

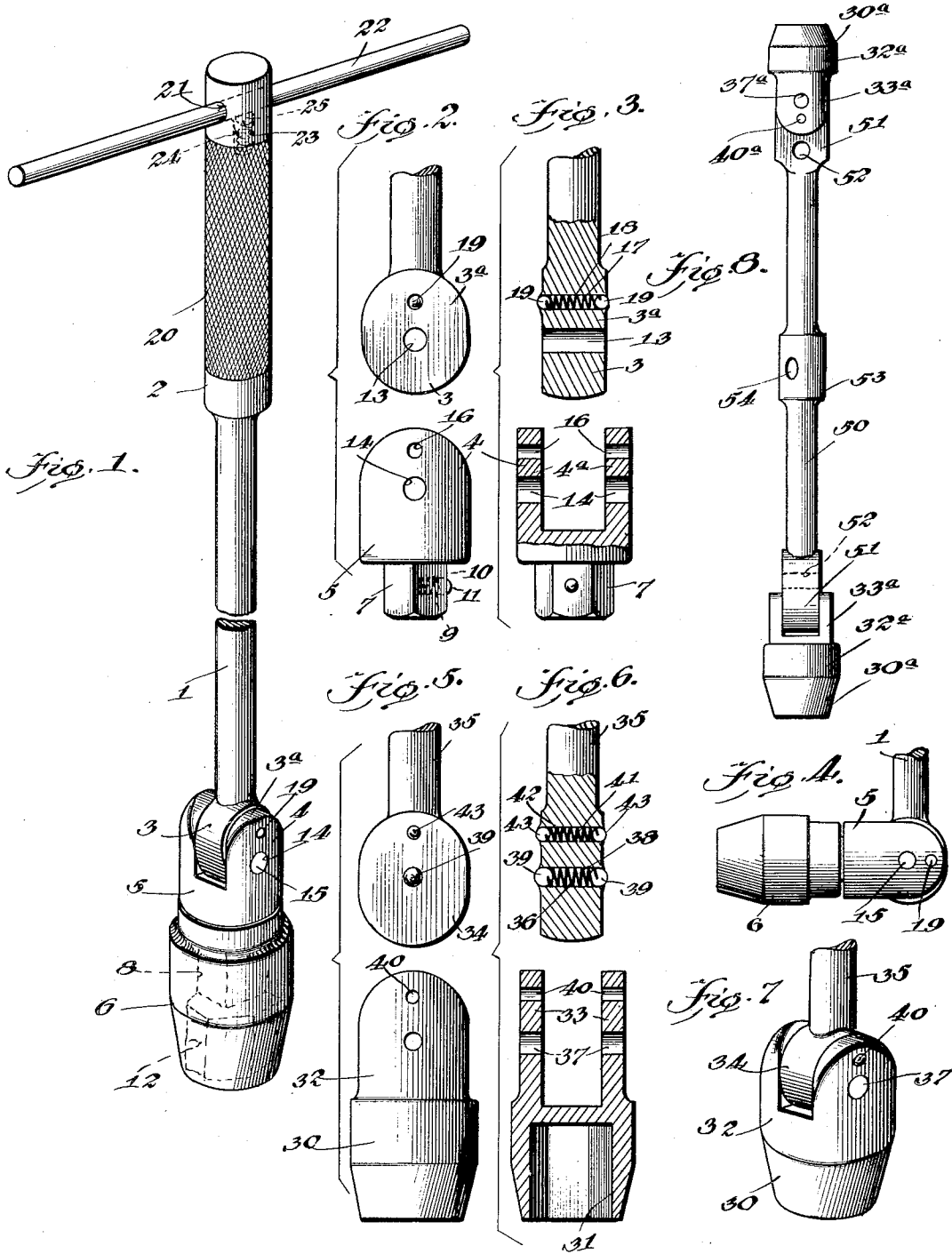
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SOCKET WRENCH

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WITNESSES

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## SOCKET WRENCH.

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My invention relates to improvements in socket wrenches, and it consists in the combinations, constructions and arrangements herein described and claimed.

5 An object of the invention is the provision of a socket wrench having a wrench head hinged to a handle so that the handle may be disposed in axial alignment with the wrench head or at various angles with the axis of the  
10 wrench head and will be held securely, although releasably, against accidental swinging movement independently of the wrench head.

15 A further object of the invention is the provision of a wrench of the character described having novel and efficient spring actuated means for releasably connecting a handle with the wrench head of the device and for securing the handle against swing-  
20 ing accidentally from any one of a plurality of different angularly related positions to the wrench head.

25 A still further object of the invention is the provision in a wrench of the character described of a wrench head which comprises two coengageable separable sections, whereby socket members adapted for engaging with nuts or like members of different sizes and configurations may be used selectively with  
30 the remaining elements of the device.

