G. W. BOWERS.

MICROMETER SCREW DRIVER.

APPLICATION FILED NOV. 4, 1907.

922,080.

Patented May 18, 1909.

Fig. 6

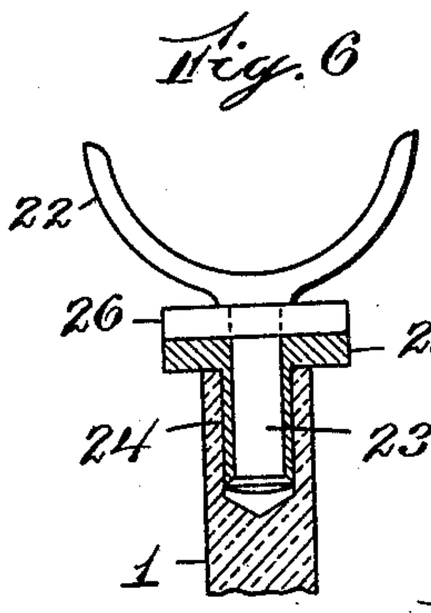


Fig. 1

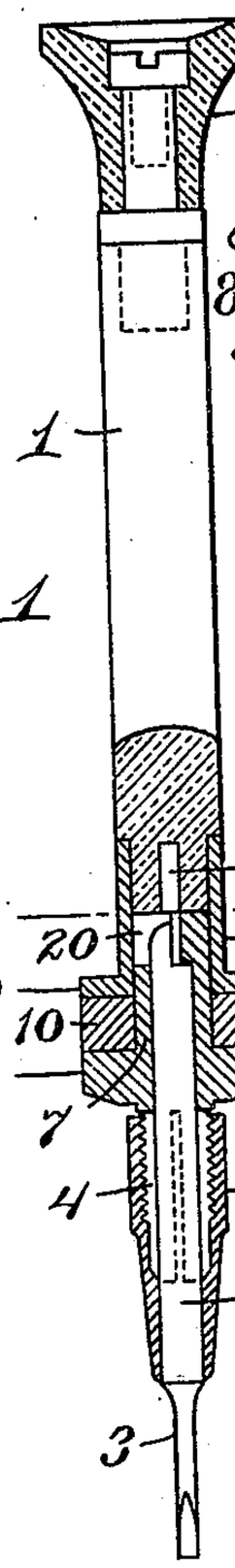


Fig. 7

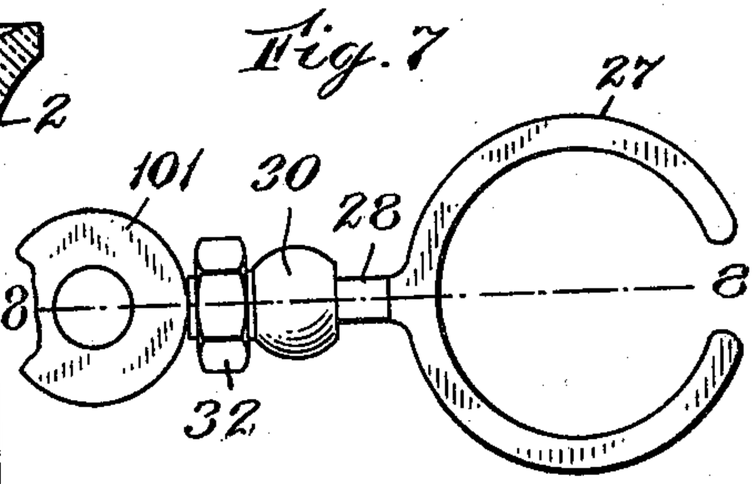


Fig. 8

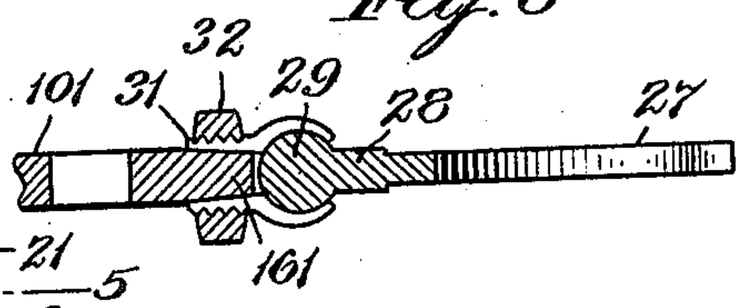


Fig. 2

