April 8, 1952 H. F. PHIPARD, JR 2,592,462

RECESSED HEAD FASTENER

Filed Sept. 11, 1951 4 Sheets-Sheet 1

Fig. 1.

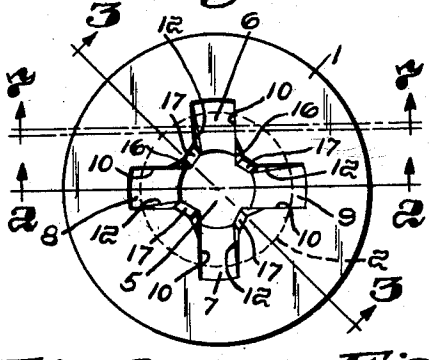


Fig. 2.

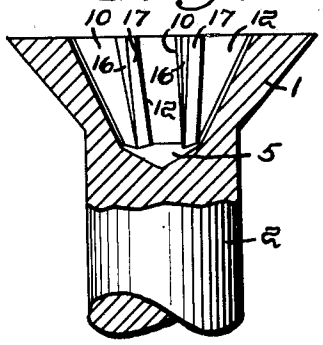


Fig. 3.

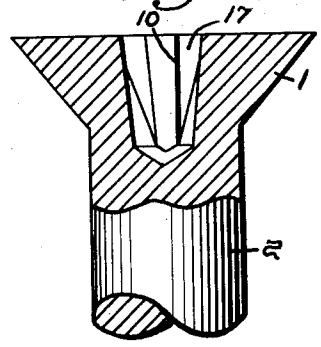
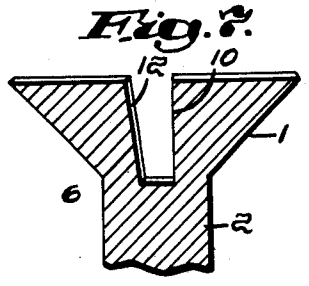


Fig. 4.



Inventor:
Harvey F. Phipard Jr
by James R. Hoddor
Attorney

April 8, 1952 H. F. PHIPARD, JR 2,592,462

RECESSED HEAD FASTENER

Filed Sept. 11, 1951 4 Sheets-Sheet 2

Fig. 4.

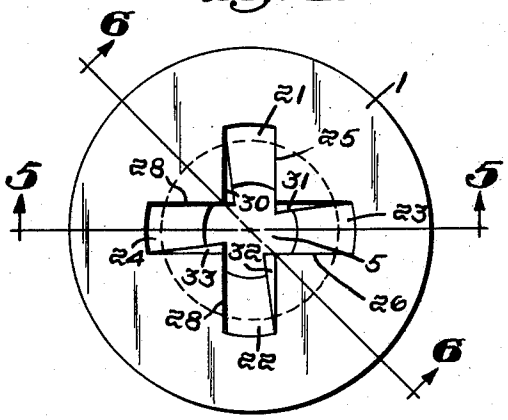


Fig. 5.

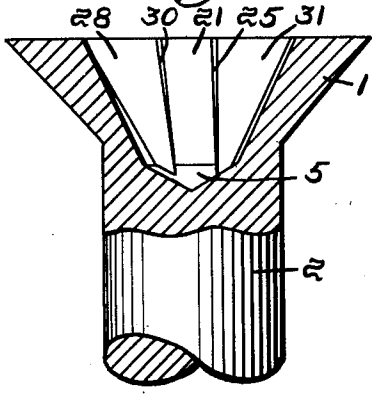
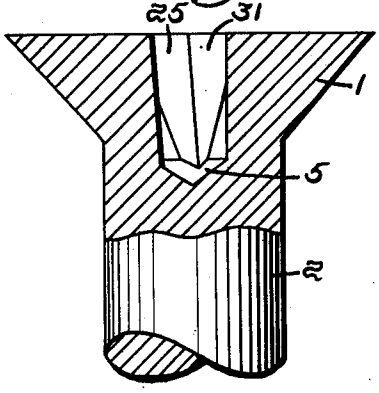


Fig. 6.



Inventor:
Harvey F. Phipard Jr
by James R Hodder
Attorney

April 8, 1952 H. F. PHIPARD, JR 2,592,462

RECESSED HEAD FASTENER

Filed Sept. 11, 1951 4 Sheets-Sheet 3

Fig. 8.

