W. G. ALLEN.

MANUFACTURE OF SCREWS.

APPLICATION FILED JAN. 9, 1909.

960,244. Patented June 7, 1910.

Fig. 1

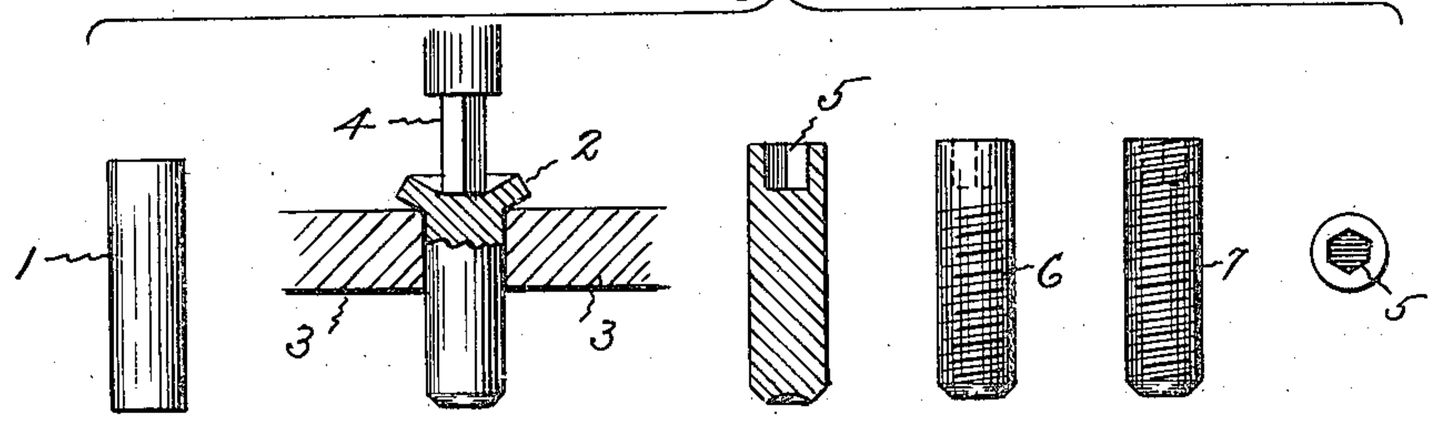


Fig. 2

