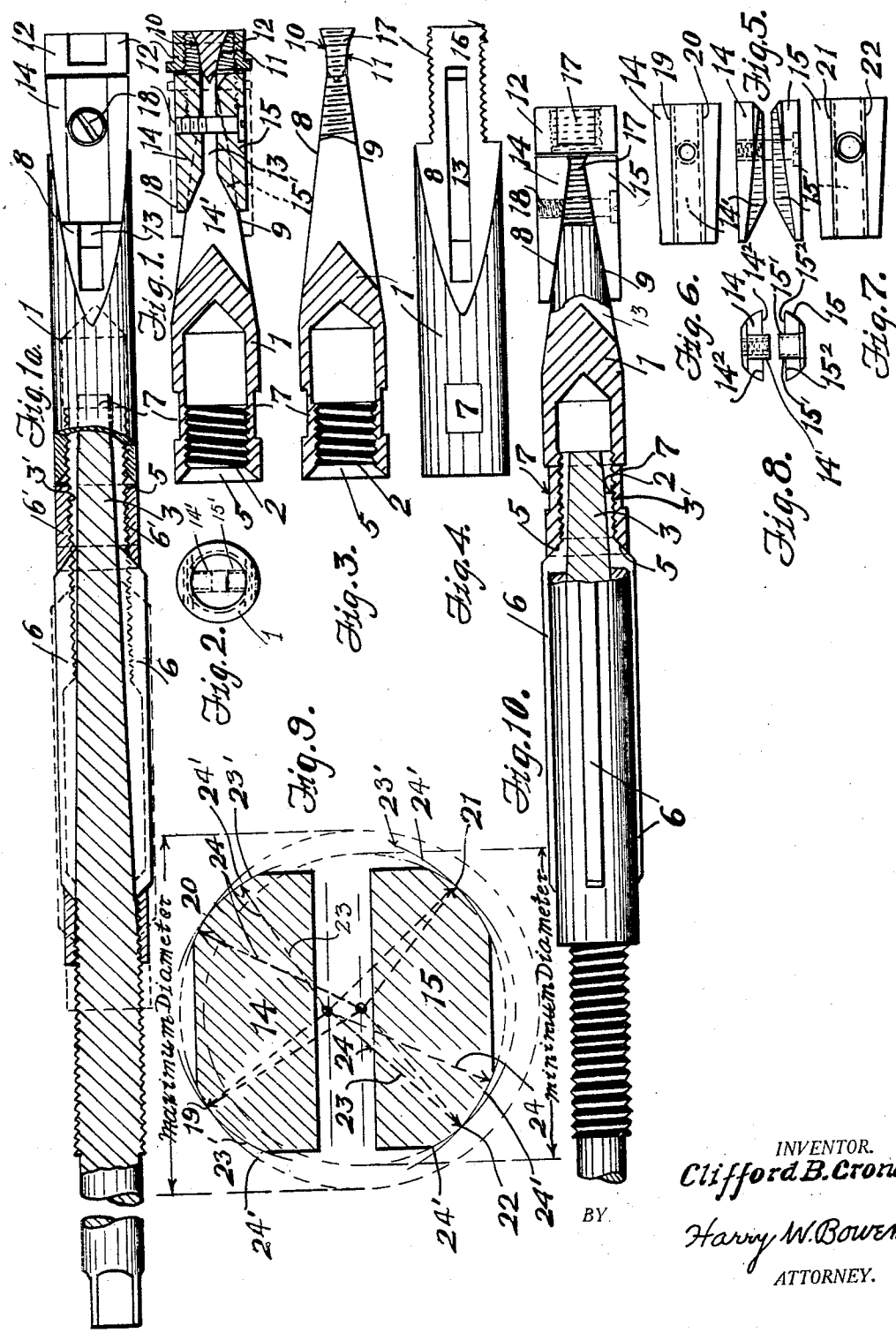
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ADJUSTABLE PILOT FOR REAMERS

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ADJUSTABLE PILOT FOR REAMERS.

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To all whom it may concern:

Be it known that I, CLIFFORD B. CRONAN, a citizen of the United States, and a resident of Shelburne Falls, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Adjustable Pilots for Reamers, of which the following is a specification.

My invention relates to reamer pilots, and has for its object the provision of means whereby a reamer may be guided in concentric alinement with the hole to be reamed and which will be readily adjustable for use in holes of varying diameters, this feature being especially desirable when used in connection with a reamer of the expansion type.

My invention further provides a self contained pilot which can be supplied either in combination with a reamer, or as a separate unit for use with reamers which have previously been provided without a pilot. It is easily attached to a reamer and as easily removed when desired.

