

March 22, 1938.

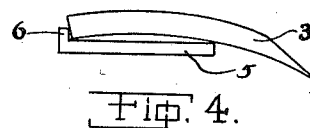
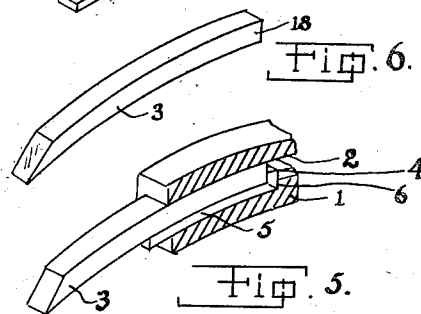
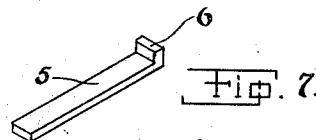
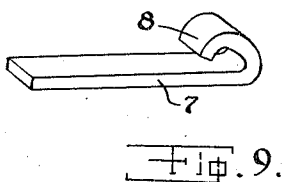
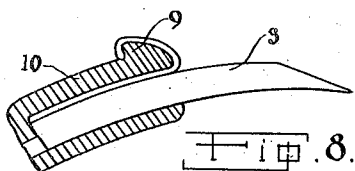
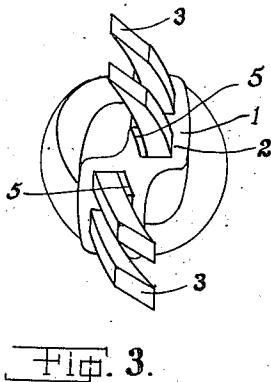
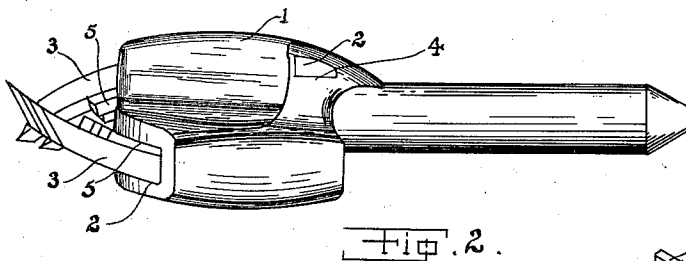
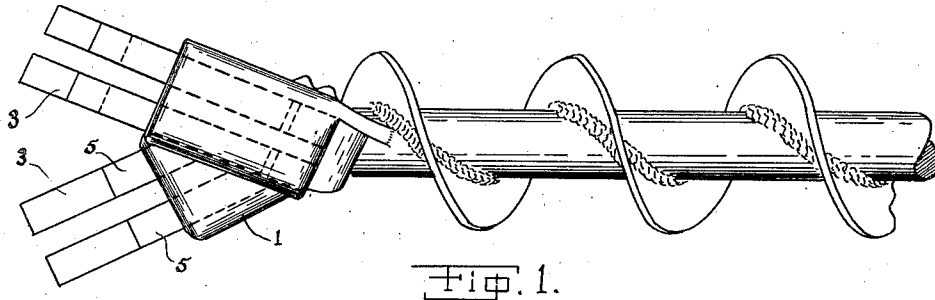
M. J. KITTRELL

2,111,785

DETACHABLE FASTENING FOR DRILL BITS

Filed Jan. 6, 1936

2 Sheets-Sheet 1



Milton J. Kittrell
INVENTOR.

BY *A. B. McCall*
ATTORNEYS.

March 22, 1938.

