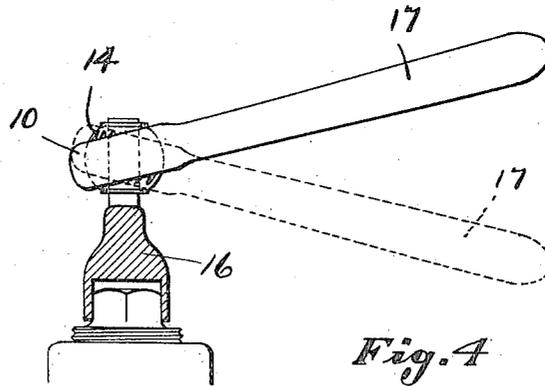
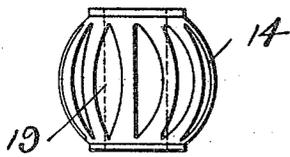
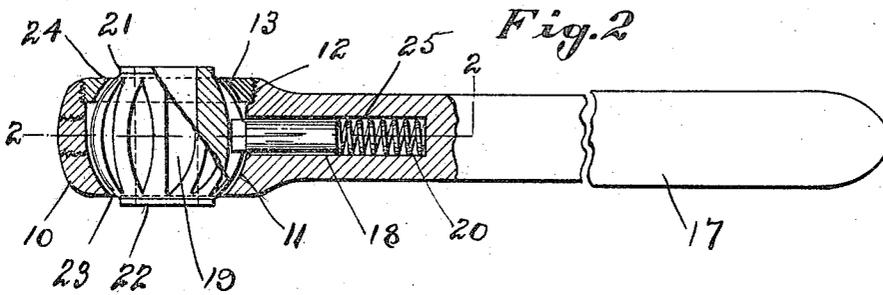
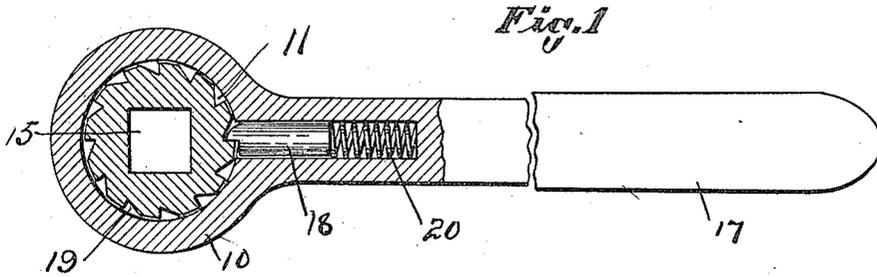


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WRENCH.
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WRENCH.

1,261,092.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRED R. ALLEN, citizen of the United States, and resident of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Wrenches, of which the following is a specification.

This invention relates to a ratchet wrench and has for its object to provide a wrench of this character having a substantially spherical work engaging member mounted in the socket portion of the handle to receive a universal movement therein, said member having teeth on its curved surface engaged by a spring pressed pawl carried by the handle whereby a reciprocating movement of the handle causes a rotary motion of said member, the spherical member being provided with work engaging means, and also with means for limiting the angular movement of the handle relative to the axis of its work engaging socket.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully pointed out in the appended claim.

In the accompanying drawings:

Figure 1— is a sectional view of my improved wrench on line 2—2 of Fig. 2.

Fig. 2— is a side elevation partially in section showing the toothed spherical member mounted in the socket of the handle and engaged by the spring pressed pawl.

Fig. 3— is a side elevation showing a detail of the spherical work engaging member.

Fig. 4— is a reduced sized view illustrating the angular movement of the handle relative to the axis of the work engaging socket of the spherical member.

