

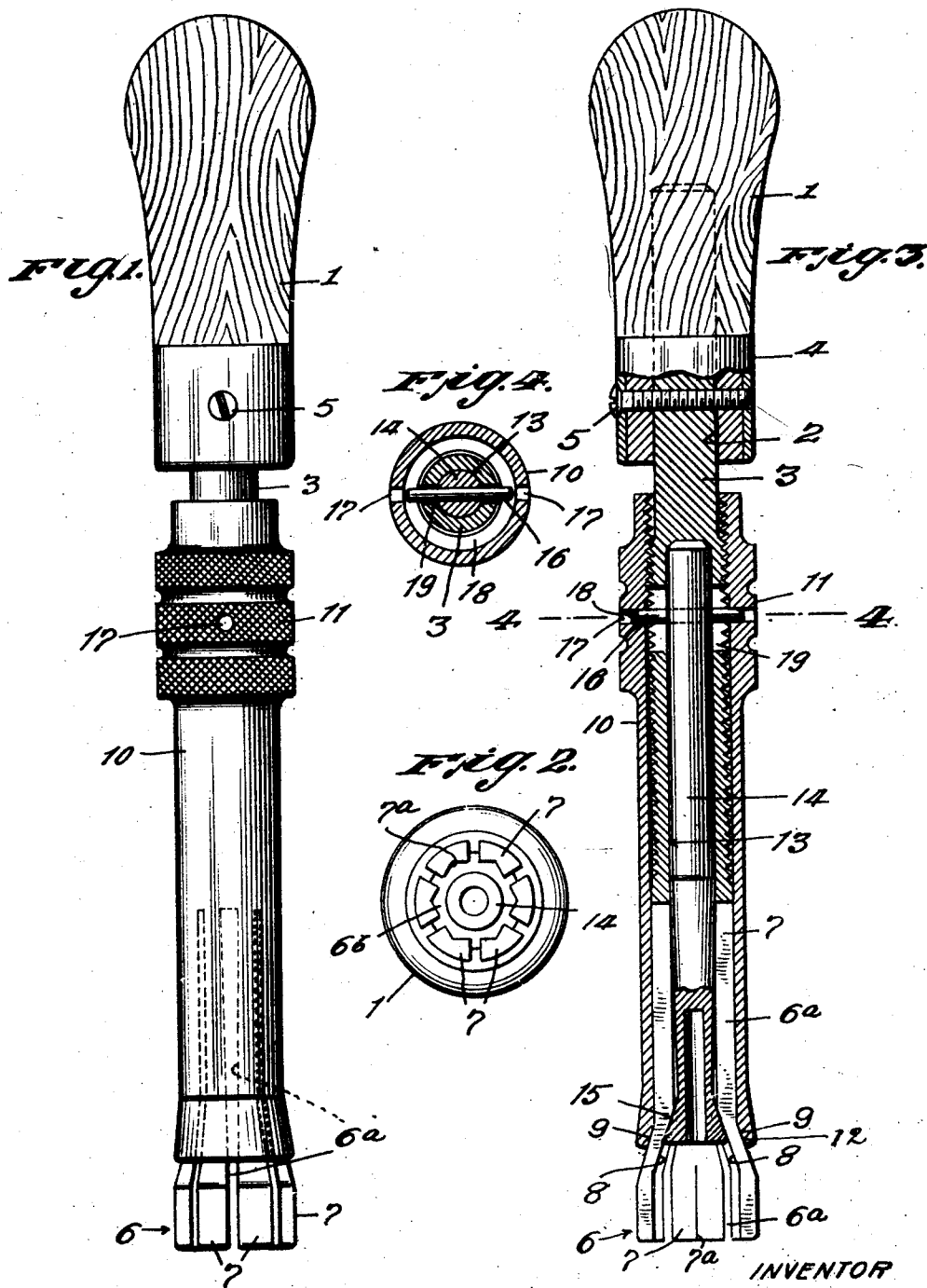
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B. P. KERFOOT

ADJUSTABLE WRENCH

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INVENTOR
BRANCH P. KERFOOT
BY *William P. Hammond*
ATTORNEY

UNITED STATES PATENT OFFICE.

BRANCH P. KERFOOT, OF NEW YORK, N. Y.

ADJUSTABLE WRENCH.

