May 12, 1942. W. A. PERVIER 2,282,743

WRENCH

Filed April 24, 1941

Fig. 1

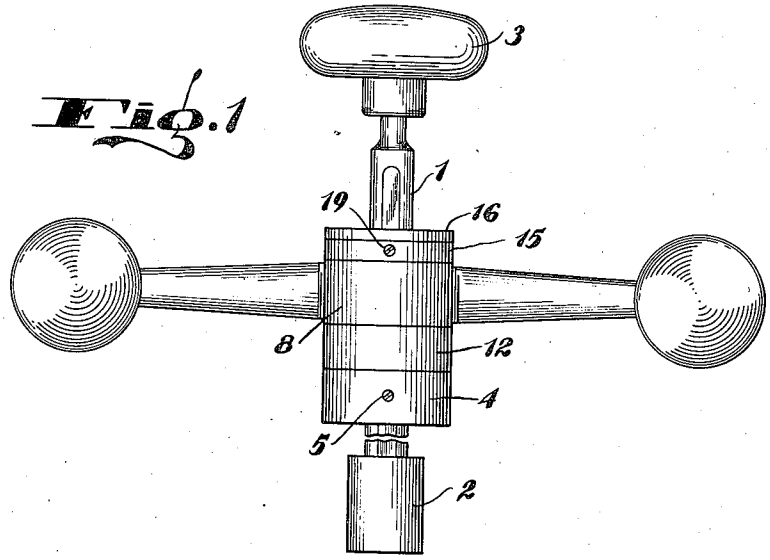


Fig. 2

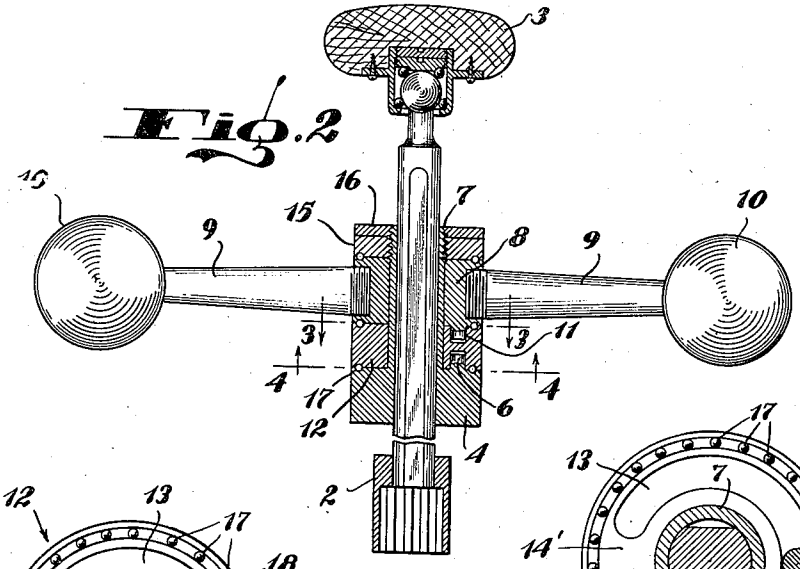


Fig. 3

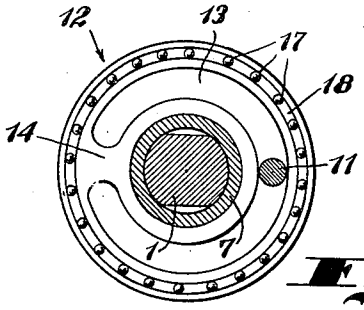
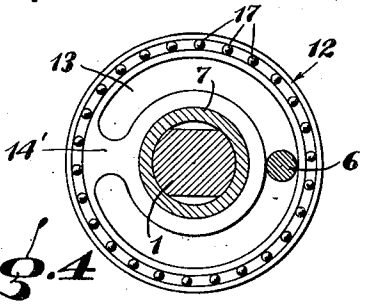


Fig. 4



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2,282,743

WRENCH

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Application April 24, 1941, Serial No. 390,079

5 Claims. (Cl. 81—53)

The invention relates to an improvement in wrenches of a type especially designed for turning nuts on, or off.

The objective purpose of the invention is to provide a wrench which will lessen the manual labor attending the turning of a nut, both for applying it and for removing it.

The invention resides in the idea of utilizing the force generated by the momentum of a mass moving at a relatively high speed for obtaining the objective purpose, together with the means by which this idea is physically attained.

The mode of attainment can best be seen and understood by reference to the drawing, in which

Fig. 1 shows the wrench in side elevation.

Fig. 2 is a vertical section to the body of the wrench as shown in Fig. 1.

Fig. 3 is a cross section on the line 3—3 of Fig. 2.

Fig. 4 is a cross section on the line 4—4 of Fig. 2.