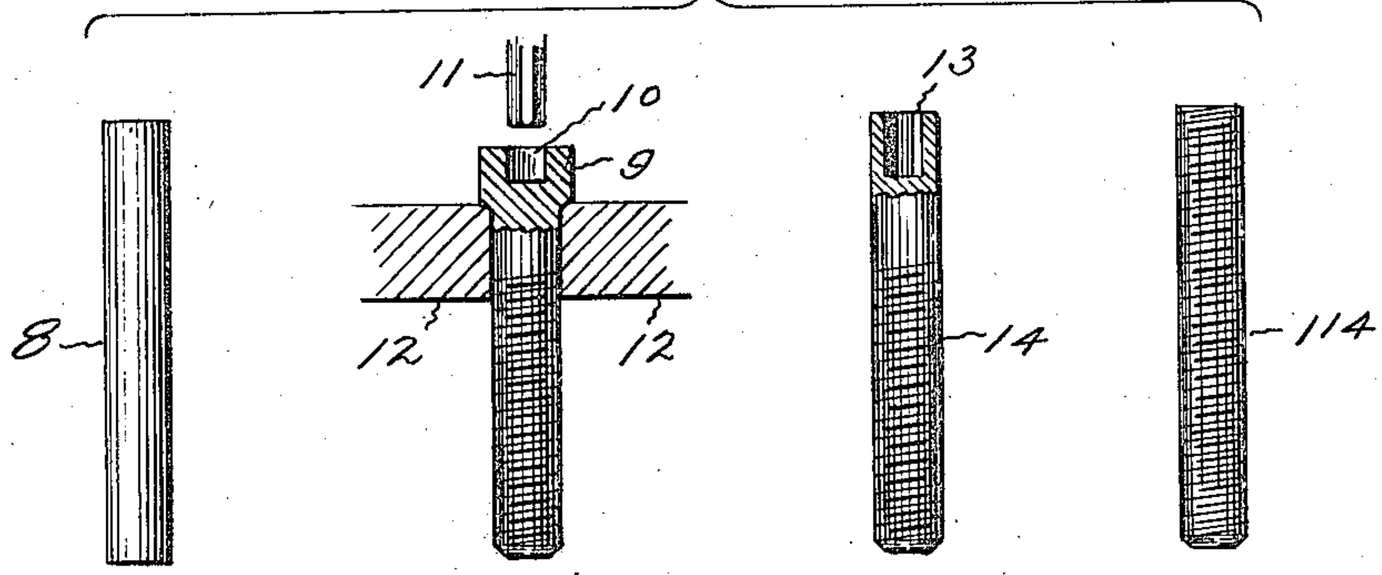


Fig. 3

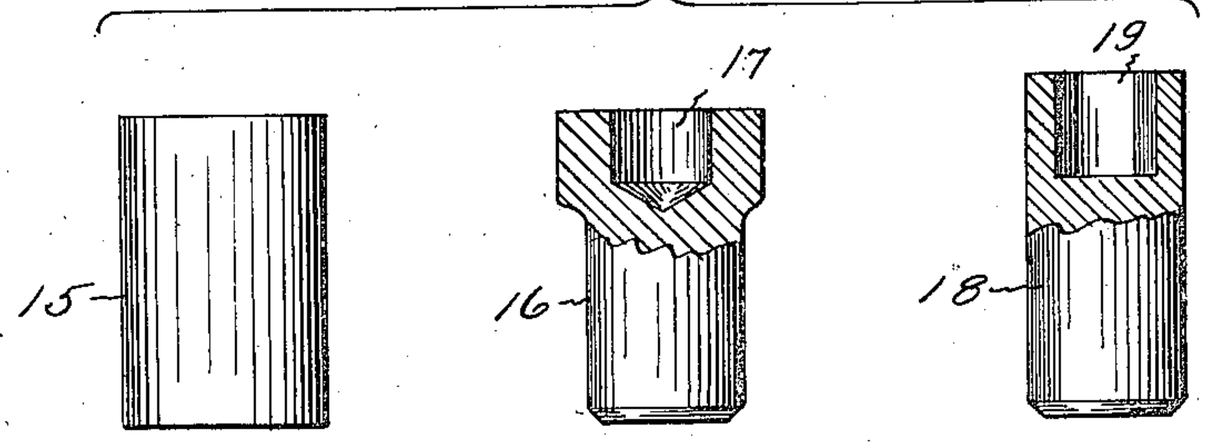


Fig. 4

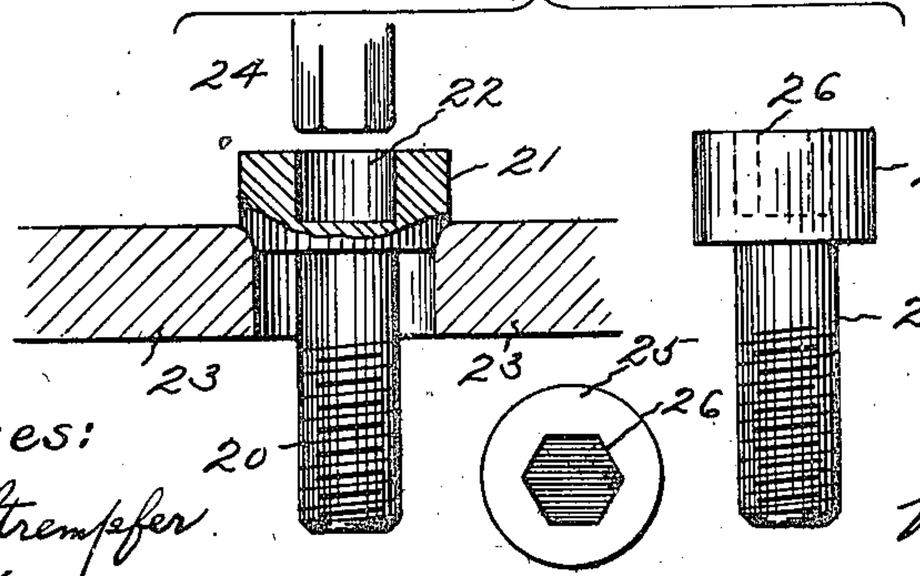
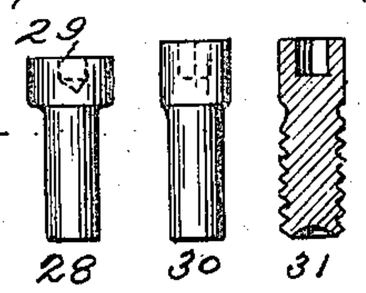


