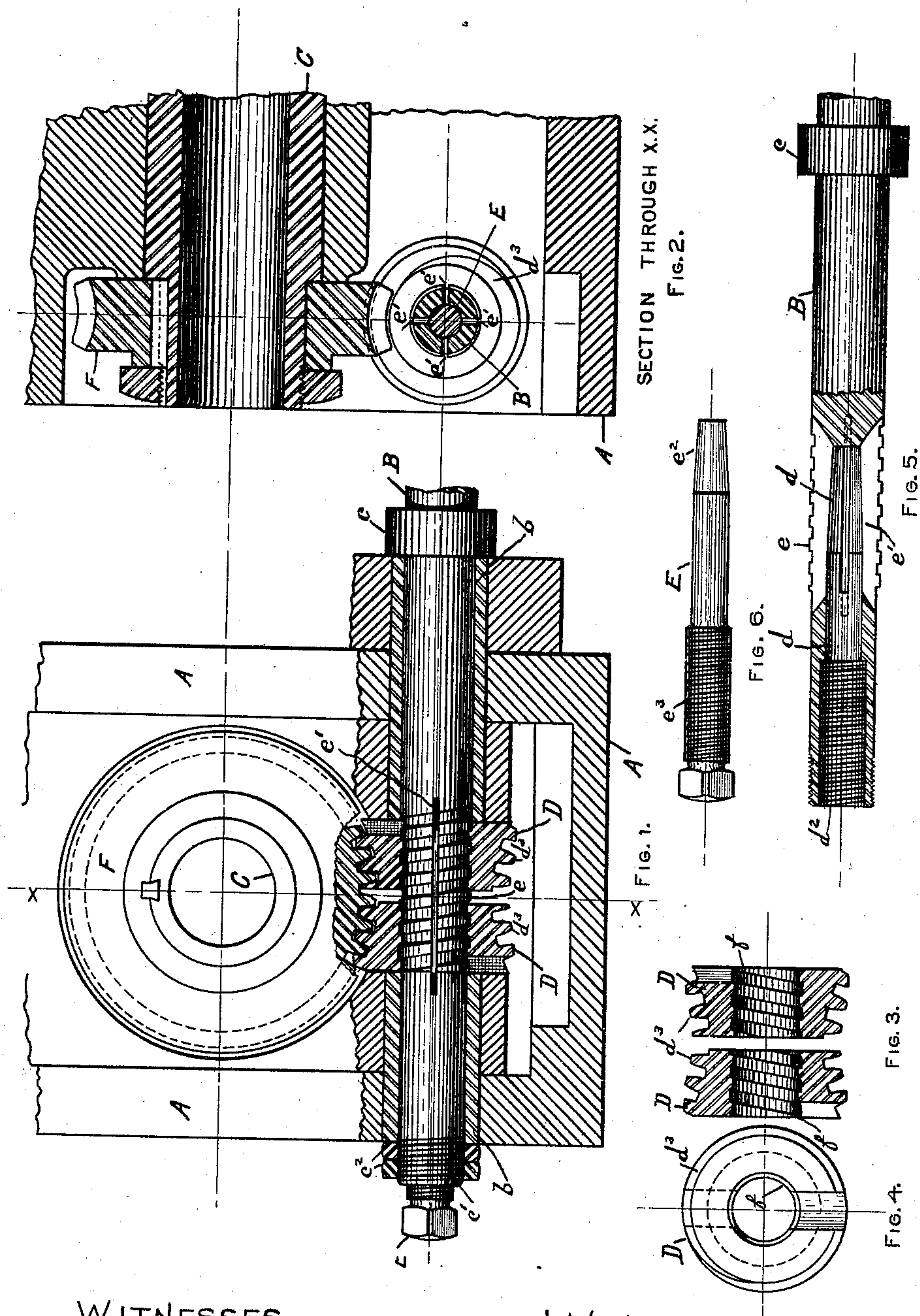


(No Model.)

O. J. BEALE.
WORM AND WORM SHAFT.

No. 472,517.

Patented Apr. 12, 1892.



WITNESSES.

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OSCAR J. BEALE, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE
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WORM AND WORM-SHAFT.

SPECIFICATION forming part of Letters Patent No. 472,517, dated April 12, 1892.

Application filed July 22, 1891. Serial No. 400,277. (No model.)

To all whom it may concern:

Be it known that I, OSCAR J. BEALE, of the city and county of Providence, in the State of Rhode Island, have invented certain new and
5 useful Improvements in Worms and Worm-Shafts; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description
10 thereof.

My invention relates to improvements in worms and worm-shafts for imparting motion to a co-operating worm-wheel; and the object of my invention is to provide for an adjust-
15 ment of the parts to take up wear and prevent backlash without changing the distance between the axis of the worm-shaft and the axis of the worm-wheel.

