

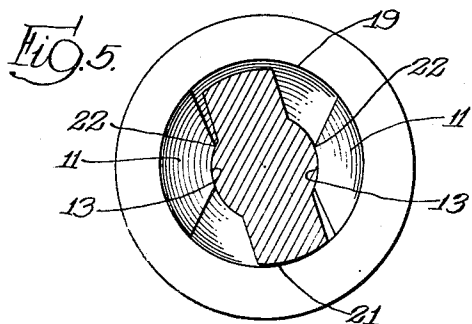
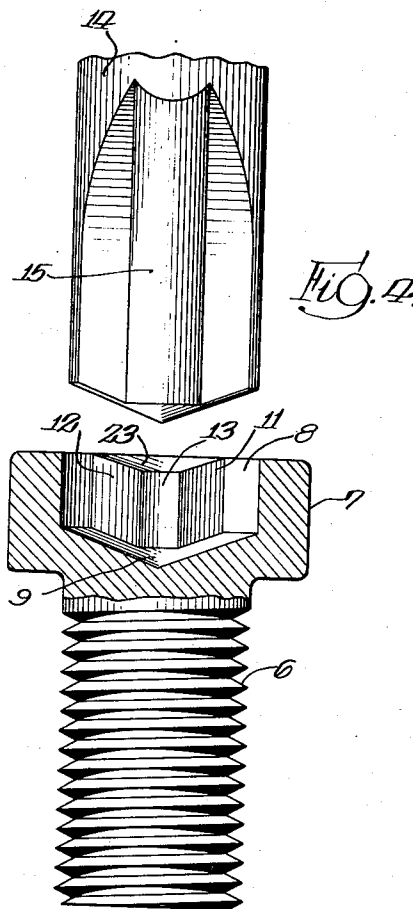
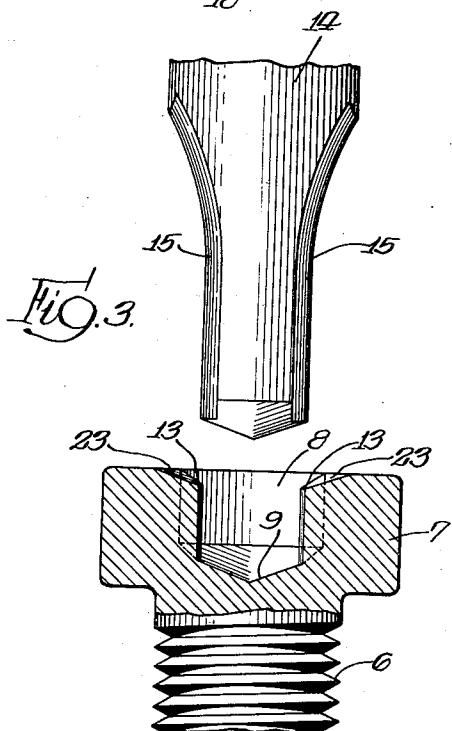
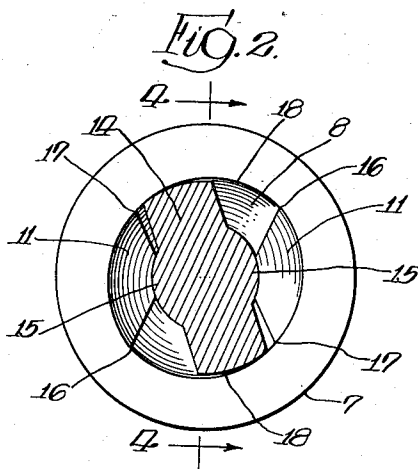
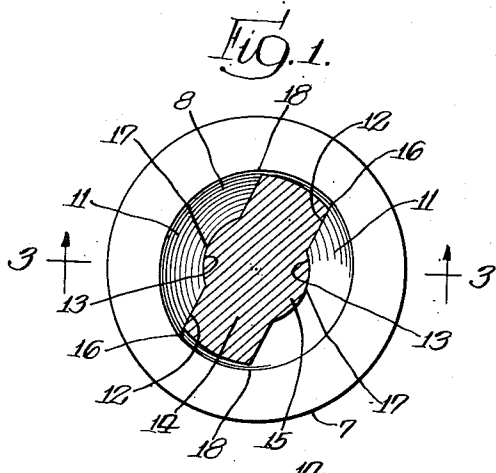
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J. F. FIEG

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SCREW

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INVENTOR.
BY *Joseph F. Fieg.*
Chas. Wilson
ATTORNEY.