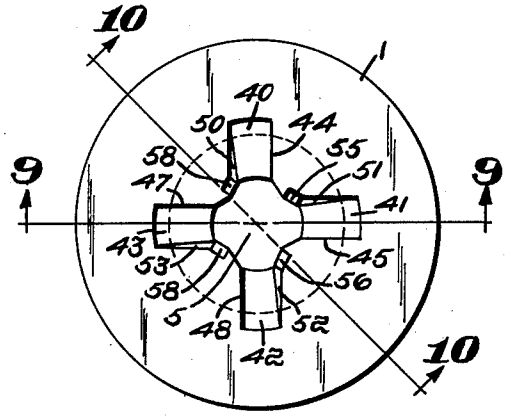


Fig. 9.

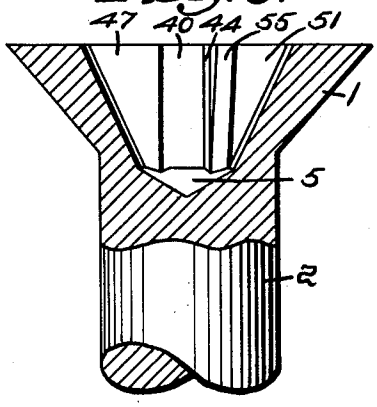
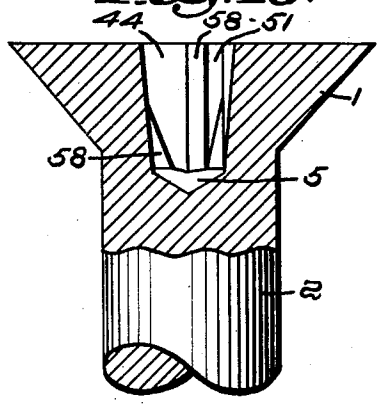


Fig. 10.



Inventor:
Harvey F. Phipard Jr
By James R. Hodder
Attorney

April 8, 1952 H. F. PHIPARD, JR 2,592,462

RECESSED HEAD FASTENER

Filed Sept. 11, 1951 4 Sheets-Sheet 4

Fig. 11.

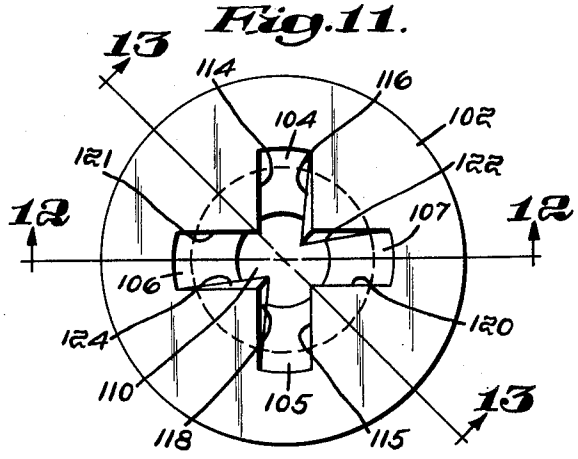


Fig. 12.

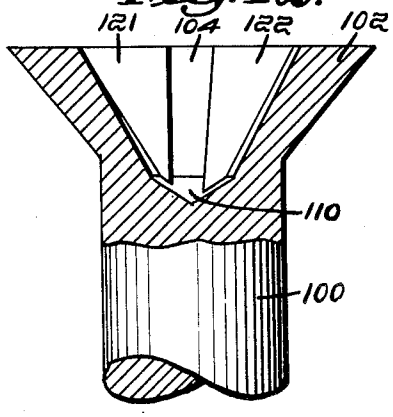
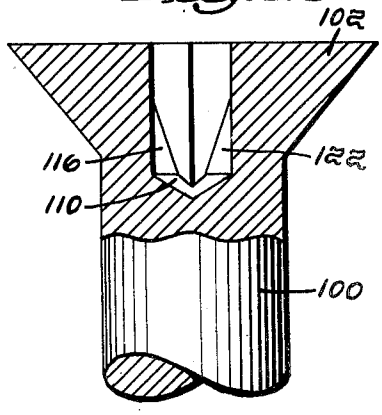


Fig. 13.



Inventor:
Harvey F. Phipard Jr.
by James R. Hodder
Attorney

Patented Apr. 8, 1952 2,592,462

UNITED STATES PATENT OFFICE

2,592,462

RECESSED HEAD FASTENER

Harvey F. Phipard, Jr., South Dartmouth, Mass., assignor to Research Engineering & Manufacturing, Inc., New Bedford, Mass., a corporation of Massachusetts

Application September 11, 1951, Serial No. 246,119

4 Claims. (Cl. 85—45)

1

My present invention is an improved fastener such as a screw, bolt, or the like having a novel formation of head with a recess or socket therein which will cooperate with a driver to afford a direct thrusting portion for driving, in combination with a slanting portion for a wedging action to retain the fastener and the driver in pre-attached or united relationship, the present application being a refiling as a combination and continuation of my prior and copending applications, Ser. No. 727,451 filed February 8, 1947, and Serial No. 38,518 filed July 13, 1948, both now abandoned.