A still further object of the invention is the provision of a wrench of the character described having socketed wrench heads at  
35 opposite ends of a handle.

Other objects and advantages of the invention will be apparent from the following description, considered in conjunction with the accompanying drawings, in which

40 Figure 1 is a perspective view of a wrench embodying the invention,

Figure 2 is a side elevation of cooperative coengaging elements of the handle and the wrench head of the device separated from  
45 each other.

Figure 3 is a view similar to Figure 2 at right angles thereto with portions of the cooperative elements of the wrench head and handle broken away and other portions being shown in section,

50 Figure 4 is a side elevation of the lower end portion of the wrench shown in Figure 1, showing the wrench head turned at right angles with the handle.

Figure 5 is a view similar to Figure 2,  
55 showing a modified cooperative part of a

wrench head and a handle embodying the invention,

60 Figure 6 is a view of the parts shown in Figure 5, the view being at right angles to Figure 5 and mainly in vertical section, portions of the handle being shown in elevation,

65 Figure 7 is a perspective view of the parts shown in Figures 5 and 6 as they appear when connected together and disposed with the handle in axial alignment with the wrench head, and

70 Figure 8 is a side elevation of a wrench embodying the invention and having wrench heads at opposite ends thereof.

75 A wrench embodying the invention includes a substantially straight rod-like handle 1 which may be enlarged from one end for part of its length as indicated at 2. The opposite end portion of the handle 1 may be enlarged as indicated at 3 to provide an attaching portion. This attaching portion may have substantially flat parallel side faces 3<sup>a</sup> which lie in planes parallel to the longitudinal axis of the handle 1. This attaching portion 3 also may be formed to be substantially circular in configuration in a plane parallel to the axis of the handle 1. The attaching portion 3 of the handle is adapted to fit between the parallel inner  
80 faces 4<sup>a</sup> of ears 4 at one end of a section 5 of a wrench head which also includes a socket member 6. The section 5 of the wrench head has a portion 7 which is non-circular in cross sectional contour and which fits in a socket 8 in the upper end of the socket member 6. The portion 7 of the section 5 of the wrench head is provided with a lateral pocket 9 in which an expansion  
85 spring 10 is compressed between a latching ball member 11 and the inner end wall of the pocket 9. The ball member 11 protrudes from the pocket but is held against moving completely out of the pocket as a result of the actuation of the spring 10 in any suitable known manner, as by having the wall of the pocket 9 swaged inwardly at the outer end of the pocket so as to have a diameter slightly less than that of the ball member 11. However, the spring will function to hold the ball member in frictional engagement with the side wall of the socket 8 and thus will tend to hold the socket member 6 in place on the portion 7 of the section 5 of the head of the wrench. The  
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socket member 6 also has a socket, indicated at 12, in its lower end adapted to receive and engage with a nut, not shown, or like object. The socket 12 may be of any suitable non-circular configuration in cross section. The attaching portion 7 of the section 5 of the head also may be of any suitable configuration in cross section and the socket 8 of course will conform in cross section to the configuration of the portion 7 of the section 5 of the wrench head. It will be understood that a plurality of the socket members 6 may be provided, the respective socket members having sockets 12 of different sizes or different configurations in cross section and these socket members may be used interchangeably and selectively with the section 5 of the wrench head.

The attaching portion 3 of the handle of the wrench is provided with a transverse opening 13 which may be formed through the attaching portion 3 of the handle slightly below the transverse median line of the attaching portion 3 and across the vertical median line of the attaching portion 3. When the attaching portion 3 of the handle is in place between the ears 4, the opening 13 will be in register with transverse openings 14 in the ears 4. A pivot pin 15 extends through the aligned openings 14—13—14 so that the handle 1 is hingedly connected with the wrench head.

The handle 1 thus may be swung from axial alignment with the head of the wrench to positions at various angles to the head. It is desirable that the handle 1 shall be maintained in axial alignment with the wrench head more positively than in any other position and to this end, the ears 4 may be provided adjacent to their upper ends with aligned transverse openings 16. The attaching portion 3 of the handle is provided with a transverse opening 17 in position to register with the openings 16 when the handle 1 is in axial alignment with the wrench head. An expansion spring 18 is disposed in the transverse opening 17 and reacts at its opposite ends against ball-shaped latch members 19 which are prevented from moving completely out of the opening 17 in any suitable known manner, as by swaging the walls of the opening 17 inwardly at the ends thereof to have diameters less than the diameters of the ball members 19. The ball members 19 are permitted to protrude from the opposite ends of the opening 17 into the adjacent ends of the openings 16 when the handle 1 is in axial alignment with the wrench head and a considerable force therefore must be exerted on the handle to swing it from the position shown in Figure 1 to a position at an angle with the longitudinal axis of the wrench head, as for example to position to extend at right angles with the longitudinal axis of