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SCREW

Joseph F. Fieg, La Grange, Ill., assignor to United
Screw and Bolt Corporation, Chicago, Ill., a
corporation of Ohio

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5 Claims. (Cl. 85-45)

This invention relates to screws and more particularly to that portion adapted to be engaged by a driving tool for positioning and driving the screw. For illustrative purposes, my invention is disclosed herein as embodied in a machine screw, but the principles thereof are equally applicable to wood screws, set screws, and in fact all types of screws adapted to be inserted by a hand or power driven tool.

In my pending application, Serial No. 167,893, filed October 8, 1937, a screw is disclosed which is adapted to automatically attach itself to the blade of an ordinary screw driver upon reverse rotative movement of the driver relative to the screw so that the screw may be readily positioned and started in locations where it is inconvenient to hold the screw by hand. It has been found, however, that even though such a screw be firmly attached to a screw driver blade, it is not entirely restrained from canting or tilting transversely of the blade. When a screw thus cants and becomes displaced out of axial alignment with the tool, considerable difficulty in starting the screw into an opening may be presented.

My present invention is designed to overcome this difficulty by so constructing the tool receiving socket of the screw and the cooperating driving tool that the screw will not only be firmly attached to the tool but will be maintained in axial alignment therewith so that it can always be presented in proper relation to the opening adapted to receive it even when such opening is in a remote or not readily accessible location.

Another feature of my invention resides in a novel construction by which the screw becomes attached to the tool upon reverse rotation thereof through the gripping action upon the tool of surfaces located respectively remote from and in proximity to the axis of the screw. In other words, instead of relying upon engagement of two clutch walls of the screw socket with both edges of the tool for attaching the screw to the tool, as in my prior application, engagement of one clutch wall with one edge only of the tool is in this instance sufficient to effect the attachment, since additional frictional engagement between the tool and the screw in proximity to the axis of the screw is automatically accomplished with my present construction, as will be later explained.

Other advantages of my present invention will be appreciated as the same becomes better understood by reference to the following description when considered in connection with the accompanying drawing.

Referring to the drawing,

Fig. 1 is a plan view of my improved screw showing in cross section a tool blade positioned in driving relation in the socket of the screw;

Fig. 2 is a similar view showing the tool in reverse position in which the screw is frictionally attached to the tool;

Fig. 3 is a sectional view on the line 3-3 of Fig. 1, but showing the tool in full lines as withdrawn from the socket;

Fig. 4 is a similar view on the line 4-4 of Fig. 2 and looking toward the right in Fig. 3 at the tool; and

Fig. 5 is a view similar to Fig. 2 illustrating the attachment of the screw to the tool even though only one edge of the tool be frictionally engaged by the peripheral wall of the screw socket.

Referring now to the drawing more in detail, reference character 6 indicates generally the body or shank of a screw equipped with any desired type of threads and provided in the present instance with a head 7, although with some types and sizes of screws no enlarged head is formed upon the body. In headed screws, the head may be of the flat type illustrated or of round or other preferred type. Consequently, it should be appreciated that my invention is not restricted to a screw of any particular design either with respect to the head or with respect to the type of thread, or to the purposes for which the screw may be adapted.

In the form of screw here shown, the head is provided with an upwardly opening, longitudinally disposed socket 8 having preferably a conical bottom 9, although a flat or a rounded bottom may be utilized if preferred. The socket is provided with oppositely arranged, inwardly extending shoulders or abutment members 11 each providing an abutment face 12 in position to be engaged by a flat face of a tool positioned concentrically in the socket and rotated in a clockwise direction viewing Figs. 1 and 2 into the position shown in Fig. 1 in which further rotation of the blade will rotate the screw for driving purposes.

