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E. BUCKINGHAM

METHOD AND DEVICE FOR LAPPING GAUGES

Filed March 19, 1924

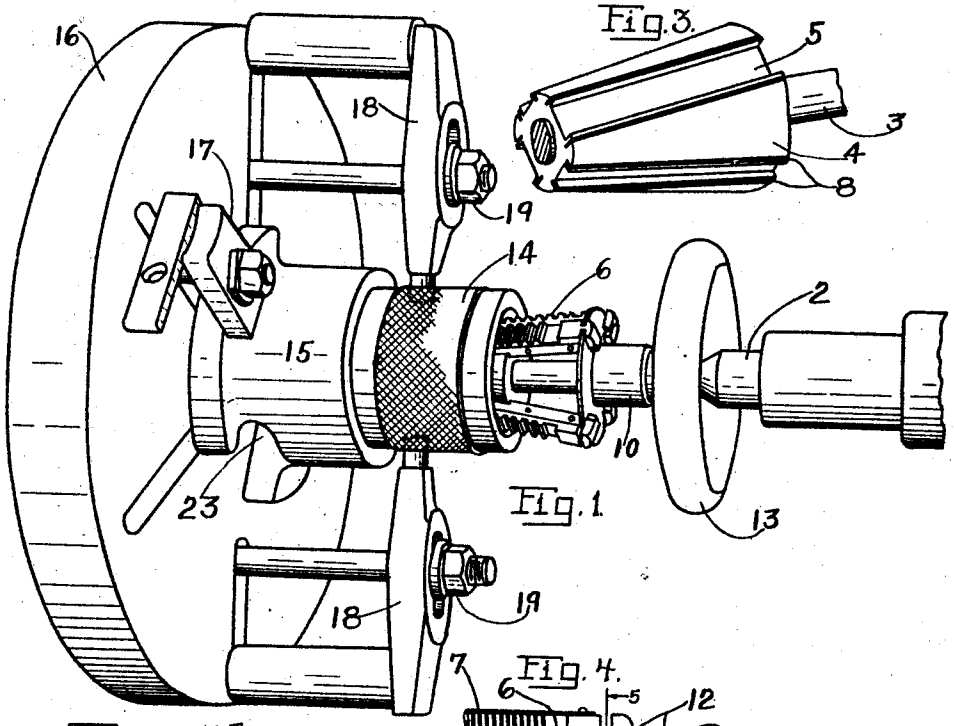


Fig. 1.

Fig. 3.

Fig. 4.

Fig. 5.

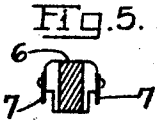


Fig. 2.

Fig. 6.

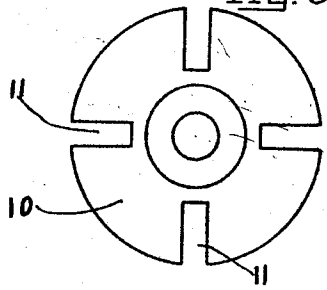
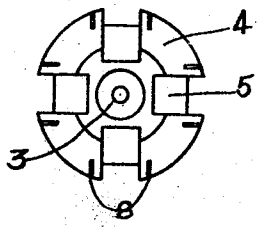


Fig. 7.



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METHOD AND DEVICE FOR LAPPING GAUGES.

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This invention relates to methods and devices for lapping internal taper gauges and internal taper thread gauges in particular. Such gauges are ordinarily finished by lapping the gauging surfaces thereof with a member or members corresponding to the configuration of the finished surface it is desired to impart to the gauge, such lapping operation serving to bring the gauging surfaces down to their proper dimensions and shape and to polish the same to a smooth finish. The primary object of the present invention is to provide an improved method and device for performing this lapping operation on internal taper gauges.

Another object of the invention is to provide an improved method and device for lapping internal taper thread gauges, such method and device comprising the supporting of a plurality of toothed lapping members in a conical relationship and in threaded engagement with the gauge threads to be lapped, the arrangement of the parts being such that as a relative rotation is effected between the gauge and the lapping members such parts, because of their threaded engagement, also partake of a relative axial or longitudinal movement while the lapping members maintain their conical relationship and their threaded lapping engagement with the gauge.

With the above and other objects in view, my invention consists in the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing. In such drawing annexed hereto and forming a part of this specification, I have shown one embodiment of my invention in connection with a device for lapping internal taper thread gauges but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

Referring to the figures of the drawing:

Figure 1 is a fragmentary perspective view of a lathe showing an internal taper thread gauge being lapped thereon by my improved lapping device.

Fig. 2 is an enlarged side elevation thereof partially in section and broken away.

Fig. 3 is a fragmentary perspective view of the guideway supporting member for the gauge lapping members.

Fig. 4 is a fragmentary view of one of the lapping members.