Heretofore it has been customary in the construction of recessed or socket head screws, bolts, wrenches, or the like to provide a series of bevelled surfaces or faces to permit a correspondingly bevelled driving element to afford a wedging action so that the driver could be forced into the socket, and the fastener and driver would remain thus wedgingly pre-united temporarily.

Such a prior construction, shown for example in the so-called Phillips head screw of Patent No. 2,046,839 with slanting or bevelled faces against which the slanting or bevelled element would bear during the turning and driving operation, tended to force the driver and socket head fastener apart axially or lengthwise of the driver and fastener because of the contact of the two bevelled or slanting surfaces. Therefore, considerable pressure was necessary on the driver to hold the same in contact with such bevelled face socket portions, and the driving element would frequently slip or jump out of the socket and damage, injure, and cut the top edge of the same.

A further prior difficulty with such slanting faced socket head fasteners was that a special driver was necessary and usually a special driver for different sized sockets; and, furthermore, an ordinary screwdriver could not be used.

Prior types of sockets with straight flat faces all around the socket recess did not, of course, have any wedging action and, hence, could not be pre-attached before inserting the fastener in the work, and were unsatisfactory in use.

I have discovered a new, novel, and efficient method and construction whereby I am enabled to form a socket head driving recess in the fastening element which will afford a direct thrusting driving face or surface between the driving element and the driven element during the rotation or twisting action of same, in combination with a slanting or bevelled wedging surface, which latter will not tend to set up an axially separating moment, but will hold the driving and driven element in wedging contact at all times.

2

Furthermore, my improved construction will permit either a standard type of screwdriver or a specially formed driver to fit and turn the fastener with my novel socket formation in the head of a fastener.

Also, I have devised a construction with capacity for rotating the fastener in either a clockwise or contra-clockwise direction, thus permitting it to be driven home or retracted outwardly, eliminating any axially separating action, thus preserving the recessed head screw or fastener for re-use.

In carrying out my invention, I provide a socket or recess either diametrically across the head of the screw and within the periphery of the outer portion, or with a plurality of such diametrically formed sockets intersecting at the longitudinal axis of the fastener wherein each thrusting face of the socket is substantially perpendicular to the surface of the driver which engages it; and opposite thereto is a wedging contour cooperating therewith to hold the driving element in contact with the perpendicular thrusting face while affording a wedging connection between the driver and the fastener.

My present invention thus secures the advantages of both a direct ninety degree thrust and a pre-attaching union between a driver and a driven element, either where a specially formed driver is utilized or where an ordinary screwdriver is employed, together with a cooperating wedging face directly opposite the direct thrusting face which thus maintains the wedging connection and prevents the tendency of the thrust of the driver from slipping out of the recess and damaging the socket edges.

Referring to the drawings illustrating preferred embodiments of my invention:

Fig. 1 is a plan view of a fastener with my improved construction of socket or recess head;

Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 1;

Figs. 4, 5, and 6 illustrate a modification of a simpler formation of flat and wedging surfaces; Fig. 5 being a cross-sectional view on the line 5—5 of Fig. 4; and Fig. 6 a cross-sectional view on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary view showing the wedging face slightly exaggerated;

Figs. 8, 9, and 10 illustrate still further modified forms of socket head construction; Fig. 8 being a cross-section on the line 9—9 of Fig. 8;

and Fig. 10 a cross-section on the line 10—10 of Fig. 8; and

Figs. 11, 12, and 13 illustrate a construction for reversing the rotation of the fastener to turn either in clockwise or contra-clockwise direction with equal efficiency.

As shown in the drawings, the fastener element may be of any suitable size and of any desired metal or alloy, my invention being equally useful for screws, nuts, bolts, wrenches, or the like, of any length or diameter, the socket being formed within the perimeter of the head substantially as shown.

Referring to the drawings, 1 indicates the metal of the head and 2 the shank of the fastener, which latter may extend to a threaded end portion. Formed in the head is the socket or recess which will be preferably swaged therein during the heading operation, said socket comprising an axial opening 5 and one or more diametrically opposed openings therefrom. One pair of diametrical opening recesses are indicated at 6 and 7, and in this case a second pair at 8 and 9, these openings extending downwardly a substantial distance in the head, as shown. The pair of diametrically opposite sockets 6 and 7, for example, each have a flat substantially vertical thrust face 10; and cooperating therewith and opposite thereto in each of these diametrical recesses are wedging faces 12, similar flat thrusting faces 10 and wedging faces 12 being provided in the corresponding diametrically opposite openings 8 and 9.