Fig. 5



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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF SCREWS.

960,244. Specification of Letters Patent. Patented June 7, 1910.

Application filed January 9, 1909. Serial No. 471,400.

To all whom it may concern:

Be it known that I, WILLIAM G. ALLEN, a citizen of the United States, residing at West Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Manufacture of Screws, of which the following is a specification.

This invention relates more particularly to the manufacture of flush head set screws, that is, set screws so shaped and threaded that when put to use their heads are sunk even with the outer surfaces of the parts into which they are driven, although the invention is applicable to the manufacture of machine screws and set screws having projecting or fillister heads.

It is now generally recognized as very desirable, and numerous governments, State and national, make it obligatory, for the purpose of eliminating danger of accidents due to projecting heads of set screws on rotating parts, to either protect such heads of screws on rotating parts by a cover or guard, or to sink the heads flush with the rotating surface, and for this purpose screws having hollow heads, adapted to receive a key or crank for turning them in are proposed.

The object of this invention is the production of machine screws, particularly set screws, which are very simple and cheap to make, in fact cheaper than the common headed set screws, which can be entirely sunk below the surface of the rotating parts into which they are screwed, and which are very strong and consequently can be set tightly and will hold firmly.

The invention is applicable to the production of many types of screws of any length and any diameter from common screw rod, for instance either short or long screws that are threaded their entire length or only a part of their length by either rolled or cut threads, and screws of any size which are the same diameter throughout their length, or have enlarged heads if desired, which screws can be formed by various steps. The result obtained by the practice of my invention is a screw having a substantial body portion with sufficient metal to insure strong, perfect threads, with an angular or non-circular socket in the head, surrounded by a substantial body of firm metal, which socket is designed to receive a strong key or crank end for turning the screw in or out of its desired position.

Figure 1 of the accompanying drawings shows a series of views illustrating one method of producing set screws which embody this invention. Fig. 2 shows a series of views illustrating a similar method of producing such screws. Fig. 3 shows another method. Fig. 4 illustrates a method of producing a headed machine screw which embodies the invention. Fig. 5 illustrates another method.

Referring to the steps employed in producing the screws illustrated by Fig. 1, a piece of suitable round wire stock of any diameter and length is cut to form a blank, 1, and one end upset in the ordinary way to form an expanded head 2 in a common header or rivet forming machine. This blank is then driven through a die 3 of ordinary form by a punch 4, which is preferably hexagonal in cross section, although of course it might be square or have any desired shape other than round. This operation causes the expanded head of the blank to be drawn up to the original diameter of the wire, leaving a socket 5 in the end having the same cross-sectional shape as the punch. The blank thus formed may be threaded for any desired part of its length, as is the screw 6, or for its entire length, as is the screw 7, by either cutting the threads or by rolling the threads in the common manner. If the screw is to be threaded for only a part of its length, the threads could of course be formed by cutting or rolling before the headed blank is punched through the die to draw up the end.

Referring to Fig. 2, the blank 8 may be formed of any ordinary round stock of suitable length and diameter and swaged or punched to provide an enlarged head 9. This blank with the head slightly larger in diameter than the body of the blank and containing the circular drilled or punched socket 10 may then be driven by a punch 11 through a die 12 to reduce and draw the head to the original diameter and form the socket 13 of angular or non-circular cross section. Such a blank can be threaded for a part of its length to form the screw 14, or for its entire length, as is the screw

114, by cutting or rolling the threads either before or after the head is drawn to form the socket in the head end.

