This invention relates to a vernier dial attachment for machine tools. The invention has for an object to provide a novel and improved vernier dial attachment for machine tools for accurately indicating the position of a movable element of the machine tools.

Another object of the invention is to provide a novel and improved vernier dial attachment of the character specified having provision for adjustably stopping the movable element at a predetermined position whereby the movement of the movable element may be indicated for successive pieces of work being worked upon.

With these general objects in view and such others as may hereinafter appear, the invention consists in the vernier dial attachment hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a cross-sectional view of the present vernier dial attachment showing the same applied to a cross slide of a machine tool;

Fig. 2 is a plan view detail of the vernier dial attachment;

Fig. 3 is a front elevation of the same;

Fig. 4 is a front elevation of a modified form of the present vernier dial attachment embodying stop means for terminating movement of the cross slide at a predetermined adjusted position;

Fig. 5 is a cross-sectional view taken on the line 5-5 of Fig. 4;

Fig. 6 is a plan view of the attachment shown in Fig. 4;

Fig. 7 is a cross-sectional detail view taken on the line 7-7 of Fig. 4 showing an adjustable stop clamp; and

Fig. 8 is a detail view of a pivoted stop member as seen from the line 8-8 of Fig. 5.

In general, the present invention contemplates a novel and improved vernier dial attachment for machine tools having a feed screw for advancing or retracting a slide on which a tool is mounted for performing cutting operations upon a piece of work, the dial herein being applied as to the feed screw for the cross slide of a lathe. Some of the lathes now on the market are provided with relatively small diameterials or gauges secured to the feed screw which are graduated in thousandths of an inch and are arranged to coat with a mark on a relatively stationary hub portion extended from the carriage. In practice, such dials are difficult to read because of the relatively small graduations necessitated by the small diameter of the dial.

In accordance with one feature of the invention, the relatively small dial may be replaced by a larger diameter dial secured to the feed screw, and a vernier section is arranged to be secured to the existing extended hub portion of the carriage which forms a bearing for the feed screw. The enlarged diameter of the present dial permits larger graduations in thousandths of an inch, which may be easily read, and the addition of the vernier permits readings in tenths of thousandths of an inch, thus providing a vernier dial attachment for machine tools permitting accurate and easily read measurements.

In a modified form of the invention and as illustrated herein, a plurality of movable and preferably pivoted stop members are provided on the stationary portion of the dial which may be selectively moved for cooperation with adjustable stop clamps provided on the feed screw dial whereby to permit repeat operations to be performed on successive pieces of work with uniform accuracy.
and into the path of the set screws 62 carried by the clamping members 60.

As best shown in Fig. 7, each adjustable clamping member or dog 60 may comprise U-shaped members grooved at a radius such as to fit over the laterally extended rim 58 of the dial, the groove being made of a size such as to also receive a curved wear piece or clamping element 72 against which clamp screws 74 carried by the inner leg of the U may bear to clamp the member in its adjusted position on the rim. The outer leg of the U which extends over the periphery of the dial is provided with a radial lug or extension 76 in which the adjusting screw 62 is carried, the latter being maintained in its adjusted position by a set screw 78. One of the clamp members 60 may be provided with a handle 80, as shown, for rotating the dial.

In operation, the L-shaped stop members 54 are initially in their retracted position rocked out of the path of the set screws 62, and the feed screw 18 may be rotated by the handle 80 to present the tool against the work to be turned, whereupon the vernier disk 50 may be adjusted on its hub 22 to present the zero mark thereon in line with the zero mark on the dial 56. The tool may then be advanced to cut the rotating work by rotating the feed screw the required number of turns to reduce the diameter of the work to the desired amount, as indicated by the reading with relation to the vernier. One of the stop members 50 may now be rocked into operative position to dispose the same over the periphery of the dial, and an adjacent clamping member or dog 60 may then be loosened and radially along the rim 58 until its set screw 62 comes into engagement with the stop member, whereupon the clamp may again be tightened. Critical adjustment may be made by adjusting the set screw 62 in the clamp member 60. Now, the stop member 54 may be rocked to its inoperative position, and the feed screw may be rotated to retract the cross slide and the tool. In practice, the operator may count the number of rotations of the feed screw required to back the tool away from the finished work. Thereafter, when a new piece of stock has been set up in the lathe, and the feed screw 18 is adjusted for repeat operation, the operator may rotate the feed screw to advance the tool toward the work the same number of turns he used to back away from the work, and during the final revolution he may rock the pivotal stop into operative position and then continue rotation of the feed screw until the set screw 62 engages the step 54, thus permitting uniform and accurate repeat operations on successive pieces of work to be performed without further reference to the vernier.

The above description has been confined to a single cutting operation on each piece of work. However, it will be readily seen that the present stop arrangement may be employed with a cross slide provided with a double tool post wherein one tool engages the work when the cross slide is advanced and the other tool engages the work when the cross slide is retracted. Thus, in operation, one of the clamp members 60 may be adjusted relative to a stop member to limit the advancing stroke, and the other clamp member may be similarly adjusted relative to a stop member to limit the retracting stroke.

It will be further observed that the present vernier dial embodying stop means may be adjusted for a plurality of limiting or stopping positions in an advancing or retracting direction by virtue of the plurality of stop members and the plurality of adjustable clamping members, such plural stopping positions being of particular advantage when using a turret tool post having a plurality of cutting tools mounted thereon for successive use on a piece of work.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A vernier dial attachment for a machine tool having a feed screw and having a relatively small diameter extended bearing portion for the feed screw, the attachment comprising: a vernier dial having a relatively large radius and provided with an elongated hub having a bore there through snugly receiving and clamped to said extended bearing portion and projecting a substantial distance beyond the end of said bearing portion, said vernier dial projecting radially from its hub at a position axially beyond said extended bearing portion, and a graduated dial having a radius corresponding to the radius of said vernier dial for cooperation therewith, said graduated dial having a hub portion extending within the bore of the hub of said vernier dial and being fixed to said feed screw within the bore of the hub of said vernier dial.

2. A vernier dial attachment for a machine tool having a feed screw and having a relatively small diameter extended bearing portion for the feed screw, the attachment comprising: a vernier dial having a relatively large radius and provided with an elongated hub having a bore therein through snugly receiving and adjusably clamped to said extended bearing portion and extending a substantial distance beyond the end of said bearing portion, said vernier dial projecting radially from its hub at a position axially beyond said extended bearing portion, a graduated dial provided with an axially extending flange at its periphery, said graduated dial being of a radius corresponding to the radius of said vernier dial for cooperation therewith and having a hub portion fixed to said feed screw within the bore of the vernier dial hub, at least one stop dog adjustably and removably clamped to said flange and having a stop screw adjustably mounted therein, and a pivotally mounted member carried by said relatively stationary vernier dial and selectively pivotally movable into the path of said stop screw for adjustably limiting the rotation of said feed screw.

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