Aug. 15, 1944. L. F. POLK 2,356,003

GAUGING DEVICE AND METHOD

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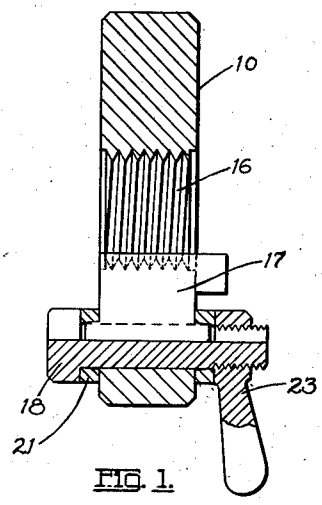


FIG. 1.

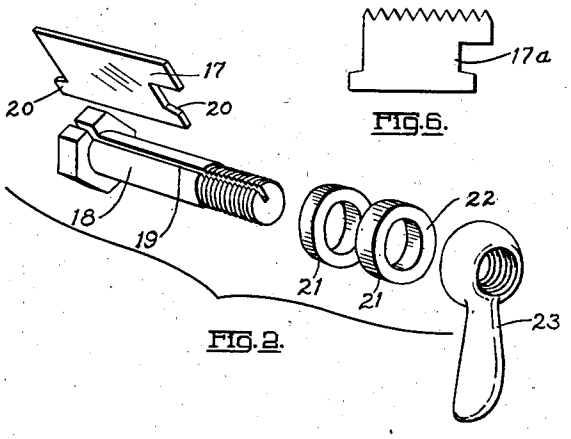


FIG. 2.

FIG. 6.

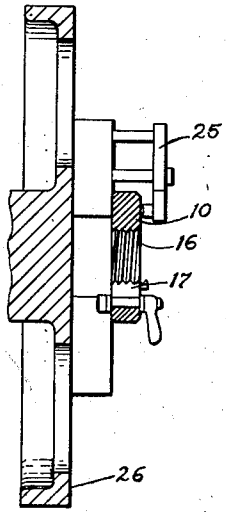


FIG. 4.

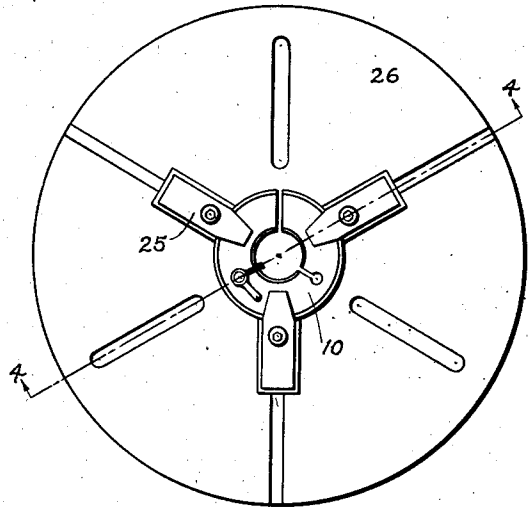


FIG. 3

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GAUGING DEVICE AND METHOD

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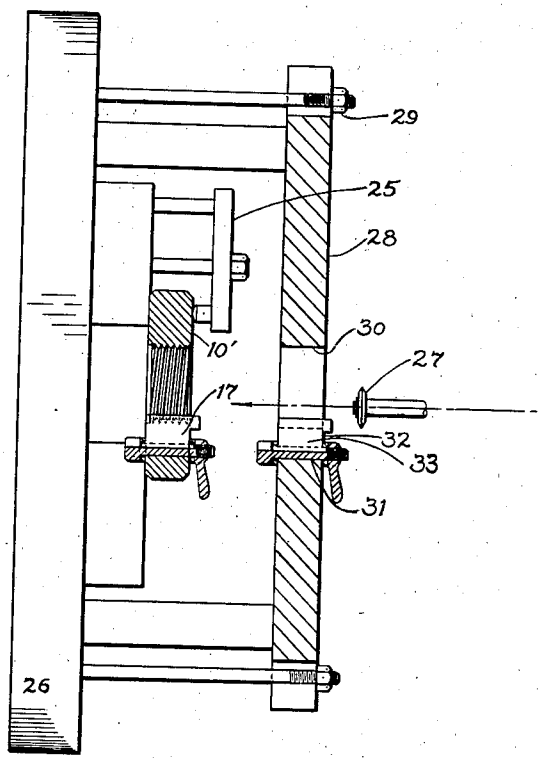


Fig. 7.

