May 8, 1956 K. K. KERR ET AL 2,744,269

PIPE THREADING DIE HEAD ASSEMBLY

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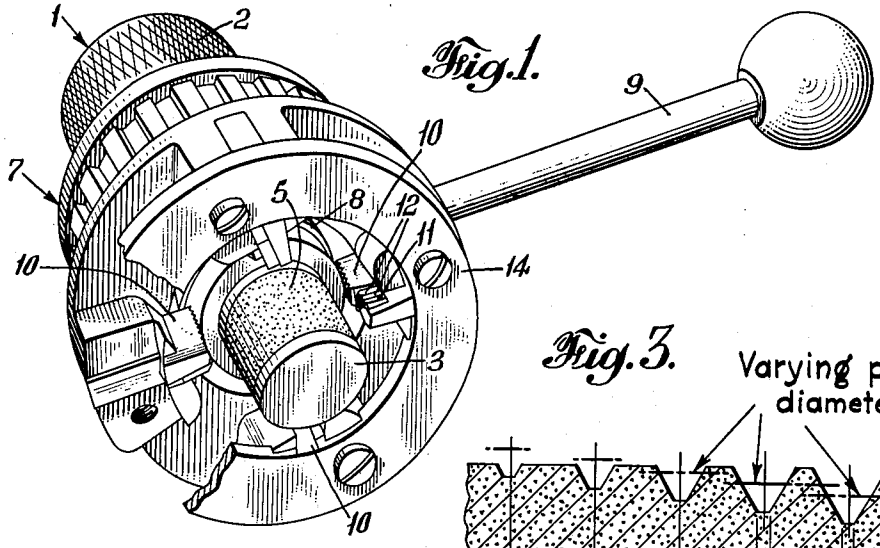


Fig. 1.

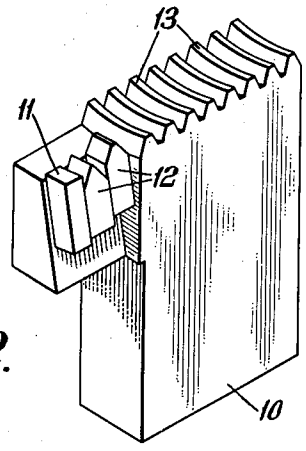


Fig. 2.

Fig. 3.

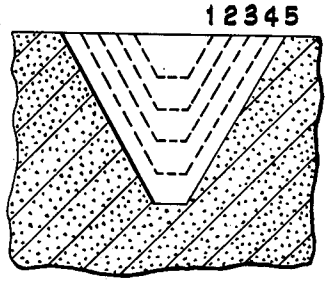


Fig. 4.

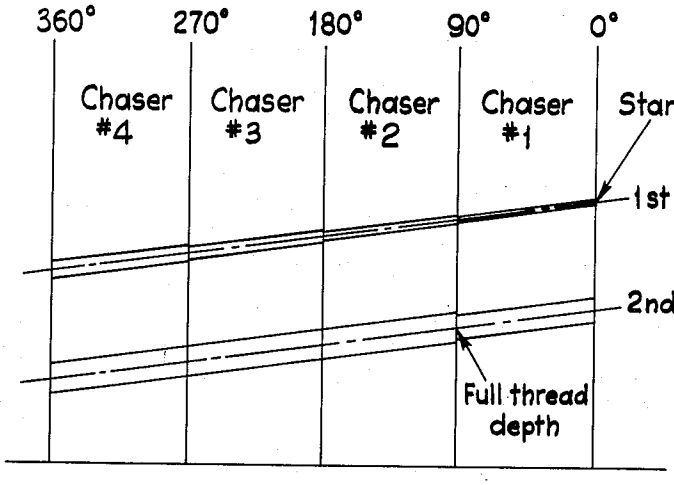


Fig. 5.

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Fig. 6.

