

Aug. 30, 1949.

R. S. THOMPSON

2,480,168

PRECISION SCRIBING INSTRUMENT ATTACHMENT

Filed April 2, 1946

2 Sheets-Sheet 1



INVENTOR
ROBERT S. THOMPSON

BY

William D. Hall
ATTORNEY

ATTORNEY

Aug. 30, 1949.

R. S. THOMPSON

2,480,168

PRECISION SCRIBING INSTRUMENT ATTACHMENT

Filed April 2, 1946

2 Sheets-Sheet 2

FIG. 2

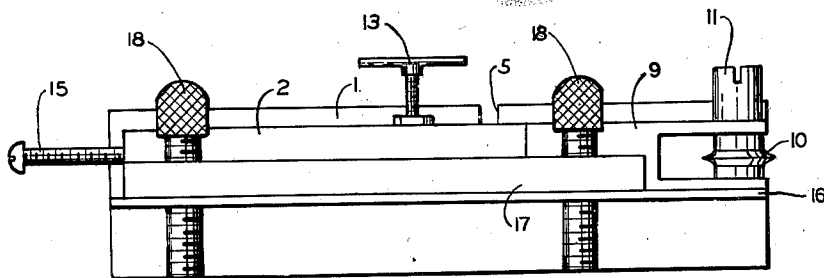


FIG. 3

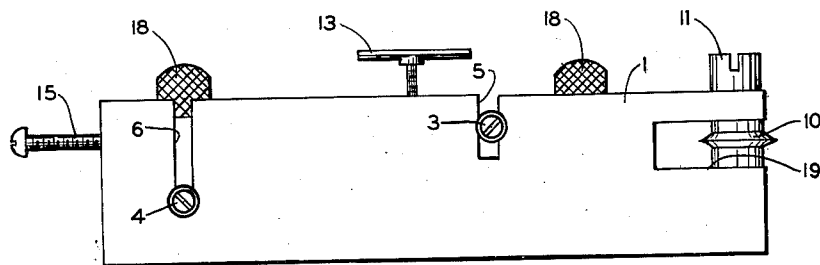


FIG. 4

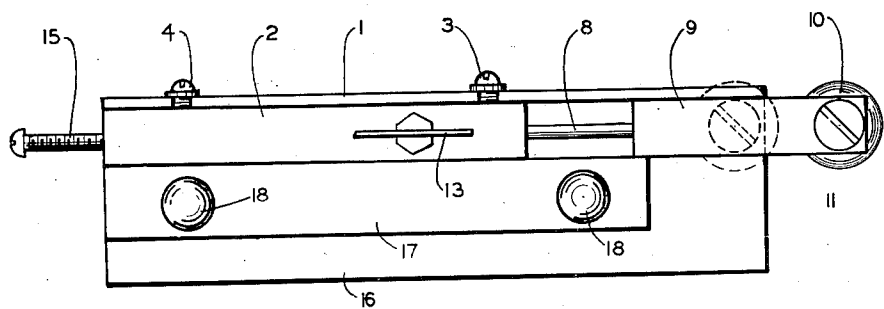
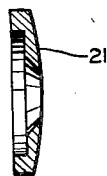


FIG. 9



INVENTOR
ROBERT S. THOMPSON

BY

William D. Hall
ATTORNEY

UNITED STATES PATENT OFFICE

2,480,168

PRECISION SCRIBING INSTRUMENT
ATTACHMENT

Robert S. Thompson, Lexington, Ky.

Application April 2, 1946, Serial No. 658,917

7 Claims. (Cl. 33—32)

(Granted under the act of March 3, 1883, as
amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The invention to be hereinafter described relates a precision scribing instrument attachment.