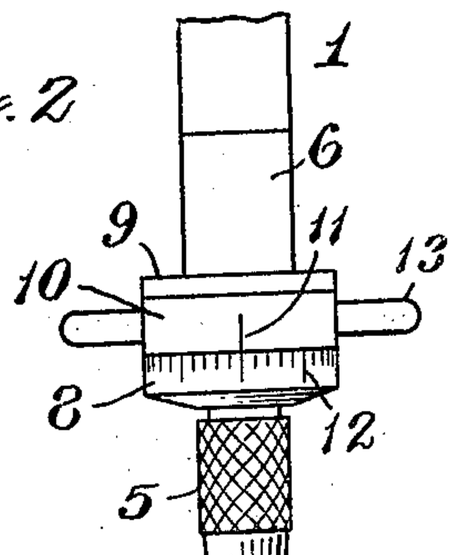


Fig. 3

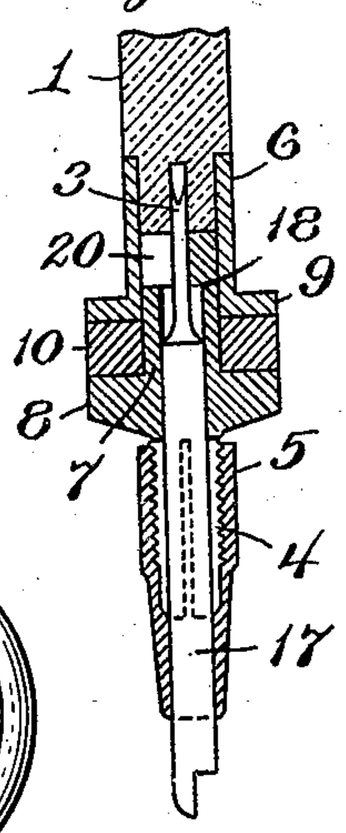


Fig. 4

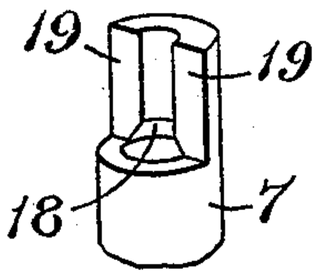


Fig. 5

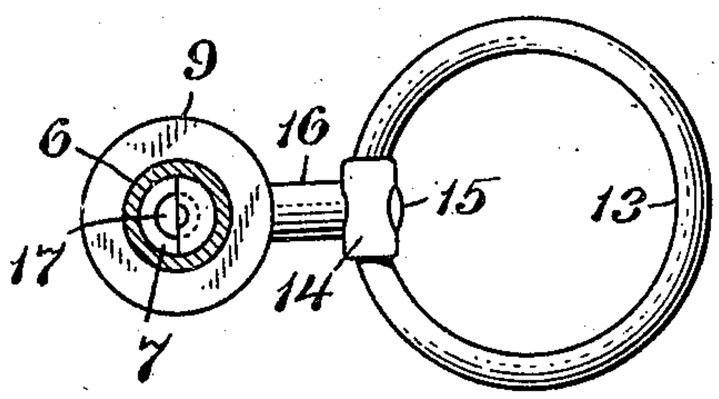
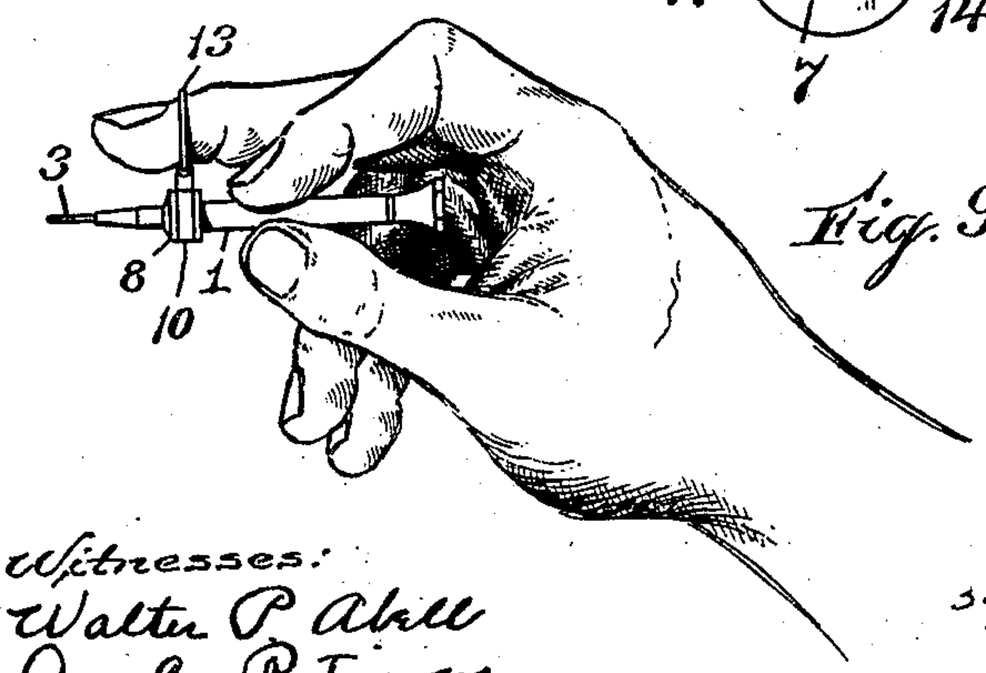


Fig. 9



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UNITED STATES PATENT OFFICE.