Fig. 5 is a cross section thereof on line 5—5 of Fig. 4.

Fig. 6 is an end view of the member for supporting one end of each of the lapping members.

Fig. 7 is an end view of the member shown in Fig. 3.

Internal cylindrical gauges, both of the plain and threaded type, can be lapped to an accurate and smooth finish without difficulty since the lap used in this operation is of the same diameter throughout its length and can therefore accomplish the lapping operation merely by rotating and reciprocating the same through the gauge. Internal taper gauges however cannot be lapped in this manner and the lapping of such gauges is performed with considerable difficulty. In my present invention, I slidably mount a plurality of lapping members in conically arranged guideways in a central supporting member, the said conical arrangement of the guideways corresponding to the taper of the gauge to be lapped. The gauge is mounted in lapping contact with these members and in the lapping operation the members are moved longitudinally along their guideways and through the gauge, first in one direction and then in the opposite direction. Since the conical arrangement of the guideways corresponds to the taper of the gauge, the lapping members maintain their original position in lapping contact with the conical or taper gauging surface of the gauge throughout the longitudinal movement of the members. In the accompanying drawing, I have illustrated my invention in connection with the lapping of a thread gauge but it will be understood that the invention broadly contemplates the lapping of any gauge of the internal taper type.

In the drawing, 1 indicates the headstock center and 2 the tailstock center of a lathe on which is mounted the supporting arbor 3 of my improved lapping device. Supported on the arbor and preferably integral therewith is a conical lap supporting member 4. This member is provided with a plurality of conically arranged guideways 5 each adapted to slidably receive a lapping mem-

ber 6 therein. Guiding plates 7, also preferably secured to the sides of each member 6, are adapted to slide in slots 8 cut in the member 6 adjacent and parallel with the adjacent guideways 5. Transversely extending lapping teeth 9 formed in the outer surface of each lapping member are adapted to engage the threads of the gauge to be lapped.

The lapping members 6 are also preferably engaged at one end by a member 10 slidably mounted on one end of the arbor 3. The flange portion of this member is slotted at 11 to receive therein the slotted heads 12 of the lapping members, the cooperating slots being so formed that the members are free to move radially in the flange. A hand wheel 13 is secured to the outer end of the arbor adjacent the member 10.

The thread gauge 14 to be lapped is mounted on the lapping members with the gauging threads 14' thereof in threaded contact with the teeth 9. When assembled for the lapping operation, as shown in Fig. 1, the gauge is seated on a member 15 secured to the face plate 16 of the lathe by means of clamps 17. The gauge is held down firmly on the member 15 by means of clamping members 18, the ends of which seat in holes in the gauge. By tightening the nuts 19, the gauge is forced tightly against the member 15.

The headstock center 1 is freely slidable in a supporting sleeve 20 and can be adjusted axially therein by means of a nut 21 threaded to the center. Holes 22 are provided in the periphery of this nut and the nut can be rotatably adjusted by inserting a rod through diametrically opposite openings 23 in the member 12 and into these holes.

As illustrated in Fig. 2, the conical arrangement of the guideways 5 corresponds to the taper of the gauge to be lapped. Gauges varying in size but corresponding in taper can be lapped with the same lapping device by adjusting the member 4 axially to bring the lapping members into accurate lapping contact with the gauge. Axial adjustment of the member to the left (Fig. 2) expands the lapping members and adjustment thereof to the right retracts such members. This adjustment is made by rotating the nut 21, the tailstock center 2 of course being adjusted in like manner whereby to properly engage and support the arbor.

In the lapping operation, the parts are assembled in the manner illustrated and described. Before beginning the lapping movement, the nut 21 is accurately adjusted to bring the lapping members into accurate lapping contact with the gauge. The parts being so assembled and adjusted, the lathe is started. Rotation of the face plate 16 drives the gauge, the lapping device normally rotating as a unit with the gauge on the centers 1 and 2. During such rotation, the operator retards the rotation of the lapping device by placing his hand on the hand wheel 13. Continued rotation of the gauge, because of its threaded engagement with the lapping members 6, moves the lapping members longitudinally therethrough along their guideways 5 from the position shown in full lines in Fig. 2 to the position shown in dot and dash lines. When the member 10 strikes the member 4, all the parts again rotate together as a unit. The operator now reverses the rotation of the face plate and, upon retarding the rotation of the lapping device, the parts are brought back to the position shown in full lines. Thus, the lapping operation is performed by reversing the rotation of the gauge and moving the lapping members back and forth therethrough. It will be understood that, since the conical arrangement of the guideways corresponds to the taper of the gauge, the lapping members maintain their lapping relationship with the gauge during their longitudinal movement therethrough.

What I claim is:

1. The method of lapping an internal taper gauge comprising supporting the gauge on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while maintaining the members in their said relationship and in lapping contact with the gauge.