the wrench head, as shown in Figure 4. When the handle 1 is disposed at an angle with the longitudinal axis of the wrench head, the latch members 19 will be pressed by the spring 18 against the walls of the ears 4 and the friction will be sufficient to maintain the handle 1 in a given angular relation with the longitudinal axis of the wrench head until the angular relation of the handle 1 with the longitudinal axis of the wrench head is changed as a result of the application of a considerable force. The enlarged end portion 2 of the handle 1 may be knurled or otherwise roughened for part of its length, as indicated at 20 so that it can be conveniently gripped in the hand of the user. In addition, the upper end portion of the enlarged portion 2 of the handle is provided with a diametrical opening 21 for the reception of a removable cross bar 22 which can be grasped and manipulated to turn the handle 1 about its axis. A vertical pocket 23 is provided in the enlarged end portion 2 of the handle in position to intersect the transverse opening 21. An expansion spring 24 is disposed in the pocket 23 and presses a ball member 25 against the cross bar 22, thus preventing accidental axial movement of the cross bar 22.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. The wrench head and the handle 1 may be disposed at various angles to each other and will be releasably held in any given angular relation by the spring pressed latch means hereinbefore described. The device therefore can be manipulated to turn nuts or similar objects which are located at places inaccessible to a rigid socket wrench. Also, the handle 1 may be swung to a desirable angular relation with the longitudinal axis of the wrench head after the wrench head has been engaged with a nut or like member so that a relatively great leverage may be exerted on the nut or like member to effect turning of the same. The handle 1 will be more securely held in place and against swinging about the axis of the pivot element 15 when the handle 1 is in alignment with the wrench than in any other angular relation to the longitudinal axis of the wrench head. The handle 1 and the section 5 of the wrench head can be used with socket members 6 having sockets 12 of different sizes and configurations formed therein and the device thus is adapted to have a relatively wide range of utility.

The wrench head of the modification which is partially exhibited in Figures 5 to 7 inclusive is formed in a single piece and comprises a socket member 30 having a socket 31 in its lower end of suitable size and configuration in cross section to receive and engage with a nut or other object that is to be

turned. The socket member 30 is integral with a connecting member 32 which has a pair of upstanding spaced ears 33 adapted to straddle an attaching end portion 34 of a stem 35. The attaching end portion 34 is similar to the attaching portion 3 of the handle 1 and is provided with a relatively large transverse opening 36 in the same position in the attaching portion 34 of the handle as the transverse opening 13 in the attaching portion 3 of the handle 1. The transverse opening 36 is adapted to register with aligned transverse openings 37 in the ears 33. The openings 37 are of less diameter than the opening 36. An expansion spring 38 is disposed in the opening 36 between a pair of ball members 39 which are urged to positions to protrude from the ends of the opening 36 into the openings 37, whereby the handle 35 will be pivotally and detachably connected with the member 32 of the wrench head. The ears 33 also are provided with smaller aligned transverse openings 40 and the attaching portion 34 of the handle 35 is provided with a transverse opening 41 which will be disposed in alignment with the openings 40 when the handle 35 is in axial alignment with the wrench head 32—30. An expansion spring 42 is disposed in the transverse opening 41 between a pair of ball-shaped latch members 43 and urges the ball-shaped latch members 43 to positions to protrude from the ends of the opening 41 into the openings 40, whereby the handle 35 will be releasably held in axial alignment with the associated wrench head but can be swung as a result of the exercise of a considerable force to various angles with the longitudinal axis of the wrench head. The ball-shaped latch members 43 will engage with the inner faces of the ears 33 when the handle 35 is in any position to which it may be swung about the aligned axes of the ball-shaped pivot and latch members 39 and thus will tend to maintain the handle 35 in any given angular relation to the longitudinal axis of the associated wrench head. A plurality of the wrench heads 30—32 may be provided, the respective wrench heads being identical with one another in essential respects but having sockets 31 of different sizes or different configurations in cross section and these respective wrench heads may be used interchangeably and selectively with the handle 35.

