Sept. 3, 1935. J. PEHRSSON 2,013,065

ADJUSTABLE WRENCH

Filed July 14, 1933

Fig. 1

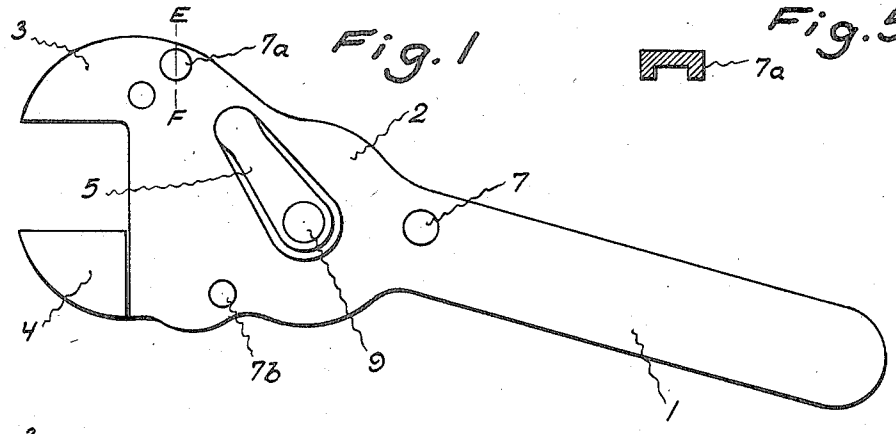


Fig. 5

Fig. 2

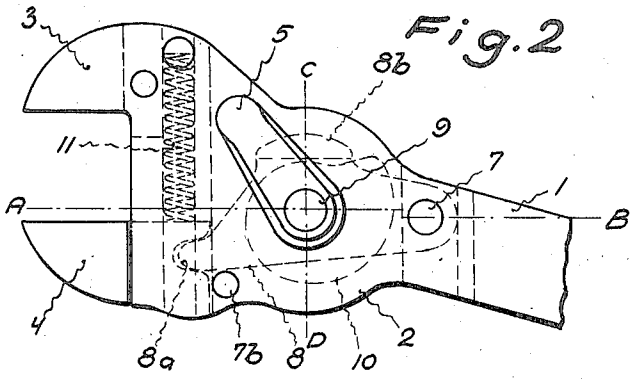


Fig. 4

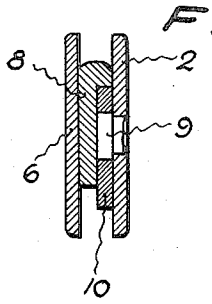


Fig. 3

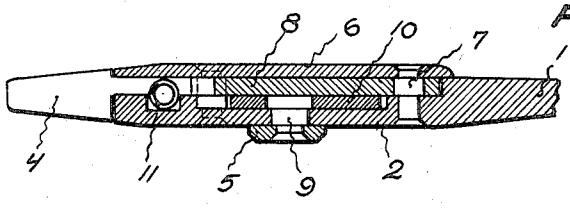


Fig. 6

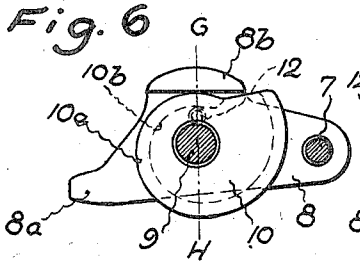


Fig. 7

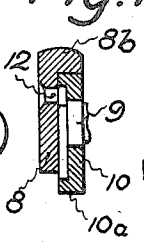


Fig. 8

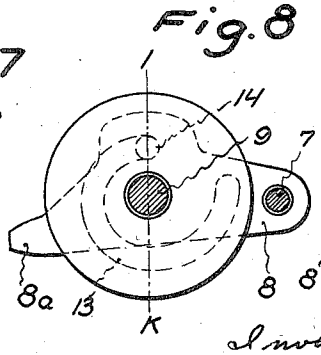
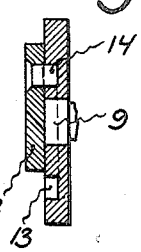


Fig. 9



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UNITED STATES PATENT OFFICE

2,013,065

ADJUSTABLE WRENCH

Johan Pehrsson, Skillingaryd, Sweden

Application July 14, 1933, Serial No. 680,453
In Sweden August 11, 1932

4 Claims. (Cl. 81—128)

My present invention refers to an improvement in adjustable wrenches of the type comprising a fixed jaw rigidly connected with a handle member, and another jaw mounted adjustably in relation to the former and slidably in the handle member, or in a head provided thereon and adapted to support the fixed jaw, an adjusting member being rotatably mounted in, or on, the handle, or head, such adjusting member coacting with the adjustable jaw for the purpose of displacement of the same in relation to the fixed one.