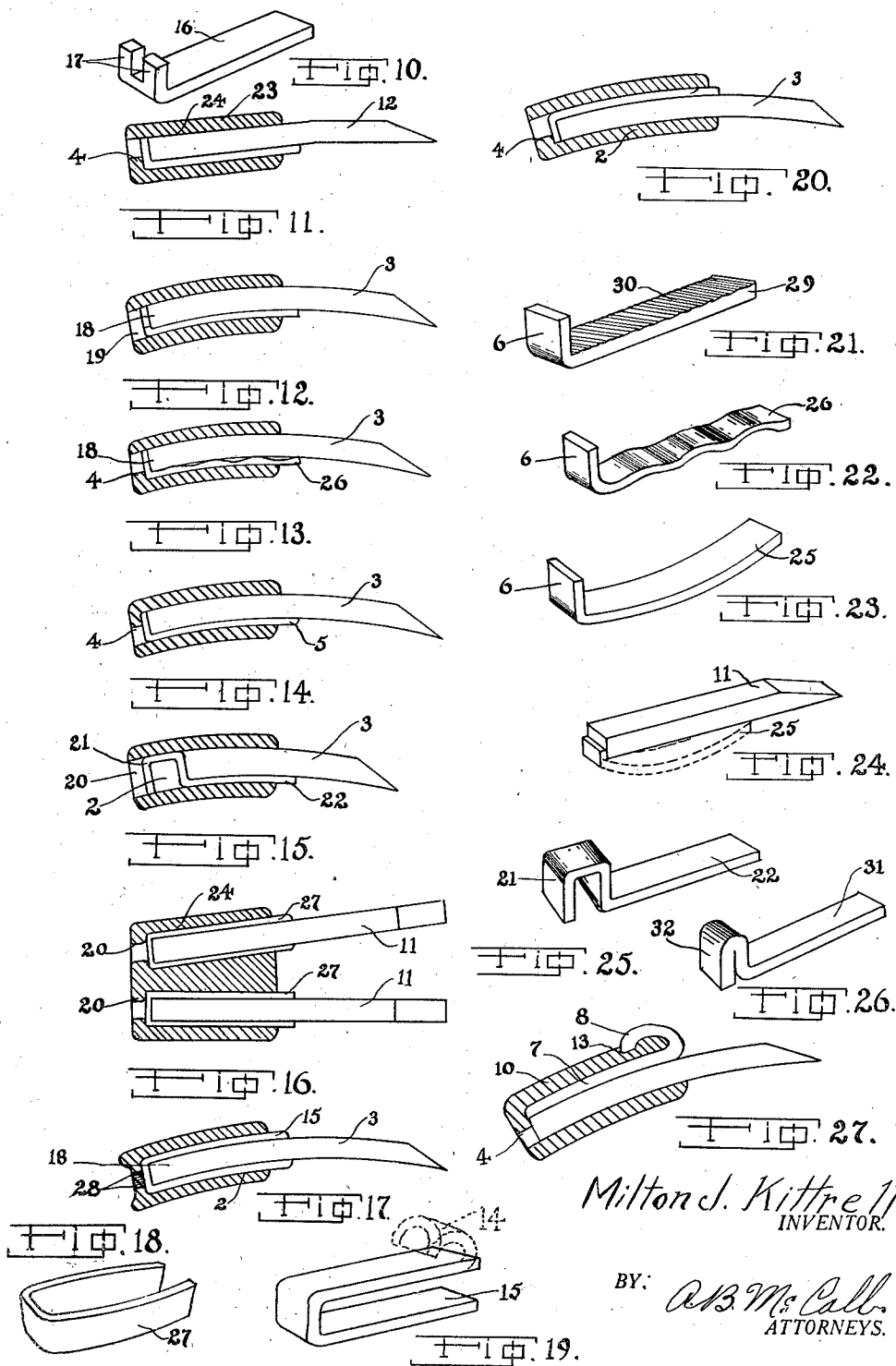
M. J. KITTRELL

2,111,785

DETACHABLE FASTENING FOR DRILL BITS

Filed Jan. 6, 1936

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,111,785

DETACHABLE FASTENING FOR DRILL BITS

Milton J. Kittrell, Ottumwa, Iowa, assignor to
Hardsocg Manufacturing Company, Ottumwa,
Iowa

Application January 6, 1936, Serial No. 57,651

8 Claims. (Cl. 255—69)

My invention relates to drills, drill heads and drill bits and to methods and means of fastening the bits into their operating positions; an object being in my invention to provide a new and very efficient detachable fastening for drill bits in the head of mining drills and the like.

A further purpose of my invention is to provide a method and means of detachably securing drill bits into their supporting sockets with but one bit in each socket and with it a spring binding member to hold the bit in place instead of the usual wedge that is so commonly used for such purposes.

A further purpose of my invention is to provide in a drill head and in the socket thereof with a drill bit a spring engagement or a spring binding member for the drill bit instead of the usual tapering wedge holding member; whereby the spring binding member, when normally straight, may hold the drill bit in a curved socket and will utilize the principle involved where a spring inserted in the socket alongside of the adjacent surface of the drill bit will cause such a spring thus curved in the socket to have a tendency to straighten out, resulting in such a spring thus exerting a lateral pressure against the adjacent flanking surface of the drill bit. On the other hand where a binding spring within the scope of my invention, which may be normally curved if inserted in a straight socket with the shank of a bit will thus have a tendency to assume its normally curved shape resulting in an exerted pressure against the adjacent flanking surface of the drill bit, tending to hold the bit substantially in place in the socket.

