Sept. 17, 1957 C. E. FITCH 2,806,706

INSERT BIT AND HOLDER

Filed April 2, 1953

Fig. 1.

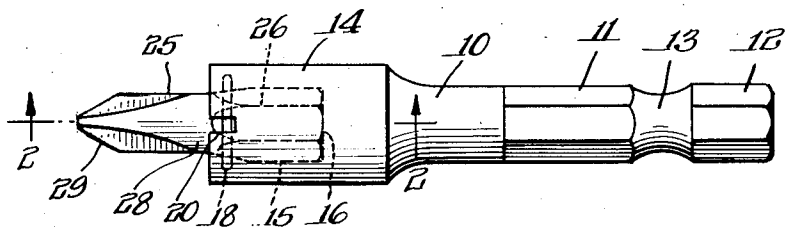


Fig. 2.

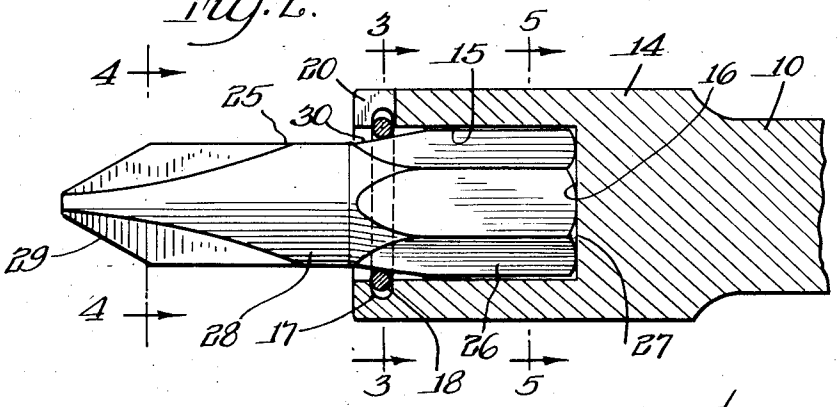


Fig. 3.

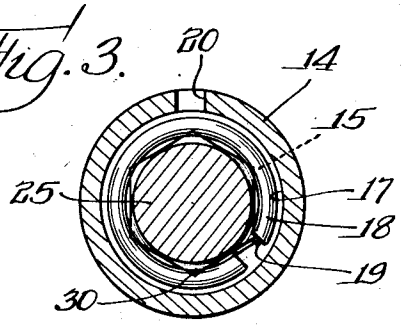


Fig. 4.

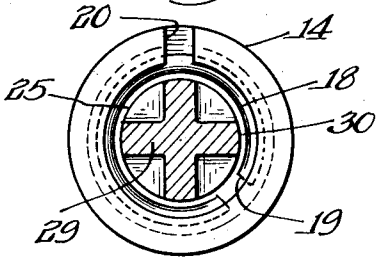
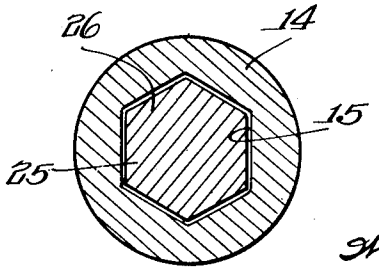


Fig. 5.



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INSERT BIT AND HOLDER

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1 Claim. (Cl. 279—79)

This invention relates to insert bits and holders therefor.

The principal object of this invention is to provide an improved insert bit for a holder, and the combination thereof, which is simple in construction and foolproof and safe in operation, which may be readily received and firmly secured in the holder regardless of small relative variations in the dimensions of the bit and the holder, which provides a limited floating relation between the bit and holder, and which permits the application of a large thrust to the bit.

The insert bit of this invention is used with a driving holder having a socket of polygonal cross section in one end thereof, a retaining groove in the socket adjacent the outer end thereof and a resilient spilt ring mounted in the retaining groove. The insert bit has a portion of polygonal cross section adjacent one end which is received in the socket of the driving holder between the bottom of the socket and the resilient split ring for driving engagement therein. There is a small clearance between the portion of the bit of polygonal cross section and the socket to provide a limited floating relation between the two. The insert bit also has a cylindrical portion adjacent the other end thereof which is of smaller transverse dimension than that of the portion of polygonal cross section. A working point is provided on the end of the cylindrical portion for driving a screw or a bolt or the like. The insert bit also has a tapered portion between the portion of polygonal cross section and the cylindrical portion which is engaged along its length by the resilient split ring of the holder to releasably secure the portion of polygonal cross section of the bit in the socket of the holder with the end thereof in engagement with the bottom of the socket. This relationship is at all times maintained regardless of small relative variations in the length of the portion of polygonal cross section of the bit and the depth of the socket in the holder.

As a result the bit is readily received and firmly secured in the holder by reason of the resilient split ring engaging the tapered portion of the bit, maximum thrust can be applied by the holder to the bit because the bit engages the bottom of the socket of the holder, close tolerances between the bit and the holder are not required because of the coaction between the resilient split ring and the tapered portion of the bit, a limited free floating action between the bit and the holder is brought about by the small clearance between the bit and the socket of the holder, and the cylindrical portion of the bit presents a smooth surface which is not likely to catch fingers or clothing during use of the bit thereby providing safe operation.

Further objects of this invention reside in the details of construction of the insert bit and holder and in the cooperative relationships between the component parts thereof.

Other objects and advantages of this invention will become apparent to those skilled in the art upon reference to the accompanying specification, claims and drawing in which:

Figure 1 is an elevational view of a driving holder with an insert bit secured therein.

Figure 2 is an enlarged sectional view through a portion of the driving holder taken substantially along the line 2—2 of Figure 1 and showing the insert bit in elevation.