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This invention relates to adjustable socket wrenches for turning nuts and bolts of assorted sizes. It is an object of the invention to provide a wrench having an expandible and contractible socket which may be adjusted to fit various sizes of nuts and which when adjusted for any selected size will retain this adjustment until a different adjustment is desired by the operator.

To this end provision is made of a handle and a sectional spring metal socket directly connected to the handle by a shank which is externally threaded. A contracting sleeve threaded upon the exterior of the shank may be screwed along the shank in one direction to contract the socket and in the opposite direction to permit the socket to be expanded. This contracting sleeve is connected, through suitable means to an expanding core within the shank to simultaneously move the core longitudinally of the shank, so that upon movement of the sleeve in the direction to permit the socket to expand the expanding core is moved with the sleeve to positively expand the socket, and upon movement of the sleeve in the opposite direction to contract the socket the expanding core is moved with the sleeve to permit such contraction. The sleeve and core are thus caused to grip the inner and outer faces of the socket sections firmly between them in all adjusted positions with the result that the nut engaging sections, although of rather light spring metal, are held rigidly and unyieldingly at all times. It is obvious, of course that any adjustment of the wrench may be definitely maintained as long as desired without any danger of accidental disarrangement, due to the fact that the sleeve is inherently incapable of movement longitudinally of the shank except when seized and turned for the purpose of screwing it along the shank.

It is an object of the invention to provide an adjustable socket wrench for use with polygonal nuts having more than four sides, such for example as hexagon nuts. Due to the bluntness of the corners of such polygonal nuts and the obtuseness of the angles of the corresponding socket the sides of the nuts act on the sides of the socket at very favorable camming angles to expand the socket unless the socket is very securely held to its adjusted position. This invention therefore provides a means for rigidly hold-

ing the sections of the socket in any adjusted position.

It is a further object of the invention to provide an adjustable socket wrench so constructed and arranged that every corner of the nut to be turned will be gripped by the wrench, regardless of the adjustment of its socket. To this end the vertices of the socket are located midway of the socket sections, and as many sections are provided as there are vertices.

It is still another object of the invention to provide an adjustable socket wrench wherein the socket sections move in and out by substantially right line movements so that their faces remain parallel or nearly so to the axis of the socket. The socket when expanded is thus enabled to grip the nuts along their entire lengths, the contact not being confined to the upper corners.

Other objects and advantages will herein-after appear.

Figure 1 is a view in elevation of the novel wrench of this invention, with socket shown as hexagonal.

Figure 2 is a bottom plan view of the same; and

Figure 3 is an elevation of the wrench, partly in section.

Figure 4 is a sectional view on the line 4-4 of Figure 3.

The wrench comprises a wooden knob or handle 1, having an opening 2 therein which snugly receives the upper end of a long metal shank 3. The handle 1 is reinforced at its lower end by a metal ferrule 4 and the shank 3 is made fast in the opening 2 of the handle 1 by means of a screw 5 that passes through the ferrule, 4 the bottom part of the handle, and the shank.

The shank 3 extends downward and at its lower end is hollow and is split or sawed along the lines 6^a into a plurality of socket sections 7. As illustrated the socket 6 formed by said sections 7 is hexagonal in form and consists of six separate spring metal fingers or sections 7 of considerable length each of which is inclined outward for a short distance just above the socket forming part to provide external and internal cam faces 8 and 9. The lower ends of the fingers or sections 7 extend straight downward and each has its interior formed to include adjacent halves of two meeting sides of a regular hexagon, the vertex 7^a of the

angle formed by the intersection of the sides being located substantially at the middle of each finger.

The exterior of the shank 3 is threaded to receive an internally threaded contracting sleeve 10. This sleeve 10 has a roughened gripping portion 11 adjacent its upper end whereby it may be held while the handle 1 is turned to screw it along the shank 3. The sleeve 10 is fluted at its lower end to provide an inclined interior cam surface 12 for cooperation with the cam surfaces 8 of the spring fingers 7 to press the fingers toward each other and thereby contract the socket when the sleeve 10 is moved downward along the shank 3.

The interior bore 13 of the shank 3 houses an expanding core 14 which flares outward at its lower extremity to provide an exterior cam surface 15 for cooperation with the interior cam surfaces 9 of the spring fingers 7 to separate them and thereby expand the socket when the expanding core is moved upward along the shank 3.