A further purpose of this invention is to provide means for holding a drill bit in the drill head socket and I utilize a flanking spring pressure in the socket wherein the shape of the socket forces the spring inserted with the drill bit to assume some shape that it does not normally have so that the tendency for the spring binding member to resume its normal shape may exert a lateral flanking pressure against the adjacent surface of the drill bit regardless of the original normal shape of the binding spring whether it be normally a straight spring to be bent in a curved socket, a curved spring to be straightened in a straight socket a wavy spring which is somewhat straightened in a curved or straight socket or a U-shaped spring which would flank two opposite sides of a bit within the socket.

A further purpose of my invention is to provide a binding spring member shaped to permit it to engage the socket wall either on the inside or outside surface with the binding member, for instance, hooking into the recess of the wall sur-

face or hooking over a holding knob thereof so that the spring may hold itself in place in the socket when the drill bit is knocked out.

I attain the purposes of my invention by the method and means described in this specification, recited in the claims and illustrated in the drawings wherein the same reference numerals indicate like parts in the different figures.

Referring to the figures:

Fig. 1 is a side view of a drill and drill head with my drill bit fastening.

Fig. 2 is a side view of one of the drill heads containing my drill bit secured therein.

Fig. 3 is an end view of the drill head and drill shown in Fig. 1.

Fig. 4 is a side view of one of the drill bits shown when laid on the binding spring before the two are forced into the socket together.

Fig. 5 is a sectional view of a portion of one of the drill heads, illustrating the manner of fitting the curved bit into the curved socket where it is held by the binding spring.

Fig. 6 is a perspective of one of the drill bits, defining a part of my invention.

Fig. 7 is a perspective of one of the binding springs mounted in the drill head with the drill bit for holding the bit in place.

Fig. 8 is a horizontal section through a portion of the drill head illustrating one manner of holding the binding spring in place, while a drill bit is removed from the socket.

Fig. 9 is a perspective of one of the forms of binding spring used on the type of socket shown in Figure 8 and in Figure 27 and where such a spring may be normally bent it would be used in the manner illustrated in Figure 24 where it is adapted to hold a straight bit.

Figure 10 is a perspective of a normally straight binding spring for use in a curved socket and provides with a divided shoulder where it may be used in a situation shown in Figure 12 where the rear of the socket has upright side shoulders for the spring to abut against. It is conceivable that the curved spring shown in Figure 23 could be used in a straight socket with its terminal shoulder divided where the straight socket would have its rear end form of upright side shoulders as illustrated in Figure 12 in section.

Figure 11 is a section of a straight socket wherein a curved binding spring as shown in Figures 23 and 24 is used with an angularly formed drill bit.

Figure 12 is a sectional view of a curved bit in a curved socket having upright side shoulders in the rear of the socket and using a binding spring such as is illustrated in Figure 10.

Figure 13 is a sectional view showing a wavy binding spring such as is illustrated in Figure 22 in use in a curved socket. The same kind of a spring could be used if desired in a straight socket.

Figure 14 is a sectional view showing how a normally straight binding spring as illustrated in Figure 7 may be used with a curved bit and curved socket with the rear stop shoulder of the socket above rather than below the center as shown in Figure 13.

Figure 15 is a sectional view showing how a binding spring in the form illustrated in Figure 25 may be used with a relatively short bit to fill up space in the rear of the socket. It is conceivable that any one of several types of stop shoulders could be used at the rear of the socket but in this instance there is illustrated an upright side shoulder such as is illustrated in Figure 12 for the binding spring to abut against.

Fig. 16 is a relatively horizontal section illustrating the manner in which a U-binding spring normally curved as illustrated in Figure 18 could be used to flank the sides of the bits. This illustration shows upright side shoulders at the rear of the socket for the binding springs to abut against.

Fig. 17 illustrates in section the use of a normally straight U-spring in a curved socket, (see spring in Figure 19). In this illustration the U-spring fits under the bottom and over the top and around the rear end of the curved bit while the socket has its stop shoulders across the top and bottom for the spring to abut against.