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MICROMETER SCREW-DRIVER.

No. 922,080. Specification of Letters Patent. Patented May 18, 1909.

Application filed November 4, 1907. Serial No. 400,541.

To all whom it may concern:

Be it known that I, GEORGE W. BOWERS, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Micrometer Screw-Drivers, of which the following is a specification.

This invention relates to screw-drivers and has for its object to enable fractions of a rotation of a screw-driver to be indicated and measured.

The principal application for which this tool is designed, is in connection with watch making, especially in the adjustment of the balance wheel. Most watch balances are provided with mean time screws, sometimes called simply "timing" screws, which are used to bring the watch approximately to time when the regulator is at the center of its arc. These screws, being in some cases two, and in others four in number, are threaded into the rim of the balance approximately in line with the arms which connect the rim with the hub, and, when there are four, midway between such arms, and are given sufficient friction so that they will remain in any position with their heads clear of the rim. To make the watch run faster, the screws are turned inward, thereby reducing the moment of inertia of the balance, while to make it run slower, they are turned outward. The effect is analogous to the raising and lowering of a pendulum bob. To insure a uniform rate of oscillation of the balance in all positions of the watch, the balance must be perfectly poised. Unequal changing of the timing screws, subsequent to the poising of the balance wheel, is liable to destroy such poise unless diametrically opposite screws are turned precisely the same angle. It is primarily to enable the timing screws thus to be so turned that I have devised the present invention which I have illustrated as applied to a watchmaker's screw-driver, and having an index capable of measuring minute fractions of a rotation, and thereby still minuter distances through which the timing screws are advanced or retracted. By the use of the index, the diametrically opposite screws can be turned by exactly the same amount.

In the drawings, Figure 1 represents a sectional elevation of a watchmaker's screw-driver embodying the principles of my invention. Fig. 2 represents an elevation of the lower part of the same, showing the micrometer. Fig. 3 is a longitudinal section showing the screw-driver blade reversed. Fig. 4 is a perspective of one of the elements of the screw-driver. Fig. 5 is a sectional plan on the line 5—5 of Fig. 1. Fig. 6 is a sectional view showing a modification. Fig. 7 is a plan view of another modification. Fig. 8 is a longitudinal section of the parts shown in Fig. 7, the section being taken on the line 8—8 of said figure. Fig. 9 is a view showing the manner of use of the micrometer screw-driver.

The same numerals of reference indicate the same parts in all the figures.

The tool shown in the drawings has externally substantially the same form as the ordinary watchmaker's or jeweler's screw-driver, having the shank 1 and the button 2, which by endwise pressure may be applied, and the blade 3 detachably secured in the opposite end of the shank by means of chuck jaws 4, and a tapered sleeve 5. The chuck jaws are connected with the shank 1 through the medium of the sleeve 6 which fits tightly over the end of the shank, and the end of a hub 7 on which the chuck jaws are formed. The sleeve 6 fits so tightly over the parts which it surrounds that they are securely held together and caused to rotate in unison. Surrounding the hub 7 between a disk or flange 8 formed on the latter and a flange 9 on the sleeve 6, is a ring 10 which is loosely confined between the flanges 8 and 9 and is held stationary when the screw-driver is turned. This ring 10 has engraved upon it an index mark 11 which coöperates with a series of graduations 12 marked on the periphery of the disk 8, these marks constituting the coöperating or complemental indices by which fractions of a rotation of the screw-driver blade are indicated and measured. The ring or band 10 is held stationary by a finger ring 13 which is adapted to surround the middle finger of the user's hand, while the screw-driver is turned by his thumb and forefinger. The ends of the finger ring are snapped into a socket 14 which is swiveled upon a stud 15 secured in a stem 16 which projects from one side of the band 10. Thus the finger ring can be

turned about three axes at right angles to each other, having universal motion with respect to the screw-driver.