The main object of the invention is to construct the adjusting member in such a manner that it will be self-locking, so that the adjustment and locking of the adjustable jaw may be performed by means of one single manual operation. For this purpose, the adjusting member is constructed in the form of a cam disc having a helically shaped working face, the pitch of the helix of which being everywhere smaller than the self-locking friction angle. By means of a suitable transmission member, preferably a lever, the said cam disc coacts with the adjustable jaw, and the construction is of such a kind that the possibilities for a dead motion are practically eliminated.

Hence, it will be possible, from a greater distance, or gap, between the jaws, by means of a simple manipulation to adjust the wrench to the desired grip rigidly around the nut, or the like, and this rigid grip is not changed or lost, due to torsional forces arising when turning the nut.

The invention has also for its purpose to simplify the mechanical construction of the means required in such a manner that it may be applied to practice without the requirement of any special mechanical exactness.

The invention is illustrated in the accompanying drawing which shows a number of embodiments thereof. In the drawing:—

Fig. 1 shows the exterior of the wrench seen in elevation, and

Fig. 2, in a similar manner, shows the head end of the wrench, the interior mechanical parts of which are shown in dotted lines.

Fig. 3 is a section at the line A—B in Fig. 2, and

Fig. 4 is a section at the line C—D in the same figure.

Fig. 5 is a detail section of a connection rivet at the line E—F in Fig. 1.

Fig. 6 shows a modification of the adjusting means seen in elevation, and

Fig. 7 is a section at the line G—H in Fig. 6.

Fig. 8, in the same manner as Fig. 6, shows another modification of the adjusting members, and

Fig. 9 is a section at the line I—K in Fig. 8.

In the customary manner, the wrench (Fig. 1) consists of a handle 1 provided with a head 2 supporting and embracing the adjusting means, such head being rigidly connected with the fixed jaw 3, an adjustable jaw 4 being slidably mounted in the head 2 in relation to the fixed jaw 3. The adjustment and locking of the adjustable jaw are affected and controlled by the adjusting means which are actuated by means of a lever 5 rotatably mounted exteriorly on the wrench head 2 and shaped so as to form a thumb piece.

In the embodiment according to Figs. 1–3, the adjustable jaw is supposed to be slidable in a direction substantially perpendicular to the direction of length of the handle 1, but naturally it might have been mounted so as to slide substantially parallel to the direction of length of the handle, in case the fixed jaw takes a corresponding position on the wrench head. Hence, the invention is not limited to wrenches having their nut gaps positioned substantially transversely to the handle only.

At the one side, i. e. the upper side in Fig. 3, the wrench head is provided with a recess for accommodation of the adjusting means, and such means are mounted in a protected position covered by a side plate 6 (Figs. 3 and 4) riveted to the wrench head. One of the rivets 7 serves as a pivot for an adjusting lever 8, which in a suitable manner adapted as far as possible to prevent dead motion is hingedly connected with the adjustable jaw 4 slidably mounted in suitable guides in the wrench head 2 and the side plate 6. In constructional respect the said hinge-connection may be brought about in many different ways, for instance by means of an intermediate link member, but the construction shown in the drawing can be considered simpler and more efficient in practice. According to the drawing, the hinge-connection is simply performed by means of a tempered tooth 8^a provided at the free end of the lever 8 and engaging a corresponding recess in the guide flange of the adjustable jaw 4, the width of the tooth being so dimensioned that the recess is substantially completely filled up, but the depth of the recess is so much greater than the height of the tooth that the latter cannot be jammed in the former in any position. It is to be noted that this construction is intended for obtaining a hinge-connection only, and it is not to

be confused for a toothed rack connection intended for transforming a rotational movement into a reciprocating one, or vice versa.

According to the invention, the means for transforming the rotational movement of the thumb piece lever 5 into a reciprocating movement of the adjustable jaw 4 consists of a helical cam disc member connected with said lever and coacting with the adjusting lever 3, and in all of the embodiments shown the said cam member is fixedly connected with the shaft 9 of the thumb piece lever, said shaft being rotatably mounted in the wrench head 2.