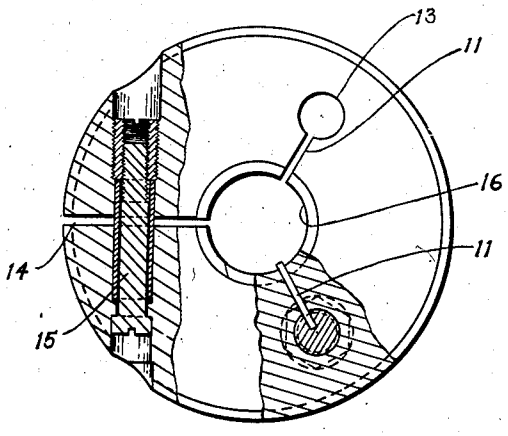


Fig. 8.

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GAUGING DEVICE AND METHOD

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Application October 26, 1942, Serial No. 463,415

10 Claims. (Cl. 33—199)

This invention relates to the making or testing of internal threads.

One object of the invention resides in the method of making and testing an internal thread of a threaded part whereby the same thread form that is produced on the threaded part is also produced, at the same time or in the course of the same operation, on a strip of suitable material which can then be used as a basis of comparison to check the thread form, pitch or other thread characteristics.

Another object of the invention resides in the method whereby an internal thread can be simultaneously made on a thread ring gauge or the like and a rigid blade which has been applied in a substantially radial position to the ring gauge in fixed association therewith but adapted for removal after the thread is ground or otherwise formed on both of these members.

Another object is the provision of an internally threaded ring gauge or the like having a separate strip of rigid material connected thereto and provided with an edge portion which is cut in exact correspondence to the thread in the ring and adapted to be released from its association with the ring so that it may be used to show the thread form, pitch or other characteristics of the internal thread of the ring.

Other objects and advantages of the invention will be apparent from the following description, the appended claims and the accompanying drawings in which:

Fig. 1 is a central transverse section through a thread ring gauge and an associated strip on which the thread form of the gauge is to be produced in accordance with the method of the present invention;

Fig. 2 is an exploded view of the strip and its fastening means;

Fig. 3 is a front elevation of a face plate of a threading machine, showing how the gauge is supported;

Fig. 4 is a transverse section on the line 4—4 of Fig. 3;

Fig. 5 is a view, partly in section, showing a ring gauge and its associated strip;

Fig. 6 is a view of the formed strip; and

Fig. 7 is a transverse section through a face plate and the parts carried thereby and illustrating a modified form of the invention.

Referring more particularly to the drawings by reference numerals, 10 designates an internally threaded ring, such as a thread ring gauge for comparing or gauging the external threads of work pieces. The thread ring comprises a body portion having a pair of substantially radially extending slots 11 extending inwardly to the threaded portion and extending outwardly to circular holes 13. Ordinarily there are a plurality of these slots 11 and, in addition, another slot 14 which extends clear through the body portion and which provides for expansion or contraction for initial setting or to take up wear. Adjacent parts of the body portion are secured together by means of a threaded attachment 15. The threads 16 on the body portion may be formed by a milling or turning operation and then ground. After the threads are ground they may be subjected to a suitable lapping operation.