It is an important feature of the invention that provision is made of means to cause the expanding core 14 to move longitudinally of the shank 3 in unison with the contracting sleeve 10. To this end a pin 16, longer than the internal diameter of the sleeve 10, may be inserted through one of two openings 17 in the sleeve and fixed in the upper end of the core 14 with both of its ends projecting into a circular groove 18 in the inner wall of the sleeve 10. The shank 3 has a longitudinally extending slot 19 along which the pin 16 can travel with the core 14 and the sleeve 10. It will now be understood that when the sleeve 10 is turned relatively to the shank 3 the pin 16 is not rotated with the sleeve, being held against rotation by the walls of the slot 19 but that the pin 16 is nevertheless forced along the slot 19 because of the fact that the ends of said pin are received in the circular groove 18 of the sleeve, so that the core 14 is caused to move along the shank 3 in unison with the sleeve 10.

It will be appreciated, of course, that the sleeve 10 and core 14 will stay in any position to which they are adjusted without any liability of misplacement, and that no amount of outward pressure exerted upon the socket forming fingers by a nut or bolt head will have any tendency to enlarge the size of the socket due to the very high mechanical advantage which the sleeve has over the socket sections as a result of the screw threads and of the cam surfaces 8, 9, 12 and 15. This is particularly important in connection with a socket formed to engage hexagon nuts or other nuts having a large number of sides, because of the fact that the pressure of the nut tending to expand the socket increases as the angles at the vertices of the socket increase.

The division of the socket into as many fingers or sections 7 as the socket has sides and the arrangement whereby the vertices 7^a are located at the middle of the fingers is very important, because it enables a grip to be obtained upon every corner of the nut, whether the socket is expanded or contracted. It is at the corners that pressure can be exerted most effectively to turn the nuts. The wear upon the corners of the socket sections is also greatly reduced with a consequent lengthening of life of the wrench.

The spring fingers 7, forming the socket, extend for quite a distance upward from the portion on which the cam surfaces 12 and 15 act. This allows for lateral spring and longitudinal rigidity. The lateral spring is essential to allow the cooperating cam surfaces to guide the lower end portions of the socket in a substantial right line or parallel face movement and to keep the socket uniform in cross section from top to bottom, expanded or contracted. The longitudinal rigidity is to prevent any undue pressure on the handle from affecting the nut engagement of the wrench socket.

This right line action is obtained by causing the parallel faces 8 and 9 of the fingers 7 to travel between and in contact with opposite parallel faces 12 and 15 of the contracting sleeve 10 and the expanding core 14 is moved upward along the shank, it bends the upper portions of the fingers 7 but the contracting sleeve 10 keeps the flaring portions of the fingers 7 from changing their directions with the result that the socket forming ends are forced from each other but are not caused to diverge. The socket is therefore, capable of gripping the nuts from top to bottom equally and entirely, and not just at their upper extremities where they are apt and subject to be worn round.

While I have described the wrench as adapted for adjustment to hexagonal nuts of various sizes, it is to be understood that the principles of the invention could be applied to square, round or other shaped nuts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a wrench, the combination with a handle and an adjustable sectional socket, of a shank directly and positively connecting the handle and the socket, a contracting sleeve threaded on the exterior of the shank to be screwed in one direction along the shank to contract the socket, and an expanding core within the shank and movable longitudinally of the shank with the sleeve to expand the socket when the sleeve is screwed along the shank in the opposite direction.

2. In a wrench, the combination with a handle, an adjustable sectional socket, and

a shank directly and positively connecting the handle and the socket, of a contracting sleeve threaded on the exterior of the socket, an expanding core within the socket, and
5 means connecting the expanding core to the contracting sleeve for movement along the shank therewith, the contracting sleeve and the expanding core having cooperating cam faces with the socket, forcing it to move in a
10 right line motion.

3. In a wrench, the combination with a handle, an adjustable sectional socket, and a shank directly and positively connecting the handle and the socket, of a contracting sleeve

threaded on the exterior of the shank, and 15 having a circular groove in its inner face, an expanding core within the shank, a pin fixed in the core and projecting through the shank into the circular groove in the contracting sleeve, the shank having a longitu- 20 dinally extending slot in which the pin can travel with the sleeve, and the arrangement being such that the expanding core is caused to travel with the sleeve longitudinally of the shank.

In testimony whereof I have affixed my signature to this specification.

BRANCH P. KERFOOT.