Thus a driver of suitable thickness extending across the diametrical opening pair of recesses 6 and 7, for example, will have one surface forced against the flat faces 10—10 by the cooperating opposite wedging faces 12—12, affording a non-slipping turning or twisting action in the direction of the arrow 15 of Fig. 1, and retain both driver and fastener united, eliminating all tendency for the driver to twist out of the socket.

A similar result is obtained in fitting the driver to the sockets 8 and 9, and where a special four-sided driving tool is utilized, the same would have wings or members fitting in all four socket portions 6 and 7, as well as 8 and 9, with the thrusting surface of each in flat, driving, and non-slipping contact with the corresponding faces 10.

When it is desirable to use a four-pronged or winged special driving element, I prefer to form a plurality of centering surfaces between the adjacent diametrical openings. These are shown as surfaces 16 and 17 which may be, and preferably are, slightly inclined to give an added wedging when a four-pronged special driver is employed and to facilitate the formation of the socket by a swaging operation.

It will thus be seen that I have developed a novel construction for use either with a special driver or an ordinary screwdriver, which will give a perpendicular or right-angled thrusting wall, and directly opposite thereto in the same recessed section and cooperating therewith, a bevelled wedging surface forcing the driving element against the thrusting surface to provide an efficient, non-slipping, non-axial separating, and continuous wedging action to pre-attach and to maintain the driver and fastener together.

Referring to the construction shown in Figs. 4, 5, and 6, in this form the head 1 is provided with a plurality of diametrical pairs of recesses

or grooves 21, 22, 23, and 24, each opening into the central recess 5, and each of these grooves or sockets being defined by vertical wall faces 25, 26, 27, and 28, respectively, together with oppositely cooperating wedging surfaces 30, 31, 32, and 33, respectively, as best shown in Fig. 4. Thus, an extremely simple conformation embodying my combined flat thrusting and cooperating wedging surface is provided capable of being turned either by an ordinary screwdriver fitting across opposite recesses or by a four-pronged driver.

In Fig. 7 I illustrate a fragmentary view of one wing or section of a recess or groove with the straight flat thrusting surface 25 and cooperating opposite bevelled wall 30, the latter being slightly overdrawn.

Referring to the modifications shown in Figs. 8, 9, and 10, I have herein illustrated the plurality of pairs of grooves or recesses 40, 41, 42, and 43, each provided, respectively, with flat thrusting surfaces 44, 45, 46, and 47, together with the cooperating rear wedging faces 50, 51, 52, and 53, respectively. In addition, I provide a further combined wedging and thrusting surface extending vertically adjacent the central opening with each groove or recess as shown at 55, 56, 57, and 58, respectively, as clearly shown in Fig. 8.

Thus I secure a further wedging and thrusting surface where a four-pronged driver, having faces cooperating therewith, is utilized; while when a straight screwdriver is employed spanning the central recess and fitting in a diametrically opposite pair of grooves, these surfaces 55 to 58 are not operative during the driving operation.

Other modifications than those above described and illustrated in the drawings may be utilized, the important and vital feature being the utilization of a direct or substantially perpendicular or right-angled thrusting surface in the head of the fastener of the kind described, wherein the driving torque will be exerted against the driven face of the fastener by the driver, in combination with a separately co-operating wedging surface, which wedging surface does not receive the thrust of the driver.

Hence there is no tendency for the driver to be forced outwardly from the socket, or sockets, as heretofore was present when the bevelled thrusting face received the driving impact.

In my improved fastener, the direct thrusting surface, or surfaces, take all the driving impulse in a perpendicular or right-angled direction, while the cooperating wedging faces simply hold the driving element into contact with the thrusting surface and the driving impulse is exerted at substantially 90° from the driving surface to the other driven surface. Hence, no tendency will exist for the driver to jump out of the recess by axial separation to damage, mar, or burr the head of the fastener. In fact, by having the cooperating rear wedging face holding the driving and driven faces together, any tendency of the driver and fastener to be separated during the driving operation is eliminated, the cooperating contacting faces of the driving element and the fastener being locked into engagement.