There is difficulty in obtaining such access to the internal threads of a threaded part as permits accurate measurement or comparison of the thread size, pitch, angle, etc. In measuring or comparing external threads they may be readily subjected to an optical comparator, and any deviation from a desired configuration can be readily seen, but that is not the case in connection with internal threads. Heretofore cast strips of a suitable hardening material have been used to make an impression or casting from internal threads to be inspected or gauged and then this casting or impression has been used as a basis of comparison or test. Due to the difficulty and time involved in this proceeding, however, and due further to the possibility of shrinkage and deformation in the process of making the impression, this means for inspecting or comparing an internal thread has a number of objections.

In accordance with the present invention, a strip of rigid material is secured in a predetermined relation with respect to the thread ring before the thread form is finished on the ring, and an edge of the strip is then serrated in exact accordance with the thread serrations and by the same instrumentality that produces the thread on the thread ring. While, for exemplary purposes, only one of the several slots of the thread ring are shown as provided with a strip of rigid material of the character mentioned, it will be obvious that the invention is not to be limited to the precise arrangement as herein shown and described.

In accordance with the form of construction shown in Figs. 1 to 6 inclusive, a strip 17 of steel or other suitable rigid material is detachably secured in one of the slots 11 by means of a suitable fastening which, as herein shown, embodies a bolt 18 extending through one of the

holes 13, the bolt having a slot 19 in which the outer portion of the strip 17 is received. The strip 17 is preferably provided with inclined shoulders 20 engaged by washers 21 which have conical surfaces 22 engaging the shoulders 20 with a wedging action to hold the strip 17 firmly in place. A wing nut 23 threaded on the end of the bolt holds these parts firmly in position in a readily detachable manner. The clearance between the cylindrical surface of the bolt and the hole 13, and the clearance between the sides of the strip 17 and the sides of the slot 11 in the ring are small enough so that there is no substantial freedom of motion of these parts.

The ring 10, either before the threads 16 are milled or after milling and before they are ground to final form, is secured by means of suitable holding clamps 25 on a face plate 26 of a threading machine, such as a thread grinder. As will be readily understood, the face plate is rotated in timed relation to the axial movements of the grinding wheel 27 so that the threads will be accurately ground. At the same time the grinding operation is performed on the ring, and by means of the same instrumentalities, the inner edge portion of the strip 17 which initially projected inwardly beyond the thread to be produced, will be ground to serrated form, and the form of the serrations will exactly correspond to the thread form in the ring in all respects. The strip 17 can then be removed and used as a basis of comparison or measurement of the exactly similar threads of the ring itself. The thread form may be seen, for example, by using the strip 17 on an optical comparator to determine if the pitch, included angle, thread size, etc., conform to some predetermined standard.

If the thread of the ring is to be lapped after the grinding operation takes place, the strip 17 may remain in place until after the lapping operation is completed, so that the strip 17 will show exactly what thread form is present in the rather inaccessible internal threads of the ring.

As shown in Fig. 1, one end of the strip 17 may project out axially a substantial distance outside of the thread ring, and the axial travel of the grinding wheel may be stopped after passing along and cutting this projecting portion of the strip and before a cut is actually made on the partially formed or milled threads in the ring itself. This projecting portion of the strip may be inspected either in place in the ring or after removing it temporarily from the ring to ascertain if the thread form is correct. If the thread form is proper, then the threading operation may be carried on, simultaneously grinding the thread ring and the strip to the same conformation. This produces the finished strip 17a as shown in Fig. 6.

In the form of construction shown in Fig. 7, the thread ring 10' is mounted on the face plate 26' in the same manner as previously described. This ring 10' may incorporate a strip 17 if desired, although in this form of construction the strip may be omitted entirely from the ring 10' itself. Arranged outwardly of the ring gauge 10' is a ring or plate 28 supported by suitable clamping bolts 29 on the face plate 26'. The ring 28 has a cylindrical hole 30 which is somewhat larger in diameter than the maximum diameter of the threads to be produced on the ring 10'. The ring 28 is also provided with a hole 31 and a radial slot 32 similar to the hole 13 and slot 11 in the ring gauge 10 shown in Fig. 5. A blade 33 similar to the blade 17 is held in this slot in the same way that the blade 17 is supported in the ring gauge 10.