It is found in practice that in many instances such as on automobiles and the like where space is limited it is very advantageous to have a wrench whose handle is capable of being adjusted or set at an angle to the axis of the work engaging portion and therefore, to accomplish this I have provided a wrench with a substantially circular body portion 10 whose center portion is cut out to form a socket 11. One edge of the socket portion is cut away as at 12 and a collar 13 is threaded therein to provide means for readily positioning the substantially spherical work engaging member 14 into said socket. The center portion 15 of the work engaging member is preferably

formed into a hollow square for the reception of the work direct or of a work engaging tool 16, see Fig. 4. This work engaging member is preferably formed into the shape of a ball or sphere, and the same is provided with longitudinal teeth 19 made in a circular form on its outer surface. The body portion of this wrench is provided with an elongated handle 17 in which is mounted a round bodied pawl 18 pressed outward into engagement with the teeth by the spring 20.

In order to limit the angular motion of the work engaging member in its socket relative to the axis of the handle, so that the sphere will not turn completely around in its socket and close the work receiving aperture therein, I have provided a boss, collar or projection 21—22 about each end of the opening through the work receiving member, which projections are adapted to bring up on the edges 23 and 24 of the socket and so insure the work receiving opening in the member being always in position to receive the work.

In the construction and operation of my improved wrench the body 10 has an elongated handle 17 so that considerable leverage may be applied to the work and the toothed surfaced spherical member is positioned in the socket in this body and the collar 13 screwed into place to hold the sphere in its socket. I have also found it convenient to drill a hole 25 in the handle and insert therein a round bodied spring pressed pawl 18 adapted to rotate in its socket and to engage the teeth in the work engaging member. These ratchet teeth are also of a circular shape extending a portion of the way around the surface of this sphere to permit the axis of the work engaging recess to be rotated in its socket and be moved to an acute angle relative to the axis of the handle.

It will be seen by this construction that when the sphere is rotated in line with the handle, the pawl slides in the teeth and when at a right angle thereto the pawl rotates in its socket and the combination of these two movements permits the sphere to receive a universal movement the extent of which is only limited by the bringing up of its stop collars on the edges of the socket body.

In the operation of ratchet wrenches of the character herein described, there is a

tendency for the operator to rotate the handle upon its axis while moving said handle in an angular position around the work-engaging member. This is because the handle
5 is grasped tightly and the hand of the operator moves in an arc of a circle. Should the pawl cooperating with said work-engaging member be disposed at an angle to the axis of the handle, such angular and rota-
10 tive movements of the handle cause the pawl to travel in an orbit around the handle as an axis. Under these conditions, the different forces acting upon the pawl and the work-engaging member, have the effect of
15 suddenly forcing the handle from its angular position to a central position, at right angles to the axis of the work-engaging member, and this sudden movement is likely to result in injury to the operator, or to the
20 tool, or to both. Should the pawl be rectangular in cross section and offset as described, there would, in addition to the foregoing action, be a tendency to throw the pawl out of engagement with the work-
25 engaging member, and thereby render the wrench useless. Therefore, in those wrenches which employ offset pawls, care must be taken not to rotate the handle upon its axis, and as a consequence efficiency of the tool is
30 greatly impaired by reason of the awkwardness in operation and the necessity for the operator to keep these peculiarities in his mind. By placing the pawl in line with the longitudinal median line of the handle and
35 allowing said pawl to rotate freely, as in the present invention, all of the above mentioned disadvantages are overcome, *i. e.* the handle

may be rotated upon its axis while in operation without affecting the engagement between the pawl and the work-engaging member and without any action tending to disturb the angular relation between the handle and the work-engaging member. Thus the operator does not have to bother about holding the handle in any particular position,
45 and can therefore work more conveniently and effectively.

I claim:

A ratchet wrench of the class described comprising a handle having a spherical
50 socket and also an axial bore therein leading from said socket, said bore extending longitudinally of the handle and in alinement with the medial line thereof, a ratchet-toothed work operating member of substan-
55 tially spherical outline mounted in said socket to receive a universal movement therein, each tooth of said member having a plane pawl-engaging surface adapted to substantially aline with the plane passing
60 through the axis of the spherical socket, and a spring pressed pawl rotatably mounted in said bore and having a plane surface to engage the plane surfaces of the teeth, where-
65 by said member may receive relative universal movement without interfering with the effective action of said pawl.

In testimony whereof I affix my signature in presence of two witnesses.

FRED R. ALLEN.

Witnesses:

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