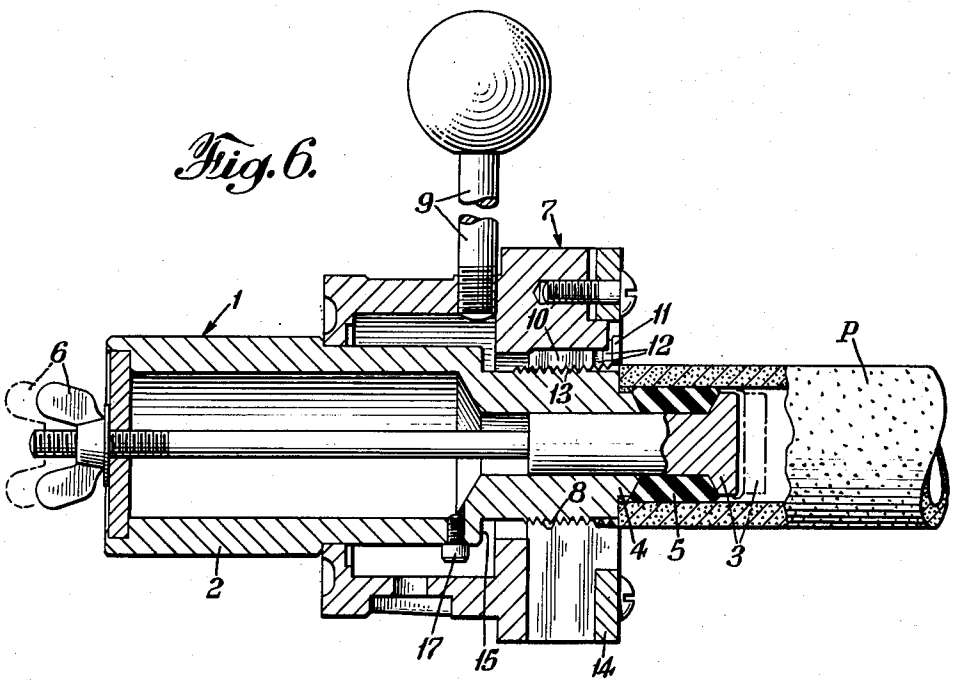
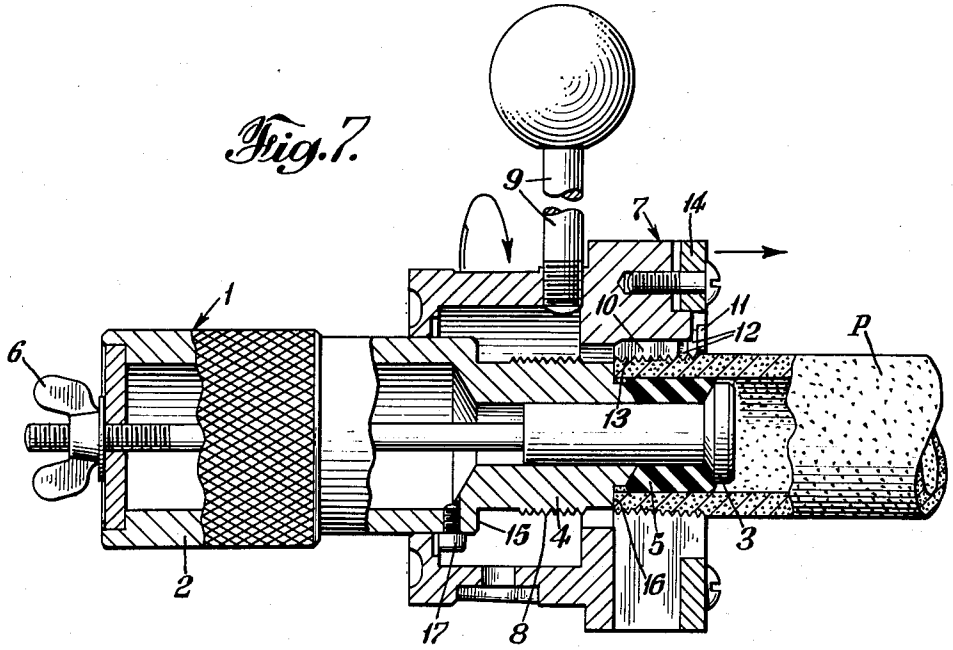


Fig. 7.



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PIPE THREADING DIE HEAD ASSEMBLY

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1 Claim. (Cl. 10—123)

This invention relates to die heads for pipe threading, and, more particularly, to die heads for threading carbon and graphite pipe. Heretofore, pipe threading has been accomplished by use of standard dies wherein the cutting teeth have a constant pitch and pitch diameter. The first few teeth of each chaser of the standard die heads are truncated to form a throat, so that the thread is generated by a series of teeth of the same pitch diameter, each tooth cutting by that amount which it projects inwardly further than the preceding tooth. When such dies are used to thread carbon and graphite pipe the threads generated are scratched, scored and ragged due to the fact that each succeeding tooth cuts deeper without cleaning up any of the thread-surface generated by the preceding tooth.

It is an object of the present invention to provide a die head that will generate threads on pipe without crushing, scratching, or damaging the thread surface.

Another object is to provide a die head that will generate a pipe thread having a gradually stepped runout of decreasing pitch diameter in the region of furthest threading.

A further object is to provide for a die head assembly that will generate pipe threads without requiring an external force to hold the assembly to the pipe once it has been set thereon preparatory to the commencement of the threading operation.

A still further object is to provide a die head that will generate smooth threads on pipe made of highly abrasive material, such as impervious carbon and graphite.

Other objects and advantages of this invention will be apparent during the course of the following description.