In the making of optical instruments, as well as in many other fields there is a wide range of uses for precision scribing instruments and attachments requiring a very high degree of accuracy. Among the many may be cited the tools and equipment for making the grooves, cuts or channels for the placing of spider-webs forming the cross hairs in innumerable optical instruments. Unless these webs are extremely accurately placed, the instruments in which they are to be used will be correspondingly faulty. If the metal web-holder of the reticle is not accurately grooved the difficulty of placing the web is greatly increased with resulting increase in defective instruments.

The main objects of the present invention are to avoid the above and other disadvantages and provide a simple efficient, compact, durable, accurate, low cost and very quickly and easily applied and adjusted attachment whereby the grooves in the metal frame of a cross hair holder may be cut with extreme accuracy.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings forming part of the present application. Throughout the several figures of the drawings like reference characters designate the same parts in the different views.

In the drawings:

Fig. 1 is a perspective view of the attachment on a milling machine;

Fig. 2 is an enlarged front elevation of the attachment, with tool fully retracted;

Fig. 3 is a rear elevation;

Fig. 4 is a top plan view; showing in dotted lines the cutter plunger retracted;

Fig. 5 is an end view, looking toward the cutter;

Fig. 6 is a longitudinal cross section through bar 2 and associated parts, with the parts in position of Fig. 2;

Fig. 7 is a front elevation of an unprocessed metal cross hair holder;

Fig. 8 is a like view of a processed one ready to receive the webs;

Fig. 9 is a cross section on line 9—9 of Fig. 7.

The invention has been illustrated and described as used as an attachment on a milling

2

machine on which the metal frames of cross hair holders or reticles are quite generally grooved. While it is particularly applicable to that type of work, it is also applicable to a great many other lines of work and capable of advantageous use in practically any case in which it is desired to make surface cuts, fine grooves or the like with accuracy, relative to a given point or line.

While stainless steel is a preferred material for the attachment, it will be readily understood that any other acceptable material may be used.

Preferably, though not essentially, the attachment is made in several parts detachably connected.

In order to provide a fin or wall by which the attachment may be securely clamped in a vise A, such as is regularly used with and accompanies milling machines, a simple rectangular back plate 1 is provided. Such a vise is mounted on the bed of the milling machine in usual and well-known manner so that it may be screw-fed laterally of the bed across the path of a work piece held in the clutch of the divider head B or other corresponding part of the milling machine. To the back plate 1 is adjustably connected the piston receiving bar 2. Bar 2 is adjustably connected to back plate 1 by screws 3 and 4 playing in notches 5 and 6, respectively. As will be seen, screw 3 is connected near one end to bar 2 near its upper face, while screw 4 is connected to bar 2 near its opposite end and near its lower face. In other words, the two screws are connected to the same face of bar 2 at diagonally opposite points. While the screws play freely in notches 5 and 6 their heads overlap the back plate 1 on the face remote from bar 2. So, by tightening screws 3 and 4, the bar 2 may be clamped immovably to plate 1. Likewise, by loosening one or both said screws, the bar 2 may be tilted in one direction or the other, relatively to back plate 1, and then the screws 3 and 4 again tightened to clamp the bar in such adjusted position on the plate. This, of course, will raise or lower the cutting edge.

Bar 2 is bored longitudinally as at 7 so as to slidably receive the plunger 8 of a forked piston 9 in which is rigidly though removably mounted a knife-edge cutting or scribing disc 10, the set screw 11 passing through one fork, the scribing tool hub and into the opposite fork. Plunger 8, slidably seated in 7 is urged outwardly by compression spring 12. It may be held against outward movement by the lock bolt 13 threaded into the vertical bore 14 in bar 2 which bore intersects bore 7. The force of spring 12 may

be varied by regulating screw 15 turned into the opposite end of bore 7. With plunger 8 in fully retracted position, as in Fig. 2, and screw 15 turned in only far enough to engage it, the spring will not be under compression between screw 15 and the end of plunger 8. Any further inward turning of 15 will correspondingly compress and add to the power of spring 12. This power is, of course, transmitted to the scribing disc 10 so that it cuts correspondingly deeper lines or grooves in the work piece with which it contacts. In order to provide ample clearance for tool 10, in its retracted position, back plate 1, is cut out as at 19.

