. These sleeves have an exterior cylindrical surface adapted to fit the bearing surface 40 at the interior of the holder 38 and an interior coaxial surface snugly receiving the drill which may be slid into the end thereof as shown in Fig. 3. To maintain the coaxial position of the drill relative to the holder and to provide for the clamping thereof the sleeve may be split for a portion of its length to provide (see Fig. 4) a major segment 51 extending over more than a semi-circumference and therefore serving to accurately position and center the drill and a minor yieldable segment 52 which may be forced inwardly as in the manner hereinafter described to clamp the drill in the support provided by the major segment 51. The sleeve and drill, as shown in Fig. 3, may then be inserted in the forward end of the holder 38 as shown in Fig. 5, the outer surface of the sleeve resting on and being centered by the bearing surface 40. The yieldable segment 52 is provided with a slot 54 having at its forward end the upwardly curving cam surface 56 and into this slot 54 enters a key 58 at the interior of the holder. When the sleeve is positioned in the holder and pushed rearwardly therein by a mere motion of the fingers, the key 58 comes to the end of the flat portion of the slot and the sleeve is positioned in a fixed position longitudinally of the holder while the yieldable segment 52 of the sleeve remains unstressed and the drill can still slide within the sleeve longitudinally of the holder. In the annexed claims by "major segment" I refer to one extending over more than a semi-circumference and by "minor segment" to one extending over less than a semi-circumference.

To position the drill properly both longitudinally and angularly with respect to the controlling cam elements of the holder so that it will be accurately ground I utilize a gaging device, best shown in Figs. 1 and 6. The device here shown is laterally duplicated having a portion for use with the larger drills within the range of the machine and one for the smaller drills, but the description of one mechanism will suffice. The gaging mechanism as a whole is organized on a suitable base 60 herein supported by a post 62 (Fig. 2) from the base of the machine and has a cylindrical opening 64 adapted to receive the exterior cylindrical surface of the drill holder in the manner seen in Fig. 6. At the rear of this opening at a position radially remote from the opening is a pin 66 providing stop surfaces adapted to cooperate with one of the pins 44 on the cam 42. The holder is introduced from the rear into the bearing 64 and pressed forwardly until pin 66 makes contact with the face of cam 42, thus determining its longitudinal position and then turned until pin 44 makes contact with pin 66, thus determining the angular position. Supported in axial alignment with the bearing 64 is a gaging device proper 68 having an end portion formed to engage the point of the drill and the flutes at the point. Thus when the holder is inserted in the gaging device, as shown in Fig. 6, with the drill projecting, as shown in Fig. 5, it is forced rearwardly in the sleeve until it projects only the proper amount and as the holder is turned up to the stop 66 the drill is held by engagement of the gage with the flutes thereof and its angular position relative to the cam elements of the holder is thus determined.

The drill is now clamped in position by pressing inwardly the yieldable segment 52 and herein the sleeve 48 is provided with threads at its rear end with which cooperate threads on a sleeve 70 entering the body 38 from the rear and conveniently provided with a hand wheel 72 at the rear end of the holder as a whole which will also serve as a means for turning the holder in the grinding operation. With the parts in the gaging device as shown in Fig. 6 and sleeve 70 not tightly screwed up, the holder body 38 is held by the engagement of pin 44 with stop 36. Continued rotation of the hand wheel then draws the sleeve 48 rearwardly a fixed distance causing the sloping surface 56 of the slot to ride along the key and forcing yieldable segment 52 against the drill to clamp it in adjusted position against the positioning and centering surface provided by the major segment 50. This is the position of the parts shown in Fig. 6.

The holder with the drill, now clamped in adjusted longitudinal and angular position relative to the cam elements carried by the holder, may then be removed and inserted from the rear into the holder 24, as shown in Fig. 7, and rotation of and inward pressure on the holder by means of hand wheel 72 causes the drill in its accurately determined position therein to be moved by the coordinated movement of the holder in the sleeve 36 by means of the cam couple 44—46 and of the movable support 24 about its pivotal axis under control of the cam couple 42—32 in such manner that the point and lips of the drill are properly reshaped.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive; reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. As a constituent mechanism of a machine of the type described, a drill holder comprising a body having an exterior cylindrical bearing surface free of radial projections at the forward end thereof to provide a bearing extending from the forward end toward the rear of the same, a radially disposed cam at the rear end of the body, a cam follower projecting axially from the front face of the cam, a sleeve for receiving a drill adapted to be centrally positioned in the body split to provide a major segment to receive and center the drill and a yieldable minor segment, means in the body for cooperating with said segment to cause the same to grip the drill and a hand wheel at the rear of the holder operating a screw for actuating said means.

2. As a constituent mechanism of a machine of the type described, the drill holder comprising a hollow body, a sleeve fitting therein and split to provide a major segment to receive and center the drill and a yieldable minor segment, a tapering key-way on the minor segment, means in the body comprising a key entering the slot, means engaging the sleeve to move it longitudinally of the body for clamping the drill and means exposed at the exterior of the holder for operating the said means.

3. As a constituent mechanism of a machine of the type described, the drill holder comprising a body having an exterior cylindrical bearing surface, a radially disposed cam at the rear end of the body, a cam follower projecting axially from the face cam, a sleeve for receiving a drill adapted to be centrally positioned in the body split to provide a major segment to receive and center the drill and a yieldable minor segment, a tapering key-way on the minor segment, means in the body comprising a key entering the slot, a screw engageable with the sleeve to move the same longitudinally and a hand wheel at the rear of the holder for operating the screw.

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