In the accompanying drawings:

Fig. 1 is a perspective view of a die head assembly for hand threading embodying the present invention, part being broken away;

Fig. 2 is a perspective view of a chaser removed from the die head of Fig. 1;

Fig. 3 is a partial sectional view of a partly threaded pipe illustrating the effect of variations in cutting tooth pitch diameter;

Fig. 4 is a longitudinal sectional view of a pipe showing the depth and shape of cut obtained by successive cutting teeth of a die head embodying the present invention;

Fig. 5 is a developed view of a pipe thread cut by a die head of the present invention, illustrating the depths of thread generated as the chasers pass over a given section of pipe;

Fig. 6 is a longitudinal sectional view of the hand die head of Fig. 1 with mandrel inserted into a pipe and the expanding arbor securely holding the die head to the pipe in readiness for the commencement of the threading operation;

Fig. 7 is a partial longitudinal sectional view of the hand die head of Fig. 1 and engaged pipe, wherein said die head has completed the threading operation and is in the fully threaded position.

A die head assembly embodying the present invention is shown in Figs. 1, 6 and 7, and comprises a stepped-diameter cylindrical mandrel **1**, having at one end a relatively large diameter knurled handle **2**, a relatively reduced diameter pipe-grasping arbor section **3** at the opposite end, and a threaded section **4** of relatively intermediate diameter between them. The pipe-grasping arbor carries a sleeve of rubber or other suitable material **5** which expands to grasp the internal surface of pipe P as wing nut **6** is tightened causing a retraction of the front plug of mandrel **1**. The hollow cylindrical die head **7** is mounted axially on the mandrel so that the die head moves along mandrel threads **8** as it is rotated. In manual operation this rotation of the head may be accomplished by means of handle **9**. The die head **7** supports four radially-positioned chasers **10** which are set 90 degrees apart around the internal periphery of the die head. Each chaser has a sizing nib **11** for trimming the outside diameter of the pipe as well as two cutting teeth **12** and eight teeth **13** that act as pushers to maintain the proper thread pitch for the cutting teeth as the cutting teeth generate threads on the work. A front plate **14** holds the chasers in the die head.

The chasers are so constructed that the sizing nibs turn down the outside diameter of pipe P to the proper major diameter for threading before the commencement of the threading operation. Then, as the head is further advanced along the mandrel, the first cutting tooth cuts approximately twenty-five per cent full thread depth. Subsequent teeth, following at 90-degree intervals, cut to a progressively greater thread depth with the fifth tooth in sequence cutting to full depth, as shown in Figs. 3, 4, and 5. This means that, when using the embodiment shown in the drawings, full thread depth is attained in one and a quarter turns of the die head after the first tooth has engaged the pipe.

All cutting teeth on the chasers of the die head of the present invention are of full tooth shape but of varying pitch diameters. Of the total of eight cutting teeth on the embodiment of the present invention shown in the drawings, only five actually cut when the die head is new. As these teeth become dull with use and are sharpened, the pitch diameters are increased and teeth six, seven and eight take on work progressively.

In operation, the pipe to be threaded is suitably secured in a vise. Before using the illustrated assembly, the die head **7** is threaded back against the rear shoulder **15** of the mandrel **1**. The arbor section **3** is then inserted into the pipe up to the front shoulder **16** of the mandrel, and, while the knurled handle **2** of the mandrel **1** is held stationary, the wing nut **6** on the end of the knurled handle is tightened. This causes an expansion of the rubber arbor section **3** and securely holds the die head assembly to the pipe, as is shown in Fig. 6.

The actual threading operation is then begun by turning the knobbed handle **9** in a clockwise direction. This is continued until the head **7** contacts stop **17** which resists further turning. When it is desired to generate greater lengths of thread the stop **17** is removed so that the die head **7** may move off mandrel **1** and continue threading the pipe to any desired point. The die head assembly may be removed after the threading operation is completed by backing die head **7** off the pipe with a counterclockwise motion, loosening the wing nut **6** on the handle end of mandrel **1** and removing the mandrel from the pipe.

The thread generated by the die head of the present invention has a gradually stepped runout and not a relief of full depth such as on a standard lathe-chased thread and is, therefore, considerably stronger than a standard lathe-chased thread. When the die head of the present invention is used for threading highly abrasive materials,

such as impervious carbon or graphite pipe, it has been found advantageous to employ nibs and cutting teeth of sintered carbide, silver soldered, brazed, or otherwise secured into position on the chaser.

What is claimed is:

A die head assembly for threading impervious carbon and graphite pipe to any desired length comprising a stepped-diameter cylindrical mandrel having a threaded portion near the rear end thereof, a reduced diameter expandable arbor section at the front end thereof for insertion into said pipe, and means for expanding said arbor section to engage the interior of said pipe; a die head having at least four chasers symmetrically and circumferentially disposed and rigidly secured thereto, and a plurality of pusher teeth on each of said chasers for rotatably engaging said threaded portion of said mandrel; at least one individually-mounted single cutting tooth rigidly secured to each of said chasers and projecting inwardly immediately in advance of said pusher teeth to cut said pipe, there being a total of at least five such

cutting teeth positioned to cut symmetrically to full thread profile and successive cutting teeth arranged to cut progressively deeper whereby a thread of full depth is developed on said pipe in less than one-and-one-half revolutions of said die head; said die head pusher teeth having the same pitch as said cutting teeth and a pitch diameter equal to the pitch diameter of said cutting teeth positioned to cut said pipe to full depth.

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