This invention relates to drill centering guides useful in working with concave, convex or flat surfaces.

An object of this invention is to provide a convenient, economical and practical guide for keeping the drill bit of an electric hand drill perpendicular to the work piece.

A more specific object of this invention is to provide an attachment for a hand drill which includes a head of special construction, the head having a ring from which rails rise, there being guides attached to the drill casing which are operable on the rails together with specially constructed feet arranged on the ring in such a way as to define a drill bit passage and to present versatile work-contacting surfaces.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the attachment applied to a standard hand drill;

Figure 2 is a fragmentary view of a drill showing it in operative relationship to the attachment, the latter being shown in section and in position on the edge of a flat work piece;

Figure 3 is a view similar to Figure 2, but showing the attachment being used on a spherical surface of small radius, alternatively shown in a spherical surface of a larger radius, and thirdly a spherical surface being drilled from the concave side thereof, and finally a flat surface;

Figure 4 is a fragmentary elevation view of the guide attached to the drill casing;

Figure 5 is a sectional view taken substantially on the line 5—5 of Figure 4;

Figure 6 is a transverse section taken substantially on the line 6—6 of Figure 5; and

Figure 7 is a transverse sectional view of the attachment showing it in place upon a cylindrical surface.

In the accompanying drawing there is a standard hand drill 10 having a casing 12, chuck 14 and drill bit 16 carried by the chuck. There are other components and parts of the hand drill 10 however, for the purpose of description of the attachment 18 in its operation, these are the important parts.

Two or more, but preferably three, guides as those at 20 and 22, are secured to the outer surface of casing 12 and they are usually equally spaced. Each guide consists of a U-shaped bracket having legs 23 and 24 in which aligned apertures are formed to accommodate a rail 30. The web 28 of the U-shaped bracket 20 is fastened by screws or other equivalent means to the casing 12 of the drill 10.

For each guide on drill 10 there is a rail. Incasmuch as three rails are found to be adequate, rails 30, 31 and 32 are illustrated in Figure 1, the rails 30 and 32 being disposed in the aligned apertures of guides 20 and 22, respectively, while the rail 34 is disposed in the unshown guide. Although each rail has a longitudinal slot in it in which to accommodate a manually releasable, resilient device for limiting the sliding movement of the guides with respect to the rails, one, two or three such devices may be used depending upon the strength obtainable from one device. In this regard attention is invited to Figures 4—6 where the shown resilient means consists of a spring wire 34 having one end fashioned with a hook that is held fixed by means of screw 36 to the guide 20. The main body portion of the spring wire is disposed in slot 38 of rail 30 and is not separable therefrom unless consciously removed by pressing the outwardly extending handle portion 40 of the spring wire in such direction as to remove the main body portion thereof from its captive position in the slot 38.

At the lower ends of the rails 30, 31, and 32 there is a positioning head consisting of a ring 42 having feet 43, 44, 45 and 46 connected thereto and on one surface thereof. The upper surface, as viewed in Figure 1, of ring 42 is planar, and the upper edges of each of the feet are parallel thereto. The inner ends of the generally wedge-shaped feet 43, 44, 45 and 46 are spaced from each other in order to define a drill bit passage 48 through which the drill bit is adapted to pass in use of the attachment. Additionally, the feet are spaced from each other on arcs of 90 degrees so that they are equally spaced from each other completely around the ring 42. The lower edges 50, 51, 52 and 53, respectively, of the feet are angularly inclined upwardly from the larger outer ends of the feet to the smaller inner ends at the edges of the drill passage 48. In addition, the ends of said bottom surfaces 50, 51, 52 and 53, are rounded in order to provide better work contacting means.

Attention is invited to Figure 2 showing one use of the invention. Incasmuch as the rails 30, 31, and 32 are threaded in apertures provided in the ring 42 which extend completely therethrough, the rails are readily removable for attachment to the opposite surface of ring 42 as is the case in Figure 2. When drilling through flat surfaces, as one surface of the metal plate 72, and near the edge thereof, it is recommended that the positioning head be used as disclosed in Figure 2. Then, the flat surface of ring 42 and the planar upper edges of all of the feet 43, 44, 45 and 46 form a firm, steady seat. When the drill is set into operation it may be pushed downwardly until such time that the drill bit 16 passes through the plate 72. Of course, the same operation prevails if a wooden work piece were used in lieu of the metal plate 72.

In Figure 3 the demonstration is used to show that the concave or convex surfaces of spheres or partial spheres may be drilled easily. When a small sphere 84 is being drilled on the convex surface thereof, the inner rounded edges of each of the feet contact spaced points on the outer surface of the sphere 84. This presents a portion of the sphere in the drill passage 48. When a larger sphere, as at 86, is drilled, the lower surfaces 50, 51, 52 and 53 are brought to rest on convex portion of the sphere. Moreover, in drilling the concave part of a spherical surface 88, the rounded outer corners 90, 91, 92 and 93 come to rest upon spaced parts of the interior of spherical surface 88. This also presents a portion of the surface to be drilled to the drill bit as it moves through the drill bit passage 48. The procedure for drilling flat surface 89 is also shown.

Figure 7 demonstrates the use of the attachment on a convex cylindrical surface 94, as would be found on tubing or pipe. It is suggested that the attachment in this instance be arranged so that two of the feet, for example, feet 43 and 44 straddle the pipe on one side of its longitudinal axis, while the other feet 45 and 46
are on the other side of the pipe axis. In this way the drill attachment serves its intended function.

For drilling a concave cylindrical surface 96, it is contract by rounded corners 90, 91, 92 and 93 of the feet of the attachment.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention claimed.

What is claimed is as new is as follows:

1. For use with a hand drill having a casing, an attachment comprising laterally spaced guides on said casing intermediate the ends thereof, a positioning head adapted to rest upon a work piece, rails separably attached to said head on which said guides are mounted for sliding movement, said rails being interchangeably connected on either side of said head, said head including a supporting ring, a plurality of generally wedge shaped feet secured to said ring at one surface thereof and having upper edges parallel to said ring surface to form with said ring surface a flat base on which the head is adapted to rest, and said feet having outer ends which protrude outwardly of the outer edge of said supporting ring.

2. For use with an electric hand drill having a casing, an attachment comprising laterally spaced guides on said casing intermediate the ends thereof, a positioning head adapted to rest upon a work piece, rails separably attached to said head on which said guides are mounted for sliding movement, said rails being interchangeably connected on either side of said head, said head including a supporting ring, and a plurality of generally wedge shaped feet secured to said ring at one surface thereof and having upper edges parallel to said ring surface to form with said ring surface a flat base on which the head is adapted to rest when said head is used to facilitate drilling certain types of surfaces, said feet spaced ninety degrees from each other on said ring and having their inner ends spaced from each other to define a drill bit guide passage through said head, the lower edges of said feet being in a plane upwardly toward the center line of said passage and the corners at the ends of said lower edges being rounded to form surfaces adapted to contact curved work pieces.

3. The attachment of claim 2 and manually releasable resilient means for opposing the movement of said guides with respect to said rails with equal force throughout the full travel of said guides and said hand drill casing to which said guides are attached.

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