To the bottom of bar 2 is removably screwed or otherwise attached a bottom plate 16. This plate extends at right angles to the back plate. Also, in assembled relation, the edge of 16 contacts the face of 1 and a lateral cross section through the assembled plates at any point on their length is substantially a T. On plate 16 is removably fixed by screws or the like a second bar 17 which acts as a spacer for bar 2 and a brace and guide for the forked piston 9, being parallel thereto throughout and in light contact therewith. At the same time, this second bar 17 provides material or base and foundation for a pair of levelling adjusting screws 18 which are threaded through bores in 17 and in aligned holes through plate 16. These screws 18, it will be noticed pass through bar 17 at short distances from its opposite ends and project considerably below plate 16. By the use of screws 18, when screws 3 and 4 are loosened, the disc blade 10 of the tool may be moved to any desired operating position.

The operation of the invention in use in a milling machine is as follows:

Place a centering tool in the clutch of divider head B.

Line up the vise A on the bed C so that the plate 1 of the device, when clamped in the vise will place the scribing disc 10 approximately in the horizontal plane of the centering tool in B. Clamp back plate 1 in place, disposing it with its upper edge approximately horizontal. The plunger 8 and forked piston 9 should be locked in retracted position with spring 12 under the desired compression. Screws 3 and 4 should be just tight enough to hold the assembly together. Screws 18 should be adjusted so that both engage the vise directly below. Preferably, they should be adjusted to bring plate 16 to approximately horizontal position and in about the plane of the centering tool. Cutting disc 10 will then also be substantially horizontal. Now loosen set screw 11 to free plunger 8 and disc 10 so that said disc 10 moves close to the tip of the centering tool. Next, tip bar 2 by means of screws 13 longitudinally so that the edge of cutting disc 10 exactly aligns with the tip of the centering tool.

In this alignment a magnifying glass may be used if desired for greater accuracy. After this alignment has been completed and screws 3 and 4 tightened to holding position, the plunger 8 should be fully retracted and locked by set screw 13. With parts thus adjusted, the vise is operated to carry the attachment sufficiently to the rear to permit placing the work piece in the chuck, the set screw 13 is loosened to free plunger 8 and disc 10 and the vise is traveled forward, carrying the disc across the work. In its passage across the work, disc 10 will cut a fine straight line, diametrically across the work piece. The disc 10 is then retracted, the device moved to the

rear again, the work rotated 90 degrees and the operation repeated. Where the metal frame of a reticle is the work piece, the two intersecting grooves 20 provide accurate seats for the spider-web cross hairs. Where the surface is slightly rounded or convex as at 21 instead of perfectly flat, the spring 12 will maintain the blade in continuous contact throughout its travel regardless of the curvature.

The device may be easily, quickly and very accurately set for extremely precise work. By repeated tests it has been found that a line made by above setting checked exactly when the work was rotated 180 degrees, the second cut falling exactly in and accurately matching the first.

It will be noticed that the back plate is in contact with and braces the fork 9 as the tool is fed forward in making the cut. Since the fork and tool project somewhat beyond the adjacent edge of back plate 1 there could be considerable twisting strain thrown on plunger rod 8. However, bar 17 on plate 16, overlapping fork 9 engages and braces it from the front and takes up all strain in that direction. These two engaging surfaces (front and back) prevent any lateral movement of any nature of the tool 10, thoroughly assuring maintained accuracy and precision.

It will be noticed that by the adjustments provided, the lip of disc 10 may be accurately adjusted both as to the horizontal plane of the cutting disc and to offset and tendency to turn or tip about the longitudinal axis of the plunger rod axis 8.

When, after considerable use, the cutting edge may become dulled, the disc may be easily removed by loosening screw 11, resharpened and returned. Or it may be removed, turned to present another part of the edge and remounted. One advantage of the circular edge is that it may be rotated to successively present various portions without delaying to resharpen.