Referring to the drawing, 1 represents the shank of the wrench bearing at one end a socket 2 by which the wrench is applied to a nut; and on its other end a handle 3 which is preferably flexibly secured to the end of the shank in known manner.

Arranged upon the shank 1, between the socket and handle, is a collar 4. This collar is affixed to the shank preferably by means of a sunken set screw 5. The collar 4 constitutes a driven member, inasmuch as forces, as will presently be explained, are brought to bear upon this member for turning it, and thereby turning the shank and socket. The member 4 is provided with a short upstanding post 6 through which it is turned. This post is arranged adjacent the peripheral edge of the member, but removed from it. The member 4 has also extending from it a relatively long sleeve 7 extending in the direction of the handle, and embracing the body of the shank.

Arranged upon the sleeve 7, and turnable freely thereon, is a collar 8 which is provided on either side thereof with outstanding arms 9 bearing knobs 10 on their ends. The member 8 thus provided with arms and knobs forms a relatively weighty member and may be turned in either direction by one grasping one or the other of the knobs and exerting a whirling motion. The member 8 constitutes a driving member, and exerts a driving force through a post 11 affixed to it at a point adjacent the peripheral edge of the member, but inwardly removed from it.

Interposed between the driven member 4 and the driving member 8, and freely rotatable upon the sleeve 7, is a collar 12 constituting a combination driven and driving member for it is driven, in rotary direction, by the member 8 as this member is turned and its turning acts to drive in rotary direction the driven member 4. The member 12 has formed or incised in the top thereof a circumferential slot 13 which is a complete circular slot excepting for a relatively short arcuate portion 14 which forms a stop at the respective ends of the slot. The slot 13 occupies a position adjacent the peripheral edge of the member 12, but inwardly removed from it; in fact its position, with relation to the axis upon which it turns, is the same as that occupied by the post 11 on the member 8 with relation to like axis. Thus, when the members 8 and 12 are brought together, the post 11 on the member 8 will fit within the slot 13 and turn freely therein in either direction until it encounters the stop 14 at one or the other of the ends of the slot, depending upon the direction the member 8 is turned. Formed within the under side of the member 12 is a circumferential slot 13' which, like the slot 13, describes a complete circle excepting for a short arcuate portion 14' forming a stop at the respective ends of the slot. This circumferential slot 13' occupies the same relative position in the member 12 as does the slot 13, and it also occupies a position, with relation to its axis of turning, the same as the post 6 on the member 4 with relation to the same axis. Thus the post 6 will fit within the slot 13, when the members 12 and 4 are brought together, and the member 12 turns freely with relation to the member 4 until its post 6 engages the stop 14' at one end or the other of the slot 13', depending upon the direction the member 12 is turned.

The members 4, 8 and 12 are held in proper conjunctive relation to each other by means of a collar 15 affixed to the sleeve 7 above the member 8 on said sleeve. Surmounting the collar 15 is an adjusting nut 16 which is threaded to the end of the sleeve. All the members 4, 8, 12 and 15 are mounted to turn freely with relation to each other, there being located between them ball bearings 17 which run in suitable circular raceways 18 formed in the respective members. These ball bearings are preferably located adjacent the peripheral edges of the respective members, outside the posts and slots previously referred to. When the members have been brought together to turn freely with relation to each other, and the ball bearings properly re-

tained to run within their respective raceways, which adjustment may be brought about through turning of the adjusting nut 16, then the collar 15 is securely fixed to the shank 1, as by a sunken set screw 19. Afterwards the adjusting nut 16 may be turned down and set against the member 15.

The operation is as follows: First, with relation to the application of a nut by turning the member 12, which forms the initial driving force, in a clockwise direction. Before this operation takes place the members 8 and 12 are turned to a position where the posts 6 and 11 will lie at the ends of the slots 13 and 13' in the member 12, adjacent the stops 14 and 14' at the ends of the respective slots, and will be located at such ends of the respective slots that, in the ensuing turning operation, there will be free motion of the posts in the slots, or, in other words, the posts will idle along the slots until they engage the stops 14 and 14' at the opposite ends of the slots from those ends adjacent which the posts were initially set. In consequence, when the number 8 is swiftly turned, by application of force to one of its ball carrying arms, this member will turn freely through a distance slightly less than a complete circle before the post 11 carried by it has reached a position to turn the secondary member 12, whereupon this member, by the driving force initially given, will turn freely through a distance slightly less than a complete circle before any application of power is made to turn the driven member 4 and shank 1 to which this member is secured. In consequence, through the momentum acquired by the driving parts, and especially that of the weighted driving element 8, there will be stirred up a considerable amount of potential energy for turning the nut; in fact, if the nut in its application offers but little resistance to turning, it can be turned down to a position just short of its final set position by a single whirl of the driving member 8. After the nut has reached a position just short of its final set position, where the resistance to its turning is increased, then the operation is repeated, whereupon the nut will be turned, as by a sharp blow, into its final set position.