Figure 3 is a vertical sectional view taken substantially along the line 3—3 of Figure 2.

Figure 4 is a vertical sectional view taken substantially along the line 4—4 of Figure 2.

Figure 5 is a vertical sectional view taken substantially along the line 5—5 of Figure 2.

Referring first to Figures 1 and 2, a driving holder is designated at **10** and it is provided at one end with polygonal portions **11** and **12** for reception in a suitable tool such as a power tool for rotating the same. It is provided with a groove **13** for securing the driving holder in the power tool. The driving holder **10** is provided at its other end with a head **14** having a socket **15** of polygonal cross section, the bottom of the socket being designated at **16**. The socket **15** is provided with a retaining groove **17** adjacent the outer end thereof and located in the retaining groove **17** is a resilient split ring **18**, the split in the ring being designated **19**. To facilitate insertion and removal of the resilient split ring **18** in the retaining groove **17** the head **14** is preferably provided with a notch **20**. The diameter of the retaining groove **17** is larger than the normal diameter of the resilient split ring **18** so that the resilient split ring **18** may be expanded substantially entirely into the retaining groove **17**. Normally, the resilient split ring **18** extends into the socket **15**, but is at all times retained in place by the retaining groove **17**.

The insert bit for reception in the driving holder is designated at **25**. It is provided adjacent one end with a portion of polygonal cross section **26** for reception in the socket **15** of the driving holder and this portion **26** of polygonal cross section extends between the bottom **16** of the socket and the resilient split ring **18**. The shape of the portion of polygonal cross section **26** is preferably the same as the cross sectional shape of the socket **15** so as to establish a driving relation between the driving holder **10** and the insert bit **25**. Preferably, there is a small clearance between the portion **26** of polygonal cross section and the socket **15** so as to provide a limited floating relation between the insert bit **25** and the driving holder **10**. This clearance is more clearly shown in Figure 5. The end **27** of the bit **25** engages the bottom **16** of the socket **15** when the insert bit is received in the driving holder.

The insert bit **25** adjacent its other end is provided with a cylindrical portion **28** which is of smaller transverse dimension than that of the portion **26** of polygonal cross section. The end of the cylindrical portion **28** is provided with a working point for driving a screw or bolt or the like. For purposes of illustration the working point is shown to comprise a plurality of flutes **29** for driving Phillips screws or the like. A tapered portion **30** having a gradual taper is located between the portion **26** of polygonal cross section and the cylindrical portion **28**, the transverse dimension of the tapered portion **30** gradually decreasing along its length from the portion **26** to the portion **28**.

When the insert bit **25** is inserted in the driving holder **10**, the portion **26** of polygonal cross section is received in the socket **15** of the holder and the inner end **27** of the insert bit engages the bottom **16** of the socket. As the portion **26** is being inserted in the socket **15**, the resilient split ring **18** is expanded to permit the insertion. When the inner end **27** of the bit engages the bottom **16** of the socket, the resilient split ring **18** contracts about the gradually tapered surface **30** in order firmly to hold the bit in the driving holder. The point along

the tapered portion 30 at which the resilient split ring 18 engages the same is determined by the relative dimensions of the length of the portion 26 of polygonal cross section and the depth of the socket 15, the resilient split ring 18 being adapted to firmly engage the tapered portion 30 at substantially any point throughout its length. As a result, the insert bit 25 is firmly secured in the driving holder 10 regardless of small variations in the length of the portion 26 of polygonal cross section of the bit and the depth of the socket 15 in the holder. In this way it is not necessary to keep close tolerances in the manufacture of the insert bits and the driving holders to maintain the inner end 27 of the bit in engagement with the bottom 16 of the socket. This is automatically compensated for by the coaction between the resilient split ring 18 and the tapered portion 30 of the insert bit.

Because the inner end 27 of the insert bit at all times engages the bottom 16 of the socket, maximum thrust can be applied by the holder 10 to the insert bit 25 which, of course, is extremely beneficial in tightening screws, bolts or the like. Because there is a slight clearance between the portion 26 of polygonal cross section and the socket 15, a limited floating relation is maintained between the driving holder 10 and the insert bit 25 which is also very beneficial in tightening screws, bolts or the like. When the insert bit 25 is received in the holder 10, the only exposed portions of the insert bit are the cylindrical portion 28 and the working point 29 so that a substantially smooth surface is presented which is not likely to catch fingers or clothing during use and, accordingly, safe operation is assured.

While for purposes of illustration one form of this invention has been disclosed, other forms thereof may become apparent to those skilled in the art upon reference to this disclosure and, therefore, this invention is to be limited only by the scope of the appended claim.

I claim as my invention:

In combination, a driving holder having in one end thereof a socket which is of polygonal cross section

throughout its length, a retaining groove in the socket adjacent the outer end thereof and a resilient split ring mounted in the retaining groove, and an insert bit having a portion of polygonal cross section adjacent one end received in the socket of the driving holder between the bottom of the socket and the resilient split ring for driving engagement therein, there being a small clearance between the polygonal socket of the holder and the polygonal portion of the insert bit to provide a limited floating relation between the holder and the bit, a cylindrical portion adjacent the other end of the bit which is of smaller transverse dimension than that of the portion of polygonal cross section, a working point on the end of the cylindrical portion for driving a screw or bolt or the like, and a tapered portion between the portion of polygonal cross section and the cylindrical portion of the bit which is engaged along its length by the resilient split ring of the holder to releasably floatingly secure the portion of polygonal cross section of the bit in the socket of the holder with the end thereof in engageemnt with the bottom of the socket regardless of small relative variations in the length of the portion of polygonal cross section of the bit and the depth of the socket in the holder.

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