Fig. 18 is a perspective of the type of spring adapted to be used in a situation illustrated in Figure 16.

Fig. 19 is a perspective of one of the normally U-straight springs shown in use in Figure 17.

Fig. 20 is a sectional view showing one of the binding springs as illustrated in Figure 7 but used in a manner wherein the springs rest on top of the bit with the rear shoulder of the spring abutting the rear stop shoulder of the socket disposed across the bottom of the socket. This socket stop shoulder, however, would work just as well across the top.

Fig. 21 is a perspective of a notched or grooved or corrugated spring normally straight as shown in Figure 7 and roughened on the top side to more firmly hold against one of the bits which may be likewise roughened along the surface adapted to contact the spring. This spring could be normally curved as shown in Figure 23 for use on a straight bit or an angularly formed bit as shown in Figure 11.

Fig. 22 is a waved binding spring as shown applied in Figure 13. This spring could likewise have a generally curved shape as shown in Figure 23 for use with a straight bit as pointed out in the description of Figure 21.

Fig. 23 is a perspective of a normally curved binding spring adapted to be used with a straight bit and straight socket or with a bit made in an angle as shown in Figure 11.

Fig. 24 illustrates in perspective the manner of setting a straight bit on the binding spring illustrated in Figure 23.

Fig. 25 is a perspective of one of the binding springs shown in use in Figure 15 for filling the space in the socket when a shorter tooth is used.

Fig. 26 is a perspective of that form of binding spring shown in Figure 25 with the rear end merely doubled over where a smaller space needs to be taken up.

Fig. 27 is a sectional view illustrating one of the binding springs shown in Figure 9 as used where the holding end of this spring engages a notch in the top surface of the casting over the socket in the drill head.

In the detailed disclosure of my invention and the preferred method of using the same, the salient features thereof will be set forth as it will be shown wherein my invention surpasses the merits of some other known inventions for such purposes.

As is evidenced by some of the drill bit fastenings now in use, it has been the common practice to secure the drill bits in place in the drill head by a wedge of one form or other and the vibration attending a drilling operation usually has a loosening effect upon such wedges, causing annoyances and loss of time.

In my present invention, I obviate this trouble by securing the drill bit into its socket in the drill head by using a metallic binding spring adapted to tightly fit into the drill bit socket flanking the adjacent surface of a drill bit, so that this binding spring member may, when forced into the socket with the bit, take a position conforming to the socket curve, thus assuming a position which makes the spring exert a lateral or flanking pressure against the adjacent surface of the drill bit in the socket holding the bit firmly into its operative position in the socket of the drill head. This flanking pressure will thus be exerted against the drill bit and socket wall because of the tendency of the inserted spring member to spring back to its normal position. Thus in a curved socket would be used a normally straight or wavy spring while in a straight socket would be used a normally curved or wavy spring.

In the meantime, there may be working conditions wherein it would be best to leave the binding spring in the socket while the drill bit is being removed and I provide for this contingency in this invention.

I shall now disclose the method and means used in providing my new detachable fastening for drill bits as the novel merits thereof are pointed out and while a mining drill will be discussed in this instance, it is not meant to limit the invention to mining drills, alone.

For instance, I shall first explain that form of my invention wherein I utilize a normally straight binding spring, a curved socket with a drill bit after which I shall describe other forms of my invention and the preferred manner of using the same.

A drill head 1 has a group of carefully spaced curved sockets 2 each for the operative support of a drill bit 3 shaped with an approximately square cross sectional area and bent to conform to the curve of these sockets in the drill head.

Sockets 2 have a rear stop shoulder 4 to limit the extent to which bits 3 can be forced back into them.

As a novel feature of my device, I provide a binding spring member 5 preferably made of steel and having a terminal rear stop shoulder 6. This binding spring member 5 is normally straight and when bent it tends to fly back to a straight position again; and when the curved bits 3 are fitted along the side of binding spring members 5, the sum of their cross sectional areas is equal to the transverse area of one of the bit holding sockets 2 and will thus fit these sockets when fitted therein.

Thus, when fitting a curved drill bit 3 into 75

one of the curved sockets 2, the operator will place one of the bits 3 on binding spring member 5 as shown in Fig. 4. When the curved bit and normally straight spring are thus set together they are forced side by side back into socket 2 which has the same curvature as bit 3, where they come to rest, as binding spring member 5 comes against the rear end shoulder 6 of spring member 5 touches the same.