The inner ends of the shoulders are grooved from top to bottom, as indicated by reference character 13, the grooves being formed on arcs concentric with the longitudinal axis of the screw. The tool 14 is of a generally flat character but provided at the opposite sides of the transverse axis of the tool with longitudinally extending curved projections or ribs 15. The curved surfaces of these ribs are likewise formed on arcs concentric with the longitudinal axis of the tool

and on substantially the same although slightly shorter radii than the radii of the curved surfaces 13 so that when the tool is axially positioned in the screw socket, the ribs will fairly snugly but rotatably fit within the arcuate guide surfaces 13, as will be apparent from Figs. 1 and 2.

This cooperative engagement between the ribs of the tool and the curved guide surfaces of the screw socket insures axial alignment of the screw and tool and effectively prevents any canting or tilting movements of the screw such as would result in misalignment of the screw and tool and consequent difficulty in starting the screw in an assembly.

For the purpose of attaching the screw to the tool so that it may be positioned for starting by simply manipulating the tool, one or both of the circumferential walls of the socket between the shoulders 11 are formed eccentric to the axis of the screw and socket. In Figs. 1 and 2, the points 16 at the bases of the abutment faces 12 are more remote from the axis of the socket than the points 17 at the bases of the other faces of the shoulders. That is, the circumferential walls 18 of the socket, or at least a portion thereof, between the adjacent abutment faces are formed on progressively shorter radii at progressively increasing distances from the abutment faces 12 of the shoulders. The diametral dimension of the socket is therefore greater on a diameter between points 16 of the faces 12 than it is on a diameter between points 17 of the other faces of the shoulders.

The blade of the tool 14 is dimensioned so that it may be readily introduced and withdrawn from the socket when disposed diametrically of the socket in approximation to the position which it assumes in Fig. 1, from which it will be apparent that considerable clearance is afforded between the edges of the tool blade and the opposed walls 18 of the socket.

In order to attach the screw to the tool for placement and guiding purposes, the tool is simply turned in a reverse or counter-clockwise direction in the socket from the position shown in Fig. 1 to that shown in Fig. 2, thereby bringing the edges of the blade into frictional holding engagement with the walls 18 to lock the screw to the blade so that it may be positioned for driving. When the screw attached to the blade has been properly located, it may be driven in the usual manner, since a partial clockwise rotation of the tool blade will release the friction hold and bring the faces of the tool in abutting relation with the abutment surfaces 12 by which a driving rotation is imparted to the screw from the tool blade.

The frictional holding action between both edges of the tool and the opposed peripheral walls of the socket just described is similar to that disclosed in my pending application above mentioned, but with my present invention frictional engagement between both edges of the tool and the socket is not essential for the attachment of the screw to the tool for reasons which will be apparent from an inspection of Fig. 5.

In this case, one circumferential wall 19 of the socket is shown as formed concentrically with the axis of the socket, while the opposite wall 21 is eccentric like the wall 18 of Figs. 1 and 2. While the dimensions and proportions of Fig. 5 are somewhat exaggerated for illustrative purposes, it will be obvious that counter-clockwise rotation of the tool in the socket into the position shown in Fig. 5 will not produce any en-

gagement between wall 19 of the socket and the adjacent edge of the tool, but such frictional engagement as has been previously described will be produced between the opposite edge of the tool and the eccentric wall 21. The thrust upon the tool occasioned by its engagement with the eccentric wall 21 and which if not opposed would throw the tool out of axial alignment with the socket is resisted by the curved guide surfaces 13 of the shoulders 11 substantially at the areas of the surfaces indicated by reference characters 22.

In other words, engagement of the edge of the tool with the eccentric wall 21 thrusts the ribs of the tool against the opposite sides of the arcuate guide surfaces so that a three-point clamping action between the tool and the screw is produced by the area of contact between the edge of the tool and the wall 21 on the one hand and the opposed areas 22 of the arcuate guide surfaces 13. This clamping action firmly attaches the screw to the tool so that it may be readily positioned by manipulation of the tool, and, at the same time, the engagement between the guide surfaces 13 and the tool ribs prevents canting or tilting of the screw and maintains it in axial alignment with the tool so that it may be accurately positioned and readily started in an assembly.