To that end my invention consists in the
20 combinations and arrangements of parts hereinafter described.

Referring to the drawings, Figure 1 is a front view, partly in section, of my improved worm-shaft and worms, in combination with
25 the co-operating worm-wheel, a portion of the teeth on which are shown in section. Fig. 2 is a section on the line $x x$ of Fig. 1. Fig. 3 is a central longitudinal section of the two worms detached from the worm-shaft. Fig.
30 4 is an end view of one of the worms. Fig. 5 is a view, partly in section, of the worm-shaft; and Fig. 6 represents a screw-threaded pin for expanding the worm-shaft to hold the worms thereon in the manner shown in the
35 drawings.

A represents a suitable frame for supporting the parts.

B represents the worm-shaft, and C the worm-wheel shaft. The worm-shaft B is
40 mounted in bearings b , inserted in the frame, and is provided with a collar c , and at its free end with an exterior screw-thread c' and check-nuts c^2 for taking up end-play. The end of the worm-shaft B is bored out to form
45 a central recess d , the inner end of said recess being tapering, as at d' , and the outer end of said recess being provided with an interior screw-thread d^2 , all as shown in Fig. 5. The worm-shaft B is also provided at the point
50 where the worm or worms are to be secured

with an external screw-thread e , and also with a series of slits or slots e' , which extend through to the recess d , as shown in Fig. 2.

D represents the worm, which is of tapering form, as shown in the drawings, and which
55 is provided with the usual worm-thread d^3 . The worm D is also provided with an interior screw-thread f for engaging the screw-thread e on the worm-shaft, both of the threads e and f being of the same pitch as the worm-
60 thread d^3 .

Preferably I employ two tapering worms D, arranged as shown in the drawings, each of said worms being provided with an interior
65 screw-thread f to engage the screw-thread e on the worm-shaft. To hold the worm or worms D firmly upon the worm-shaft and so that they will rotate therewith, a screw-threaded pin E is fitted to enter the recess d in said
70 shaft, said pin being tapered at its end, as at e^2 , to fit the tapering portion d' of said recess, and being provided with a screw-thread e^3 to engage the screw-thread d^2 in said recess. The worm or worms D having been screwed
75 onto the shaft B, it will be seen that by turning the pin E in a direction to force its tapering end into the tapering recess in the shaft the walls of the hollow portion of said shaft will be expanded, so as to firmly hold the worm
80 or worms upon the shaft, such expansion being permitted by reason of the slits e' .

The worm-wheel F is secured to its shaft C in the usual manner in a position to be engaged and operated by the worm or worms D
85 upon the worm-shaft.

The parts when new are to be assembled in the position shown in Fig. 1—that is, with the two worms D separated from each other to the fullest extent. If now after a period of
90 use either the worm or the worm-wheel, or both, become worn, such wear may be readily taken up in the following manner: By turning the screw-threaded pin E in a direction to withdraw the same the worms D will, by reason of the contraction of the split portion
95 of the worm-shaft, be released, so that they may be readily turned upon said shaft, and by turning said worms they will, by reason of the screw-threaded connection between said worms and shaft, be made to approach each
100

other, which will result, as will be apparent, in bringing portions of the worm which are of larger diameter in contact with the worm-wheel, thus taking up the wear. When the worms have been thus adjusted, the screw-threaded pin is again screwed in, so that its tapering end will expand the split portion of the shaft, and thus hold the worms firmly in their adjusted position. It will be seen that by the adjustment thus effected the distance between the axis of the worm-shaft and the axis of the worm-wheel is in no way changed or effected, and, further, that by reason of the fact that the screw-threads *e f* on the worm-shaft and worms, respectively, are of the same pitch as the worm-threads said worm-threads upon the two worms will always match with each other, and so that one forms practically a continuation of the other, and both of said worm-threads will likewise always match with the teeth of the worm-wheel in any and all adjusted positions of the worms.

If desired, only one tapering worm need be employed, the adjustment of which will take up the wear in the same manner as above described, although, as stated, I prefer to employ two such tapering worms adjustable toward and from each other lengthwise of the

worm-shaft, as thereby a greater extent of contact with the worm-wheel is secured.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a worm-shaft, of two tapering worms mounted upon said shaft, both said shaft and worms being provided with screw-threads of the same pitch as the worm-thread, whereby said worms may be adjusted lengthwise of said shaft without changing the relation of the worm-threads thereon, and means for holding said worms in any adjusted position upon said shaft, substantially as described.

2. The combination of a worm-shaft provided with a central recess *d*, tapering at its end, and with slots *e'*, a tapering worm mounted upon said worm-shaft, and a screw-threaded pin *D*, fitted to enter the recess *d* in said worm-shaft and provided with a tapering end, whereby said tapering worm may be firmly held in position upon said worm-shaft, substantially as described.

OSCAR J. BEALE.

Witnesses:

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