Thus, when curved drill bit 3 is inserted into curved socket 2, with normally straight binding spring 5, as when both are tightly flanked together they fill the socket, then the result is to bend the binding spring member as it conforms to the curved shape of the socket wall.

This bending of binding spring 5, when it has a normal tendency to hold a straight position, has the effect of its exerting a lateral flanking pressure against the top or bottom side of bit 3 and thus acting as a very effective binding spring or securing means to hold the drill bits 3 into their operating position in sockets 2 of drill heads 1.

The effect will be the same whether the binding spring 5 is used above or below drill bits 3.

The major application of this invention will perhaps utilize the binding spring with the simplest type of shoulder 6 as shown in Fig. 7, but there will be situations wherein the sockets 2 or one end of the binding spring 5 may be modified so that this binding member may resist removal as bits 3 are removed from socket 2.

For instance, the binding spring member 7 shown in perspective in Fig. 9 is normally straight with a hooked forward terminal adapted to hook over a knob 9 in the drill head casting 10 where the knob is normally above drill bit 3. It is obvious that spring binding member 7 could be normally curved so that it will exert a flanking pressure against the adjacent surface of the straight drill bit 11 (see Fig. 24) or an angular drill bit 12 (see Fig. 27). Spring member 7, if curved normally, could obviously be used for holding a straight socket. It is also obvious that a knob 9 or a recess 13 could be engaged by a retaining hook portion 14 for holding the U-shaped binding spring member 15 within the scope of my invention if desired.

In all of the figures running from Figure 8 to Figure 27, inclusive, I have illustrated different forms and fitting arrangements of my invention with the thought that various operating conditions may prompt these modifications, all of which it is, obvious, are within the scope of my invention.

For instance, in almost any situation the rear end of the socket should be left open to provide access either to the rear end of the drill bit or the rear end of the binding spring member to permit the operator to drive the bit out of the socket.

In Fig. 10, I have illustrated a normally straight binding spring member 16 provided with a rear terminal shoulder 17, having two uprightly disposed side shoulders with a space between them providing tool access to the rear end 18 of drill bit 3 (see Fig. 12). In this figure the rear stop shoulders 19 in the socket are uprightly disposed for the divided shoulders 17 of spring binding member 16 to abut against. The same kind of shoulders 20 are illustrated in Fig. 15 for the rear end of sockets 2 in holding the loop end 21 of a spring binding member 22 adapted to be used for filling space when the drill bit 3 gets shorter as shown in Fig. 15.

In some drill heads such as the one shown in section Fig. 11, the head 23 may have in it a straight socket 24 wherein an angle bit 12 or a straight bit 11 may be used and with it a curved binding member 25 (see Figs. 23 and 24), or a wavy binding member 26 may be used as is illustrated in Fig. 13 where wavy binding member 26 is shown in use with a curved drill bit 3. In this connection, it is obvious that wavy binding member 26 could be wavy and yet curved like binding member 25 for use with a straight bit 11 or an angle bit 12.

The rear stop shoulder 4 in the curved sockets 2 or straight sockets 24 may be at the bottom as shown in Figure 5, 11, 13 or 20 or this shoulder may be at the top as shown in Figs. 14 and 27.

Within the scope of my invention, I may choose to use a U-spring 27 (see Figs. 16 and 18), which is normally curved for fitting into straight sockets as shown in Fig. 16; while spring 27, if desired, may be sprung as shown in Fig. 18 and also curved to fit along-side of curved bits 3 in a curved socket 2.

Where the spring member may be desired above and below bits 3 and across the rear end 18 thereof. With this arrangement shoulders 28 in socket 2 (see Fig. 17), would be the stop means for spring 15 to abut against.

Spring 15, as will be noted, in Figure 19, may be curved as shown in the dotted lines in this figure to permit the hooked end thereof to be used in the manner illustrated either in Figure 8 or Figure 27.

The binding spring member 5 may be set into socket 2 so that it will be flanking the top surface of curved bits 3 as shown in Figure 20.

Binding spring member 29 is the same as spring member 5 with the exception that its top surface 30 is roughened or corrugated to make it adhere more substantially to the drill bit surface.

Wavy spring 26 may be made generally straight in outline or it may be made in a general curve as shown in Figure 23 but the generally straight spring would be used in a curved socket as shown in Figure 13, while a curved spring would be used in a straight socket as shown in Figure 11.