In the embodiment according to Figs. 1–4, the outer circumference of the helical cam disc is adapted to actuate an abutment 8^b on the lever 8 for adjustment of the jaws in a direction towards each other, whereas the adjustment of the jaws in a direction from each other is performed by means of a spring 11 inserted between a seat means on the adjustable jaw 4 and a corresponding seat means provided on a connection rivet 7^a (see Fig. 5) between the wrench head 2 and the side plate 6. This spring, acting as a pressure spring, is mounted in a corresponding recess in the guides for the adjustable jaw in the wrench head.

An embodiment of this kind is permissible without inconveniences, as it is the possibilities for dead motion of the jaws in a direction from each other, which are of any influence in practice when using the wrench only, whereas the possibilities for dead motion of the jaws in the opposite direction are of no consequence. In case it is desired that the possibilities for dead motion shall be prevented in both directions, the embodiments described in the following might be adhered to.

In the embodiment according to Figs. 6 and 7, the spring 11 is superfluous, and, besides of the circumferential edge 10^a coacting with the abutment 8^b, the cam disc member 10 is also provided with an inner guiding edge 10^b adapted to coact with an abutment pin 12 fixedly mounted on the lever 8, the position of which in relation to the cam disc 10 being positively determined thereby.

In the embodiment according to Figs. 8 and 9, the position of the lever 8 in relation to the cam disc member is positively determined in a similar manner in that the cam disc is provided with a helically shaped guide groove 13 straddling a pin 14 rigidly attached to the lever 8. In this instance there is no necessity for providing the lever with any abutment means coacting with the circumference of the cam disc, and said circumference may be circular, as indicated in Fig. 8.

In all of the embodiments, at least the helical working face of the cam member performing the advance of the jaws towards each other shall have so small a pitch that it is everywhere smaller than the friction angle, and thereby the adjusting means will be self-locking. In the embodiment according to Figs. 6–9, the working face of the cam member performing the adjustment of the jaws in a direction from each other need not have such a small pitch for a reliable functioning of the wrench (for performing an efficient grip on the nut, or the like), but preferably both of the working faces have the same pitch, and preferably the means coacting with the working faces (the distance between the abutment 8^a and the pin 12 in Fig. 6, and the diameter of the pin 14 in Fig. 8) are constructed in such a manner that the possibilities for a dead motion are prevented in both directions.

As will be understood from Fig. 2, one of the connection rivets 7^b may be used as an abutment coacting with the lever 8 for limiting the relative slidability of the jaws in a direction from each other.

Naturally, all of the constructional members adapted for the adjustment ought to be made from hard steel for the purpose of reduction of the wear, and since the interior space between the wrench head 2 and the side plate 6 is preferably open at least towards one side (compare Fig. 4), a lubrication of the said members may easily be performed.

What I claim and desire to secure by Letters Patent is:—

1. An adjustable wrench, comprising a wrench head, a handle member extending from said head and rigidly connected therewith, a fixed wrench jaw connected with the wrench head and extending therefrom in an opposite direction to the handle, said head having a cavity provided therein, a cam disc member rotatably mounted within said cavity and provided with a helically shaped working face the pitch of which is everywhere smaller than the self-locking friction angle, an adjustable wrench jaw slidably mounted in the wrench head parallel to the fixed jaw, for bodily linear movement transversely of the wrench head and relative to said fixed jaw, and an intermediate transmission member provided between the adjustable jaw and the cam disc member, said transmission member and said adjustable jaw having loosely contacting cooperable members whereby the transmission member can impart lifting motion to said adjustable jaw, means for returning the jaw to its rest position, and a bearing surface on said transmission member and contacting with the helical working face of said cam disc member and adapted to receive motion therefrom.

2. An adjustable wrench according to claim 1, in which the intermediate transmission member consists of a one-armed lever pivotally mounted at its one end to the handle member and engaging a recess in the adjustable jaw at the other, the intermediate portion of said lever being positioned in contact with the working face of the cam disc member.

3. An adjustable wrench, comprising a wrench head, a handle member extending from said head and rigidly connected therewith, a fixed wrench jaw connected with the wrench head and extending therefrom in an opposite direction to the handle, a cam disc member rotatably mounted in the wrench head and provided with a helically shaped working face the pitch of which is everywhere smaller than the self-locking friction angle, a lever means mounted pivotally in the wrench head and provided with an abutment means coacting with the said working face of the cam disc member for adjustment of the adjustable wrench jaw in a direction towards the fixed one, a tooth means provided at one end of the said lever means and engaging a corresponding recess in the adjustable jaw, and means for adjustment of the adjustable jaw in a direction away from the fixed one.

4. An adjustable wrench according to claim 3, in which the adjustable wrench jaw is spring-actuated in a direction from the fixed one.

JOHAN PEHRSSON.