2. The method of lapping an internal taper gauge comprising supporting the gauge on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while moving the members bodily in a radial plane and holding the same in lapping contact with the gauge.

3. The method of lapping an internal taper gauge comprising supporting the gauge on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while moving the members bodily in a radial plane without changing their said relationship and holding the members in lapping contact with the gauge.

4. The method of lapping an internal taper thread gauge comprising the supporting of the gauge on and in threaded contact with lapping teeth formed on a plurality of relatively long lapping members supported in a conical relationship correspond-

ing to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while maintaining the members in their said relationship and the teeth thereof in threaded lapping contact with the gauge.

5. The method of lapping an internal taper thread gauge comprising the supporting of the gauge on and in threaded contact with lapping teeth formed on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while moving the members bodily in a radial plane and holding the teeth thereof in threaded lapping contact with the gauge.

6. The method of lapping an internal taper thread gauge comprising the supporting of the gauge on and in threaded contact with lapping teeth formed on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and providing a relative rotation and a relative longitudinal movement between the gauge and the said members while moving the members bodily in a radial plane without changing their said relationship and holding the teeth thereof in threaded lapping contact with the gauge.

7. The method of lapping an internal taper thread gauge comprising the supporting of the gauge on and in threaded contact with lapping teeth formed on a plurality of relatively long lapping members supported in a conical relationship corresponding to the taper of the gauge and rotating the gauge and moving the said members longitudinally therethrough and in a radial direction bodily while maintaining the members in their said relationship and the teeth thereof in threaded lapping contact with the gauge.

8. An internal taper thread gauge lapping device comprising the combination of a plurality of relatively long lapping members having transversely extending teeth adapted to engage the threads of the gauge to be lapped and means within and supporting such members in a conical relationship corresponding to the taper of the gauge to be lapped, the members being free to slide longitudinally of the support and the arrangement of the parts being such that as a relative rotation is effected between the gauge and the lapping members such parts, because of their threaded engagement, also partake of a relative longitudinal movement while the lapping members maintain their conical relationship and their threaded lapping engagement with the gauge.

9. An internal taper thread gauge lapping device comprising the combination of a member having a plurality of conically arranged guideways therein and a plurality of relatively long gauge lapping members respectively mounted to slide in the guideways and having transversely extending teeth adapted to engage the threads of the gauge to be lapped, the members being free to slide longitudinally of the support and the arrangement of the parts being such that as a relative rotation is effected between the gauge and the lapping members such parts, because of their threaded engagement, also partake of a relative longitudinal movement and the lapping members move bodily in a radial direction while maintaining their conical relationship and their threaded lapping engagement with the gauge.

10. An internal taper thread gauge lapping device comprising the combination of a member having a plurality of conically arranged guideways therein, a plurality of relatively long gauge lapping members respectively mounted to slide in the guide ways and having transversely extending teeth adapted to engage the threads of the gauge to be lapped, and means movable relative to the first named member and supporting one end of each of the lapping members, the members being free to slide longitudinally of the support and the arrangement of the parts being such that as a relative rotation is effected between the gauge and the lapping members such parts, because of their threaded engagement, also partake of a relative longitudinal movement while the lapping members maintain their conical relationship and their threaded lapping engagement with the gauge.

11. An internal taper thread gauge lapping device comprising the combination of an arbor, a member supported thereon and having a plurality of conically arranged guideways therein, a plurality of relatively long lapping members having transversely extending teeth adapted to engage the threads of the gauge to be lapped and means slidably mounted on the arbor and supporting one end of each of the lapping members, the members being free to slide longitudinally of the support and the arrangement of the parts being such that as a relative rotation is effected between the gauge and the lapping members such parts, because of their threaded engagement, also partake of a relative longitudinal movement while the lapping members maintain their conical relationship and their threaded lapping engagement with the gauge.

12. An internal taper thread gauge lapping device comprising the combination of an arbor adapted to be rotatably supported on centers, a member supported on the arbor and having a plurality of conically

arranged guideways therein, a plurality of relatively long gauge lapping members respectively mounted to slide in the guideways and having transversely extending teeth adapted to engage the threads of the gauge to be lapped, means slidably mounted on the arbor and supporting one end of each of the lapping members, and means for retarding the rotation of the arbor, the members being free to slide longitudinally of the support and the arrangement being such that as the gauge is rotated in one direction and the arbor held against rotation the lapping members, because of their threaded engagement with the gauge, will move longitudinally through the gauge in one direction and will move longitudinally in the opposite direction when the gauge rotation is reversed, and the conical arrangement of the guideways correspond to the taper of the gauge whereby the lapping members maintain their lapping relationship with the gauge during the said longitudinal movements.

In testimony whereof, I hereto affix my signature.

EARLE BUCKINGHAM.