While in Fig. 5 I have shown the wall 19 as intentionally designed to be free from contact with the edge of a tool positioned in the socket, this wall in practice will usually be made eccentric like the wall 21 or, in other words, both walls will be eccentric as in Figs. 1 and 2. By reason of the fact, however, that the tool will be firmly clamped to the screw by the cooperating action between the ribs and the curved guide surfaces even if only one edge of the tool engages its opposed wall, extreme accuracy in the formation of the eccentric walls and in the dimensioning of the tool is rendered unnecessary. Both the tool and the screw may, therefore, be made more expeditiously and at a less cost than would be involved where extreme accuracy in the manufacture of both were required. Furthermore, the three-point clamping action of the tool gives a more firm and rigid connection between the screw and the tool than the two-point connection at the edges of the tool only, as in my prior application.

To facilitate the introduction of the tool into the screw socket, the end of the tool is preferably tapered, as shown in Figs. 3 and 4, and the exposed faces of the shoulders 11 are downwardly inclined toward the center of the socket, as indicated by reference character 23 in Figs. 3 and 4.

It should be apparent from the foregoing that I have provided an improved screw which is not only firmly attachable to a tool for purposes of placement and starting, but which eliminates canting or tilting of the screw during placement and greatly facilitates the placing and starting of the screw.

While I have shown and described a preferred embodiment of my invention, the structural details thereof may obviously be varied within considerable limits without exceeding the scope of the invention as defined in the following claims.

I claim:

1. A screw having a socket provided with opposed eccentric segmental walls, tool centering means concentric with the screw axis and driving

abutment faces located between the tool centering means and the ends of said eccentric walls most remote from the screw axis adapted to be engaged by a tool of the type having a central portion engageable with said centering means and wings projecting radially therefrom, the width of the tool being less than the maximum diameter of the socket, and the thickness of the wings being less than the width of the socket to permit partial rotation of the tool in the socket, whereby upon rotation of the tool in the socket in one direction one at least of the edges of the wings will frictionally contact the opposed inwardly curved eccentric wall of the socket and thereby frictionally lock the screw and tool together, and upon rotation of the tool in the opposite direction in the socket said frictional contact will be broken and the sides of the wings will be brought into driving engagement with said driving abutment faces.

2. A screw having a socket provided with inwardly extending shoulders shaped at their inner ends to form a pair of opposed concentrically disposed arcuate guide surfaces, one wall of each shoulder forming a driving abutment for engagement by a tool, the circumferential walls of said socket presenting inner faces eccentric to said guide surfaces, adapted to be engaged by a flat driver of the type having opposed lateral projections fitting said guide surfaces, said driver being of a width less than the maximum diameter, but slightly greater than the minimum diameter of the screw socket whereby upon rotation of the tool in one direction the flat faces thereof will engage said driving abutments and upon rotation in the other direction an edge thereof will engage an eccentric face of the socket while the lateral

projections thereof will engage said arcuate guide surfaces to thereby establish a three-point contact friction lock between said screw and tool to maintain axial alignment between said tool and said screw and contribute toward stability of connection between said tool and screw.

3. A screw provided with a transverse tool receiving socket having side walls converging toward the axis of the screw to form driving abutment faces, and provided in proximity to said axis with a pair of opposed concentric guide surfaces to receive correspondingly shaped ribs formed on the faces of a flat tool of less width than the maximum diameter of the socket, a circumferential wall portion of said socket of greater length than the thickness of the tool being eccentric to the screw axis to frictionally engage an edge of the tool when rotated in the socket away from said abutment faces and, in conjunction with said guide surfaces, thereby frictionally lock the screw to the tool and in alignment therewith.

4. A screw provided with a transversely extending enclosed socket, one at least of the end walls of said socket being arcuate and eccentric to the screw axis and the side walls of the socket being converged inwardly from the end walls to form oppositely facing driving abutment faces and provided centrally with opposed arcuate guide surfaces concentric with the screw axis.

5. A screw provided with an enclosed socket having tool guiding means arranged concentric with the screw axis, circumferential wall portions eccentric to the screw axis, and abutment driving faces located between the tool guiding means and those ends of the eccentric wall portions spaced most radially distant from the screw axis.

JOSEPH F. FIEG.