My invention is simple in construction, with a minimum number of parts, is easily adjusted and set to precision measurements for any and all diameters desirable within the adjustable range of the reamer with which it is used and when once set in adjusted position it will retain its adjustment.

When used with a reamer of the adjustable blade type my invention can be utilized not only to take the place of the front adjusting nut of the reamer, but can also be used in conjunction with this nut whenever the position of the nut with respect to the reamer body provides sufficient length of thread to engage and support the pilot. When used in this manner a lock-nut condition is provided.

Other incidental objects of my invention will appear in the course of the following description.

My invention is illustrated in the accompanying drawing, in which,

Fig. 1 is a front elevation of my improved reamer pilot detached from the reamer.

Fig. 1ª is a view showing the reamer nut and pilot assembled.

Fig. 2 is an end elevation of Fig. 1.

Fig. 3 is a combination front elevation and sectional view of the body of the reamer pilot.

Fig. 4 is a plan view of the body of the reamer pilot with the blocks removed.

Fig. 5 is a front elevation of both the top and bottom expansion blocks.

Fig. 6 is a plan view of the top expansion block.

Fig. 7 is a bottom view of the bottom expansion block.

Fig. 8 is an end view of both blocks.

Fig. 9 is an enlarged diagram of the two expansion or adjustable blocks illustrating the manner in which the corners of the expansion blocks are shaped in order to provide a smooth sliding engagement between the inner surface of the hole being reamed and the blocks for all positions of adjustment of the pilot, and

Fig. 10 is an assembled view of the reamer and pilot.

In carrying out my invention I employ a body, 1, one end of which is substantially in the form of a hollow cylindrical sleeve, adapted to fit over the body of a reamer and which can be provided with an internal thread 2 for the purpose of forming a threaded connection of the pilot to the body 3 of the reamer.

The open end of the cylindrical sleeve is provided with a bevel 5, inwardly, in order to match and retain in clamped position the adjustable blades 6 of an expansion reamer in the exact manner of the nut 6′ normally used for this purpose.

The outer cylindrical surface of the reamer pilot body is flatted at 7 near its end, as shown, in a manner suitable for providing wrench slots.

The forward end of the cylindrical sleeve portion, of the body of the pilot is tapered down towards the axis of the pilot in the form of a wedge concentric with the axis of the pilot as indicated at 8 and 9, the small end of the wedge terminating in two oppositely disposed and diverging surfaces 10 and 11, this construction serving to strengthen the pilot as well as to provide greater thread area for the securing and adjusting nut 12 and also sufficient stock at the end of the pilot for the drilling of the usual center hole for manufacturing purposes.

A longitudinal slot 13 passes through the body of the wedge and is normal to the inclined surfaces 8 and 9 of the wedge. This

slot provides means for locating and also for controlling the motion of the two slidable expansion blocks 14 and 15 relative to the axis of the wedge, as will be apparent from further description and drawings.

The front end portion 16 of the pilot body is reduced in diameter and threaded a suitable distance from the end to receive the adjusting or clamp-nut 12 for the blocks 14 and 15. This clamp-nut abuts the outer ends of the two expansion and adjustable blocks 14 and 15 and operates in the following manner:

The two expansion blocks, 14 and 15, are mounted on the inclined surfaces 8 and 9 of the wedge and are adapted for longitudinal motion thereon by means of the projecting tenons or ribs 14′ and 15′ which are located in the longitudinal slot 13. A clamping screw 18 seating freely in the block 15 passes through the longitudinal slot 13 in the wedge and is threaded into the other block 14. It serves, in combination with the nut, 12, to firmly clamp the expansion blocks, in any desired longitudinal position along the inclined surfaces 8 and 9 of the wedge, the slot 13 providing freedom of motion of the screw 18 axially of the pilot. It is obvious that by loosening the screw 18, and turning the nut 12, so as to cause it to recede from the end of the pilot the nut will, through contact with the outer abutting ends of the expansion blocks, 14 and 15, cause them to move up the inclined surfaces of the wedge and incidentally to expand or move outward in a direction normal or radial to the axis or center line of the pilot, until prevented from further motion by a tight condition of the binding or securing screw 18. By relative adjustments of both the screw 18 and the nut 12 any desired expansion or radial position of the blocks between minimum and maximum values can be obtained, and the blocks locked in this desired position.

As will be apparent on reference to the drawings, (see Fig. 9) the outer edges or surfaces of the blacks are rounded off in order to secure a smooth sliding contact with the inner surface of a hole being reamed. These blocks provide an alinement bearing in the hole along these lines or edges at points approximately 90 degrees apart for all diameters within the range of the pilot, these bearing lines being indicated at 19, 20, 21, and 22. In order to provide contact surfaces which will not scrape along on the inner surface of the hole, these corner surfaces can be ground in a series of two or more intersecting cylindrical surfaces as desired, as indicated by the radial lines 23 and 24.