Referring to Figs. 11, 12, and 13, I have devised a novel arrangement of recessed or socketed head in a fastener, wherein a direct driving force may be exerted by a cooperating fastener or bit, both to drive the fastener in one direction and to reverse it for removal. Thus, my invention permits both a clockwise and counterclockwise ro-

tative movement to be effected, each with the benefit of a direct thrust in either direction, cooperating with a wedging element, both the driving and reversing force being exerted non-axially and while obtaining the advantages of holding the driver and fastener united.

The present modification is directed to a fastener carrying out the above-noted features, and as in my prior application Ser. No. 38,519 filed July 13, 1948, I have described and claimed a driver particularly designed to cooperate with the form of the recess head in the fastener and to effect a direct driving thrust of 90° either clockwise or counterclockwise, together with independent wedging surfaces to hold the driver and fastener in longitudinal alignment and union during either the driving or reverse rotation.

Thus the central and four side recesses constitute a cruciform slot with the diametrically opposite side walls forming cooperating pairs, one pair being for driving rotation in clockwise direction, and the other pair for driving rotation in contra-clockwise direction, and each side recess is formed with a face to receive a perpendicular driving thrust from the driving element, and with the opposite slot face of sloping form to wedgingly lock the driver into contact with the thrusting face and to pre-attach the fastener on the point of the driving element.

Referring to Figs. 11, 12, and 13, a fastener designated at 101 is preferably provided with a head 102; and formed in the head by swaging or otherwise is a recess of substantial depth, here shown as having four openings or wings 104, 105, 106, and 107, and a central recess 110. The openings or recesses 104 and 105 are each provided with direct driver thrust-receiving faces 114 and 115, respectively, constituting the driving surfaces for rotating the fastener in a clockwise direction.

Cooperating with these thrust-driving faces are bevelled surfaces on the opposite side of the recesses 104 and 105, as indicated at 116 and 118. For reverse or counterclockwise driving, the recesses 106 and 107 have direct driving faces 120 and 121, and cooperating bevelled faces 122 and 124, respectively.

Thus, I am enabled to utilize a driver preferably constructed and arranged with cooperating thrusting and wedging faces to those just described in the recessed head, which will be effective to rotate the fastener in either direction without any separating tendency as the driving force is exerted from a non-bevelled driving face on the driver to a non-bevelled thrust-receiving face on the fastener, thus eliminating all tendency of the driver and fastener to separate longitudinally of their axes and effectually preventing the driver from any tendency to "jump out," separate, or mar the edges of the recess openings in the head of the fastener.

It will be appreciated that the driving bit or tool will be also united to the fastener by the wedging action of the bevelled faces 116 and 118 opposite the thrusting surfaces 114 and 115 for driving in a counter-clockwise direction; while, similarly, for driving in a clockwise direction the thrusting faces 120 and 121 have cooperating bevelled faces 122 and 124 to hold the driver in wedging union with the fastener.

While I prefer to utilize a driving instrument with cooperating surfaces corresponding approximately to the contour of the recesses in the fastener, I may utilize a standard type of screwdriver, which, by spanning the openings 104, 105, or 106 and 107, can be utilized.

I claim:

1. A socket head fastener of the kind described having a central axial socket extending longitudinally in the head and a plurality of radially extending recesses opening from said axial socket and terminating within the periphery of the head, each recess being formed with one wall face parallel to a radial plane including the axis of the fastener and arranged to receive a substantially perpendicular thrusting torque from a driving element, the opposite wall of each recess being formed with a portion slightly inclined with respect to said plane extending inwardly and downwardly and directly opposite said one wall face to constitute a wedging surface to force and maintain the driving element in contact with said thrusting wall.

2. A fastener construction as set forth in claim 1, wherein there are four recesses arranged in symmetrical relation about the central socket.

3. A screw fastener of the kind described having a recess formed within the perimeter of the head, said recess comprising a central opening and side recesses all extending lengthwise from the top of the head into the root diameter of the screw, each side recess having a thrusting face parallel with the lengthwise axis of the fastener to receive perpendicular ninety degrees thrusting forces from a driving element, the opposite wall in each of said recesses being inclined to wedgingly force the driving element against said driving face and to pre-unite in locked assembly the fastener and driving element before the fastener is applied to the work, the recess being of cruciform contour and having four side wings or slots arranged in diametrically cooperating pairs with the thrusting faces of one pair reversed relative to the thrusting faces of the other pair, one pair constituting means for driving rotation in a clockwise direction, and the opposite pair for driving rotation in contra-clockwise direction.

4. A fastener as set forth in claim 3, wherein the side recesses are substantially of equal depth in the head as the central recess, and with the wedging faces extending into the central recess nearer the axis of the fastener than the perpendicular thrusting faces.

HARVEY F. PHIPARD, JR.

No references cited.