The modified form of wrench shown in Figure 8 includes a handle 50 having enlarged attaching portions 51 at each of its opposite ends. The attaching portions 51 at the opposite ends of the handle 50 are at right angles with each other. Each of these attaching portions 51 may be identical in essential respects with the attaching portion 34 on the handle 35, the only difference being that the attaching portions 51 are rela-

tively longer than the attaching portion 34. A wrench head is provided for each of the attaching portions 51 and may be identical in essential respects with the wrench head 30—32 and therefore has been indicated by the same reference characters as the wrench head shown in Figures 5, 6 and 7, with the letter *a* added to each of such numerals. Each attaching portion 51 of the wrench handle 50 may be connected pivotally with the ears 33<sup>a</sup> of the associated wrench head in the same manner as the attaching portion 34 of the handle 35 has been described as being attached to the ears 33 of the wrench head shown in Figures 5 to 7 inclusive. Latching means, identical in essential respects with that which has been described as being used with the forms of the device shown in Figures 1 and 5 to 7 inclusive also will be provided for releasably holding each wrench head of the modification shown in Figure 8 against swinging accidentally about the axis of its pivotal connection with the handle 50. The inner end portion of each part 51 of the handle 50 may be provided with a transverse opening 52 through which the cross bar 22 or a similar bar may be projected for use in turning the wrench. In addition, the middle portion of the handle 50 may be enlarged as indicated at 53 and provided with a transverse opening 54 which also is adapted to have the cross bar 22 projected therethrough.

Obviously, the invention is susceptible of embodiment in forms other than those which are illustrated in the accompanying drawings, and I therefore consider as my own all such modifications and adaptations thereof as fairly fall within the scope of the appended claims.

I claim:—

1. A socket wrench comprising a handle, a socket wrench head, pivotal means connecting said handle with said head, the axis of said pivotal means extending at right angles with the longitudinal axis of said handle, the handle having a transverse opening and said head having transverse openings adapted to register with the openings in said handle, when the handle is axially aligned with said wrench head, an expansible spring disposed in said transverse opening in the handle, and a pair of ball-shaped latch members disposed in the opposite end portion of the transverse opening in said handle against the opposite ends of said spring and adapted to be moved by said spring to positions to protrude from the opposite ends of said transverse opening in the handle into the adjacent ends of the transverse openings in the head when said handle is axially aligned with said wrench head and to frictionally engage with the faces of said head when said handle is in angular relation to said wrench head.

2. A socket wrench comprising a handle having an enlarged attaching portion at one end, said attaching portion having a pair of opposite parallel faces, a socketed wrench head having a pair of ears straddling said attaching portion, the inner faces of said ears being disposed flatwise against said parallel faces of said attaching portion, pivot means connecting said attaching portion of the handle with the ears, the axis of said pivot means extending at right angles with the longitudinal axis of said handle, said attaching portion of the handle having a transverse opening and said ears having transverse openings adapted to register with the transverse opening in said attaching portion of the handle when said handle is axially aligned with said wrench head, said transverse openings in said ears being of less diameter than said transverse opening in said attaching portion of the handle, an expansion spring disposed in said transverse opening in the attaching portion of the handle, and a pair of ball-shaped latch members disposed in the opposite end portions of the transverse opening in said attaching portion of the handle against the opposite ends of said spring and adapted to be moved by said spring to positions to protrude from the opposite ends of said transverse opening in the attaching portion of the handle into the adjacent ends of the transverse openings in the ears when said handle is axially aligned with said wrench head and to frictionally engage with the inner faces of said ears when said handle is in angular relation to said wrench head.

3. In a socket wrench, a handle having an enlarged attaching portion at one end, said attaching portion having a relatively large transverse opening formed therethrough and also having a smaller transverse opening located inwardly of said first named transverse opening, both of said transverse openings intersecting the longitudinal axis of said handle, a wrench head having a pair of ears straddling said attaching portion of the handle, said ears having a pair of aligned transverse openings adapted to register with said first named opening in the at-

taching portion of the handle, said ears also having a pair of aligned transverse openings adapted to register with the second transverse opening in the attaching portion of the handle when said handle is axially aligned with said wrench head, coiled expansion springs disposed in said transverse openings in said attaching portion of the handle, ball members disposed at the opposite ends of each of said expansion springs, the expansion spring in said first named transverse opening in the attaching portion of the handle acting to urge the ball members at the ends of said expansion spring to positions to protrude from the ends of said first named transverse openings in the attaching portion of the handle into the associated transverse openings in said ears, whereby said handle will be pivotally and detachably connected with said ears, the expansion spring in the second transverse opening in the attaching portion of the handle acting to urge the ball members at the opposite ends of said second named expansion spring against the inner faces of said ears when said handle is disposed at an angle with the longitudinal axis of said wrench head and into the adjacent ends of the associated transverse openings in said ears when said handle is axially aligned with said wrench head.

4. In a socket wrench, a substantially straight rod-like handle having an attaching end portion enlarged and formed to be substantially circular in configuration in the plane of the longitudinal axis of the handle, said attaching end portion having flat opposite faces, a wrench head having a pair of ears straddling said attaching end portion of the handle, the inner faces of said ears being in contact with said flat opposite faces of said attaching end portion of the handle, pivot means connecting said ears with said attaching end portion of the handle, and a spring pressed ball-shaped latch member carried by said attaching portion of the handle in frictional engagement with the inner face of one of said ears.

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