As will be apparent, the ring 28 and the ring 10' rotate together as the grinding wheel 27 moves axially. In its forward movement in the direction of the arrow shown in Fig. 7, the grinding wheel first cuts or serrates the strip 33 from end to end before it is in a position to start threading the ring 10'. Before the grinding wheel enters the thread ring the strip 33 can be removed and inspected as by an optical comparator or by other suitable inspecting or testing means to determine if the thread shape and size are correct. If they are correct, the setting of the wheel 27 is maintained and the machine is started again without even requiring the replacement of the blade 33, and the internal threads are then cut on the ring exactly the same as they had previously been cut on the strip 33. If an additional strip 17 is used in a slot of the ring 10' itself, this strip 17 may be again inspected after the threads are finished, and may be retained to form a basis of comparison by the manufacturer in case ring replacement or regrinding should subsequently be ordered.

By measuring accurately the distance from the serrated end of the strip to the straight outer edge, and having determined the distance from the slotted portion of the bolt 18 to the center of the ring gauge, the diameter of the thread in the thread ring may also be computed directly from the finished strip 17 itself.

While the article herein described and the method herein referred to constitute preferred embodiments of the invention, it is to be understood that they are not limited to the precise examples employed for purposes of illustration, and changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In the method of testing an internal thread of a threaded part, the steps comprising cutting the thread on the part and cutting serrations corresponding to the thread form on a separate strip of material temporarily held in fixed association with the threaded part, by means of the same threading tool and with the same machine setup.

2. The method of testing an internal thread of a threaded part, comprising cutting the thread on the part while concomitantly with the same cutting tool cutting serrations of corresponding form on a separate strip of material held in a recess in the part.

3. The method of making a separate test strip having external serrations corresponding in form and size to the threads of an internally threaded ring, comprising grinding the serrations on the strip and the threads in the ring with the same grinding tool and the same machine setup and while the strip is secured in a recess in the ring.

4. The method of making a test strip showing the exact reproduction on an external surface thereof of an internal thread of a ring gauge, comprising grinding serrations on the strip while the strip is temporarily but rigidly held in a recess in the ring gauge during the time the thread is being ground and employing the same grinding instrumentality in such operation.

5. The method of testing an internally threaded ring having a radial recess comprising releasably securing a separate rigid strip of material

in the recess in the ring so the strip projects inwardly beyond the finished thread form, and simultaneously grinding the thread on the ring and thread form serrations on the strip.

6. In combination, an internally threaded ring having a substantially radial slot extending to the thread opening, a separate strip of rigid material having a serrated edge portion cut in exact correspondence to the thread in the ring and reproducing any errors in the ring thread form, and means extending through the ring parallel to the ring axis and rigidly securing the strip in said slot.

7. In combination with an internally threaded ring gauge having a slot extending inwardly to the thread opening, a separate strip of rigid material substantially filling said slot, and wedge means engaging the outer portions of the strip and securing the strip rigidly to the ring gauge whereby thread serrations can be made on both the strip and the ring gauge by the same instrumentality at the same time.

8. A thin flat metal blade having means at one portion thereof for detachably securing the same in a predetermined position to a thread ring gauge so as to project to the thread opening, and having at an opposite portion thereof a ground serrated surface the serrations of which correspond exactly in form, pitch and size to the sectional form of the thread of the ring gauge and thus reproduce any error in the thread form of the ring gauge.

9. A thin flat metal blade adapted for insertion in a radial slot of a thread ring whereby the blade and the ring can be threaded by the same instrumentality at the same time, said blade having opposite side portions of wedge form and providing means for securing the blade in the ring.

10. In combination, a separate strip of rigid material having means at one portion thereof for detachably securing the same in a predetermined position in a slot of a ring gauge to project inwardly to the thread opening, and a securing bolt adapted to pass through the ring gauge and having means for securing the blade and the ring gauge in rigid association with one another.

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