Instead of forming the enlarged head of the blank by swaging or upsetting its end, if desired, a blank 15 of round stock of suitable length and diameter can be turned down to form a blank 16 with an enlarged head. This head is then drilled to form a socket 17. Such a blank may then be punched through a die, as previously described, by a punch having the desired cross sectional shape, so as to draw up the head and form the blank 18 with the angular or non-circular socket 19. Such a blank may then be threaded by rolling or cutting the threads for a part of or its entire length in the usual way, or may be left without threads for future treatment.

To form a machine screw with an enlarged head, a blank may be swaged or turned to the shape of the blank 20 shown in Fig. 4. This blank with its head 21 slightly larger than the finished head of the screw is to be, and having a circular socket 22 drilled in it, is punched through a die 23 by a punch 24, and the head drawn to final shape, as is the head 25 with the angular socket 26. The shank 27 of this screw may be threaded by rolling or cutting, either before or after the head is formed to final shape.

As rolling a thread increases the diameter of the stock, that is, the finished screw is larger in diameter than the rod before the thread was rolled, the practice of this invention may be carried on by taking a headed blank 28 with a perforation 29 therein, and punching it through a die producing a blank 30, with a head slightly larger in diameter than the shank. This head is of the size of the finished screw, then when the thread is rolled the completed screw 31 will be of uniform diameter throughout its length.

By the practice of this invention, screws of any length and any diameter with or without enlarged heads and threaded for their entire or only a part of their length by rolling or cutting, can be rapidly produced with angular or non-circular sockets in the head end without redrawing to increase their length. Such sockets can be more quickly and cheaply formed than slots can be cut in the ordinary screws, and they are accurate in shape and size. Screws produced in this manner, as stated, can be any length and diameter and can be formed of ordinary round stock in such manner that the threads can be perfectly formed in a body that has sufficient metal to be strong and substantial. The sockets are formed quickly in the head ends and the metal about the sockets is firm and substantial, in fact the head is stronger than when slotted, so that a strong key or crank end can be inserted for turning the screws in or out, without danger of breaking the head ends of the screws. While the sockets are shown as hexagonal, a desired shape, of course they can be formed square, octagonal or any other angular or non-circular shape, depending on the shape of the punch, so that the screws may be turned in or out by a key or crank. The same size and depth of socket can be made in screws having the same diameter, regardless of their length, which is a saving of labor in their production. These screws which are so cheaply and rapidly made are very strong, both along the shanks and at the head ends and when headed screws are made the under side of the heads are flat and the corners square.

The invention claimed is:

1. The process of making a socketed machine screw, which consists in providing a solid cylindrical blank of metal with an enlargement at one end, forming a socket in the enlarged end, forcing the blank by an angular or non-circular punch through a die opening that is smaller in diameter than the enlarged end of the blank, thereby causing a reduction in the exterior diameter of the enlarged end and compressing that end onto the punch and producing an angular or non-circular socket therein, and forming a thread upon the exterior of the blank.

2. The process of making a socketed machine screw, which consists in providing a solid blank of metal with an enlargement at one end, punching or drilling a circular socket in the enlarged end, forcing the blank by an angular or non-circular punch through a die opening that is smaller in diameter than the enlarged end of the blank, thereby causing a reduction in the exterior diameter of the enlarged end and compressing that end onto the punch and changing the socket from circular to angular or non-circular in cross-section, and forming a screw thread upon the exterior of the blank.

3. The process of making a socketed blank, which consists in providing a solid piece of metal with an enlargement at one end, forming a socket in the enlarged end, and forcing the blank by an angular or non-circular punch through a die opening that is smaller in diameter than the enlarged end of the blank, thereby causing a reduction in the exterior diameter of the enlarged end and compressing that end onto the punch and producing an angular or non-circular socket therein.

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