Where other types of machines are used, the work piece should be centered similarly to centering in the divider head and the device of this invention should be mounted in a vise in substantially the same position relative to the work piece and arranged to travel the device in the same way as the vise on the milling machine travels it.

It is needless to state that the attachment also, may be very well used in many operations in which great precision is not required, regardless of the fact that it is of especial value in high precision work.

Many changes may be made in the construction arrangement and disposition of the various parts of the invention within the scope of the appended claims without departing from the field of the invention and it is meant to include all such within this application wherein only one preferred form has been illustrated, purely by way of example and with no thought or intent to, in any degree, limit the invention thereby.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In a precision tool attachment, a supporting back plate, a bar, means to adjustably clamp said bar to said back plate, a piston reciprocally mounted in said bar, a cutting element carried by said piston, a bottom plate carried by said bar, and means carried by said bottom plate for tilting said bar relative to said back plate.

2. In a precision tool attachment, a supporting back plate, a first bar, means to adjustably

5

clamp said bar to said back plate, a piston reciprocally mounted in said first bar and provided with a protruding forked end, a cutting element sustained by said forked end, a bottom plate carried by said first bar, a second bar carried by said bottom plate and bracing said first bar, and means for tilting said first bar relative to said back plate.

3. In a precision tool attachment, a supporting back plate, a piston receiving bar, means to adjustably clamp said bar to said back plate, a piston movably mounted in said bar and carrying a cutting element, means for yieldingly urging said cutting element to operative position, a bottom plate carried by said bar and means carried by said bottom plate for tilting said bar relative to said back plate.

4. In a precision scribing tool attachment, a supporting back plate, a piston receiving bar, means to adjustably clamp said bar to said back plate, a piston movably mounted in said bar and carrying a cutting element, means for yieldingly urging said cutting element to operative position, means for locking said element against movement, a bottom plate carried by said piston receiving bar and means carried by said bottom plate for tilting said bar relative to said back plate.

5. In a precision scribing instrument attachment, a supporting back plate, a piston receiving bar, means to adjustably clamp said bar to said back plate, a piston movably mounted in said bar and carrying a cutting element tool, means for yieldingly urging said cutting element to operative position, means for regulating said urging means, a bottom plate carried by said piston receiving bar and means carried by said bottom plate for tilting said bar relative to said back plate.

6. A precision scribing instrument attachment comprising a first supporting back plate having more than one transverse slot, a piston receiving bar, screw means to adjustably clamp said

6

piston receiving bar to said back plate through said transverse slots, a piston reciprocally mounted in said piston receiving bar, said piston having a protruding yoked end, a cutting tool movably mounted in said yoked end, means for locking said cutting tool against movement, spring means mounted in said piston receiving bar and in contact with said piston for yieldingly urging said cutting tool to an operative position, means mounted to lock said piston against movement, means for regulating said spring means, a bottom plate attached to said piston receiving bar, a bracing bar mounted on said bottom plate to brace said piston laterally and screw means threaded thru said bar and second plate for positioning said cutting tool.

7. A precision scribing tool comprising an elongated first plate provided with at least two transverse slots, a first bar in slidable contact with said first plate and provided with a longitudinal bore, two releasable screws extending through said slots and engaging said first bar to lock said first bar to said first plate in any desired operating position to which it is slid, a piston extending partly into said bore and slidable therein, said piston being in slidable contact with said first plate, a scribing element sustained by said piston, adjustable spring means to urge said piston longitudinally, a second plate secured to said first bar and substantially perpendicular to said first plate and in slidable contact with said piston, a second bar secured to said second plate and substantially parallel to said first plate and in slidable contact with said piston, and two screws substantially parallel to said first plate to support said first bar during slidable adjustment thereof, whereby said first and second plates and said second bar assist in guiding and bracing said piston during operation of said tool.

ROBERT S. THOMPSON.

No references cited.