The exact manner of producing an edge with two such intersecting cylindrical surfaces is as follows: By setting the blocks in adjusted position for the minimum diameter and then grinding them to this minimum diameter, a single cylindrical surface 23′ is produced on the four edges of the two blocks. The blocks are next adjusted to the maximum diameter position and ground to the maximum diameter. By a study of the diagram, Fig. 9, it will be apparent that this latter cylindrical surface 24′ intersects the first one near the middle points designated at 19, 20, 21 and 22 of each edge of the blocks. The line of intersection of the two cylindrical surfaces forms an edge or line over which micrometer measurements may be taken when two diagonally opposite edges are used, this line of intersection being the contact line on all cylindrical surfaces intermediate between the minimum and maximum diameters to which the surfaces are ground. Furthermore, when the blocks are set for the minimum diameter they will have contact in a hole along the minimum diameter cylindrical surfaces, and when set for the maximum diameter, they will have contact in a hole along the maximum diameter cylindrical surfaces, micrometer readings being taken, of course, in a corresponding manner when setting the blocks in adjusted position for the maximum or minimum dimensions.

It should be particularly observed that the angular distance of the contact lines of the blocks 14 and 15, as indicated by the reference numerals 19 and 20 and, 21 and 22 is approximately 90 degrees. The blocks of the pilot, therefore, have a bearing at four points of contact on the inner surface of a hole being reamed, resulting in the accurate axial alignment of the reamer.

Referring to Fig. 10 it will be observed that the usual nut 6′ is omitted, and, in its place the pilot member 1 is threaded onto threads 3′ with the inwardly inclined surface 5 engaging the inclined front ends of the reamer blades 6, thus retaining these blades in their adjusted positions.

It should be observed also that the flat faces 14^2 and 15^2 adjacent and on opposite sides of the ribs 14′ and 15′ have a bearing on the flat surfaces 8 and 9 of the wedge-shaped part of the pilot member 1.

Fig. 9 is an enlarged sectional detail view of the two blocks clearly showing how the contact surfaces or lines 19, 20, 21, and 22 are generated, or produced.

What I claim is:

1. A reamer pilot for an adjustable or expansion reamer comprising a body having a recess formed in one end which is adapted to receive the advancing or front end of the body part of a reamer, means for securing the pilot to the reamer body, means for securing the advancing or front ends of the adjustable reaming blades of an expansion reamer in contact with the reamer body, the

opposite or forward end of the body of the pilot being tapered in the form of a wedge, expansion guide blocks mounted on and adapted for longitudinal movement along the inclined surfaces of the wedge, means for moving and adjusting the blocks in relation to the wedge, and means for securing the blocks to the wedge.

2. A reamer pilot, comprising a threaded recess portion, a projecting wedge on the forward or front end of the recessed part and in axial alinement therewith, the pilot having inclined surfaces which form a wedge and a longitudinal slot in the inclined surfaces of the wedge, blocks superimposed upon the inclined surfaces of the wedge, said blocks having projecting ribs or tenons engaging the longitudinal slot and permitting the blocks to be moved in a plane containing the axis of the pilot, a screw thread formed at the forward or small end of the wedge-shaped end, an adjusting clamp-nut on said thread and engaging one end of the slidable blocks, means for securing one block to the other and serving, to cooperate with the nut to bind the blocks in any desired position on the wedge-shaped portion and along the axis of the wedge, the slidable expansion blocks having their outer edges suitably curved for smooth slidable engagement in a hole which is being reamed.

3. A reamer pilot of the expanding block type, comprising two expanding blocks, the pilot having wedge-shaped surfaces adapted to receive the expanding blocks for movement thereon and in a plane containing the axis of the pilot, the exterior and alining surfaces of the blocks being in the form of a plurality of intersecting cylindrical surfaces of varying radii for forming a smooth slidable engagement with holes of varying diameters within the adjustable range of the block on the reamer pilot.

4. A pilot for an expansion reamer comprising in combination, a body part formed with a threaded recessed portion, said part having oppositely arranged inclined surfaces constituting a wedge-shaped portion of the pilot, and an opening extending through the wedge-shaped portion, contact blocks formed with ribs which enter the opening, and means for adjustably securing the blocks in different positions on the inclined surfaces.

5. A pilot for an expansion reamer comprising a threaded recessed member which is formed with a wedge-shaped portion, contact blocks for engaging the inner surface of a hole being reamed, means for adjusting the said blocks including an opening in the wedge-shaped part, means passing through the opening for connecting the blocks but permitting the blocks to move on the wedge-shaped portion, and means cooperating with the block connecting means for securing the blocks in their adjusted positions.

CLIFFORD B. CRONAN.