The removal of a nut is accomplished by an initial setting of the parts, and movement reverse to that previously described. If the nut be hard set it may require one or more whirls of the weighted member 8, productive of hard, quick blows, to start it, after which its more easy resistance to turning may enable the nut to be turned entirely off by a single whirl of the weighted member 8.

Thus the objective end is attained. When the nut is reaching a set position, or is being turned away from a set position, it will offer a maximum of resistance to its turning. Consequently the mass is moved to acquire a high degree of momentum and is suddenly stopped, with the resultant action of striking the nut a quick hard blow for turning it, the forces being concentrated in the turning influence, and which are brought to a quick stop. On the other hand, if the nut be loose and turn more or less freely, then the force, developed by the momentum of the moving mass, is a protracted turning force which will operate to turn the nut through different phases of rotation, depending upon its resistance.

I claim:

1. In a wrench the combination comprising a shank with a work engaging end, a rotary driven member fixed to said shank for turning it, a primary driving member freely rotatable in its relation to said shank and provided with means by which it may be manually rotated and momentum acquired, a secondary driving member freely rotatable in its relation to said shank, means connecting said driving members whereby said secondary driving member may be turned by and after a period of free rotation of said primary driven member, means connecting said secondary driving member and said driven member whereby said driven member may be turned by and after a period of free rotation of said secondary driving member, means whereby said primary driving member may be maintained to freely rotate in relation to said secondary driving member within the limits afforded the free rotation of said primary driving member when said primary and secondary driving members are held nested together, means whereby said secondary driving member may be maintained to freely rotate in relation to said driven member within the limits afforded the free rotation of said secondary driving member when said secondary driving member and said driven member are held nested together, and means for maintaining said members in nested relationship to each other.

2. In a wrench the combination comprising a shank with a work engaging end, a rotary driven member fixed to said shank for turning it, a primary driving member freely rotatable in its relation to said shank provided with means by which it may be manually rotated and momentum acquired, a secondary driving member freely rotatable in its relation to said shank, means connecting said driving members whereby said secondary driving member may be turned by and after a period of free rotation of said primary driving member, means connecting said secondary driving member and said driven member whereby said driven member may be returned by and after a period of free rotation of said secondary driving member and after not less than a complete rotation of said primary driving member, means whereby said primary driving member may be maintained to freely rotate in relation to said secondary driving member within the limits afforded the free rotation of said primary driving member when said primary and secondary driving members are held nested together, means whereby said secondary driving member may be maintained to freely rotate in relation to said driven member within the limits afforded the free rotation of said secondary driving member when said secondary driving member and said driven member are held nested together, and means for maintaining said members in nested relationship to each other.

3. In a wrench the combination comprising a driven member including a work engaging end rendered active on the turning of said driven member, a primary driving member having a period of free rotation, a secondary driving member having a period of free rotation, means whereby said primary driving member may have engagement with said secondary driving member for turning it after a period of free rotation of said primary driving member, means whereby said secondary driving member may have engagement with said driven member for turning it after a period of free rotation of said secondary driving member and only after not less than a complete revolution of said primary driving member, means including friction reducing bearings whereby said driving member may be maintained

to freely rotate in relation to said secondary driving member within the limits afforded the free rotation of said primary driving member when said primary and secondary driving members are held nested together, means including friction reducing bearings whereby said secondary driving member may be maintained to freely rotate in relation to said driven member within the limits afforded the free rotation of said secondary driving member when said secondary driving member and said driven member are held nested together, and means for maintaining said members in nested relationship to each other.

4. In a wrench the combination comprising a driven member including a work engaging end rendered active on the turning of said driven member, a rotatable driving member having a period of free rotation, a secondary driving member having a period of free rotation, means including a slotted way and a pin entering said way whereby said primary driving member may have engagement with said secondary driving member for turning it after a period of free rotation of said primary driving member, and means including a slotted way and a pin entering said way whereby said secondry driving member may have engagement with said driven member for turning it after a period of free rotation of said secondary driving member and only after a complete revolution of said primary driving member, and means for maintaining said members in nested relationship to each other.

5. In a wrench the combination comprising a driven member including a work engaging end rendered active on the turning of said driven member, a rotatable driving member having a period of free rotation, a secondary driving member having a period of free rotation, means including a slotted way and a pin entering said way whereby said primary driving member may have engagement with said secondary driving member for turning it after a period of free rotation of said primary driving member, and means including a slotted way and a pin entering said way whereby said secondary driving member may have engagement with said driven member for turning it after a period of free rotation of said secondary driving member and only after a complete revolution of said primary driving member, means for maintaining said members in nested relationship to each other, and friction reducing bearings between said members lying outwardly beyond the slotted ways and pins entering said ways.

WILLIAM A. PERVIER.