The manner of use will be readily understood. The tool being held as shown in Fig. 9, the end of the blade is then inserted into the slot of the screw which is to be turned, and the index marks noted. The tool is then turned by the thumb and forefinger, while the band is held absolutely stationary, and at the end of the turning movement the number of graduations 12 which have passed the stationary mark 11 is noted. When the tool is used for setting the timing screws of a watch balance, both of the diametrically opposite screws are turned through precisely the same angle which is measured by the graduations 12. As shown in the drawings, the screw-driver blade is detachable from the body of the tool. It is formed upon a stem 17 of which the end opposite to the blade is slabbed off to make a flat face. This end being passed through the bore of the hub 7, abuts against the shoulder 18 of the latter, as shown in Figs. 3 and 4. This shoulder is formed owing to the fact that the bore at the upper end of the hub is of less diameter than at the lower end. Above the shoulder, the hub 7 is partly cut away leaving shoulders 19. When the stem 17 is rotated until its slabbed off side comes into the same plane with the shoulders 19, it can be slipped by into engagement with these shoulders, the end of the stem then lying in the open space indicated at 20. The shoulders 19 then prevent relative rotation between the body of the tool and the blade. When not in use, the blade can be turned end for end being caused to enter a recess 21 in the shank of the tool as shown in Fig. 3, being thereby preserved from injury.

In the modification shown in Fig. 6, the band 10 is omitted and the button replaced by a fork 22 of which the shank 22 is freely rotatable in a sleeve 24, being headed over at the end to prevent its withdrawal. The sleeve 24 is fitted tightly into the shank 1 of the tool and has a disk 25 lying beside a disk 26 secured to the fork. These disks have complemental graduations which serve, instead of the disk 8 and band 10, to measure the rotation of the screw-driver.

In Figs. 7 and 8 is shown a substitute for the finger ring 13. Instead of a divided spring ring, there is here shown a partial fork 27, the arms of which are curved toward each other forming nearly a complete ring. A stem 28 on the ring has a ball 29 which is contained and has a universal movement within a socket 30. This socket has an internally tapered and externally threaded sleeve 31 fitting on the tapered stud 161 which extends from the band 101. This threaded sleeve is split and is clamped upon the stud by a nut 32.

It is to be understood that although I have illustrated one embodiment of my invention and described one of the modes of its use, the invention is not limited to such embodiment or such use, but may have many other forms and may be used in any relation where it would be necessary or desirable to measure the angles through which a screw-driver is rotated.

I claim:—

1. In combination with a screw driver, cooperating index devices, one of which is arranged to be rotated and the other held stationary by the hand of the user, graduated to indicate fractions of a rotation.

2. A screw-driver having a rotary blade and a relatively stationary index for showing the angle through which the blade is turned.

3. A screw-driver, comprising a rotary blade, and a member constructed, arranged and mounted so as to be held stationary by the hand of the user while the blade is being turned by the fingers of the same hand, by reference to which the amount of rotation of the blade is indicated.

4. A screw-driver, comprising a rotary blade, a disk or barrel connected to rotate therewith and having an index, and a relatively stationary member having a complemental stationary index by reference to which the amount of rotation of the blade is indicated.

5. A screw-driver, comprising a shank, a blade connected to said shank, a disk having a series of graduation marks and attached to said shank so as to turn simultaneously therewith and with the blade, and a member beside said disk mounted upon said shank with provisions whereby it may be held stationary by the user while the blade is turned, and being provided with a complemental index mark by which, with reference to the aforesaid graduation marks, the angular movements of the blade are measured.

6. A screw-driver having a blade for actuating a screw and relatively rotary and stationary indices capable of indicating fractions of a rotation of said blade and minute advancements or retractions of a screw driven thereby.

7. A screw-driver having relatively rotary and stationary indices capable of indicating fractions of a rotation, whereby to measure minute amounts of advancement or retraction given by the driver to a screw.

8. A screw-driver comprising an index adapted to rotate simultaneously with its blade and a complemental index adapted to be held stationary while the blade is turned, whereby movements of the latter may be measured.

9. A screw-driver comprising a shank, a blade and a hub, all connected to rotate together, a ring or band surrounding said

hub and adapted to be held stationary and a disk or flange on the hub beside said band, the disk and band having complemental index marks for measuring the relative rotation thereof.

10. A rotatable screw-driver, a member mounted thereon with capability of relative rotation, and provisions whereby said member may be held stationary by a finger of the user while the screw-driver is turned, the member and driver having complemental indices for measuring rotation.

11. A rotatable screw-driver, a member mounted thereon with capability of relative rotation, and a projection from said member adapted to be engaged and held stationary by the user of the tool while the screw-driver itself is turned, said member and an adjacent surface of the screw-driver bearing index marks.

12. A rotatable screw-driver, a member mounted thereon with capability of relative rotation, and a finger ring jointed to said member and adapted to be slipped over the finger of the user to hold the said member stationary while the screw-driver is being turned.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE W. BOWERS.

Witnesses:
A. H. Brown,
C. F. Brown.