Spring 31 is used for the same purpose as spring 22 and in like manner, but this spring is adapted, by using the shorter loop 32, to use less space in a drill head socket.

It will thus be observed that my invention is adapted to be used in a number of ways in several forms within the scope of my invention, all of which forms fall within the scope of the generic idea of holding the drill bit within its supporting socket substantially by a spring binding member which exerts its holding pressure against the adjacent flanking surface or surfaces of the drill bit because of the tendency of such a spring member to resume its normal shape after it is inserted into the socket, the shape of which may bend the spring out of its normal shape.

Having thus described the nature of my invention, what I claim is:

1. A detachable drill bit, retaining spring and drill head combination comprising a metallic drill head provided with a plurality of non-circular drill sockets, metallic drill bits shaped to be received by said socket and a retaining spring for each socket with a normal shape longitudinally unlike the sockets; whereby when a bit and a retaining spring are forcefully entered into one of said sockets, the spring member will exert a springy, flanking pressure against the adjacent bit side and socket wall and tend to hold

itself into operative position by the spring tendency to resume normal shape.

2. A drill head, retaining spring and drill bit combination comprising a metallic drill head provided with a plurality of curved bit sockets, a normally waved binding spring having an integral shouldered terminal and a curved drill bit adapted to operatively fit into one of said sockets in flanking position with one of said springs; said spring member normally shaped longitudinally unlike the longitudinal shape of the sockets and when forcefully inserted into the socket with said bit will exert a flanking pressure against the adjacent side of the bit and socket tending to hold the bit in place through its springy urge to resume normal position.

3. In a drill, the combination comprising a drill head, provided with a plurality of drill bit sockets, each having a non-circular cross section, a drill bit and retaining spring for each socket and adapted to fill the socket when both are fitted therein together, said drill bit having the longitudinal shape of said socket and said retaining spring shaped to define a shouldered inner terminal for limiting the depth of insertion of said bit and normally curved along its length; whereby when said retaining spring is forcefully inserted in said socket with said bit as it flanks the side thereof, this spring will exert a flanking pressure against said bit effectively retaining the same within the socket as said spring thus tends to resume its normally curved position.

4. The combination in a drill of a drill head having a plurality of straight sockets, a drill bit for each socket and a U shaped metallic spring adapted to extend around the inner end of one of said bits when the bit is fitting into operative position in the socket and adapted to flank two opposite sides of said bits; said spring normally having a form unlike the longitudinal shape of said sockets; whereby when said spring and bit are forcefully inserted together into said sockets respectively, the tendency of said spring to resume its normal shape will cause the same to exert a flanking pressure against the contacting sides of said bits, thus holding the bit in place in the socket.

5. The combination in a drill of a drill head having a plurality of curved sockets, a drill bit for each socket and a U shaped metallic spring adapted to extend around the inner end of one of said bits when the bit is fitting into operative position in the socket and adapted to flank two opposite sides of said bits; said spring normally having a form unlike the longitudinal shape of said sockets; whereby when said spring and bit are forcefully inserted together into said sockets respectively, the tendency of said spring to resume its normal shape, will cause the same to exert a flanking pressure against the contacting

sides of said bits, thus holding the bit in place in the socket.

6. A drill head, drill bit and retaining spring combination comprising a drill head having a plurality of curved bit sockets, a like number of drill bits shaped each to conform to said sockets longitudinally and a like number of retaining springs, each for one of said sockets and shaped to define a form other than the shape of said sockets, one end of each of said springs shaped to define a hook member, said drill head adjacent each of said socket openings provided with an integral lug to be engaged by said hook of the spring, when the spring and bit are together forcefully inserted into each socket; whereby when thus forcefully inserted into said socket in flanking position to each other, then the spring's tendency to resume its normal shape will force a flanking pressure against the adjacent surface of said bit, holding the same in place and whereby when thus in operative position said hooked terminal of the spring will engage said lug on the drill head, adjacent said socket and tend to resist the removal of said spring when said drill bit is forcefully removed.

7. The combination with a drill head having a plurality of curved sockets, of a curved drill bit for each socket and a normally straight binding spring with an integral shouldered terminal; said bit adapted to rest in flanking relation with said spring and against said shouldered terminal thereof and the two together adapted to be forcefully inserted into one of said sockets, thus curving the normally straight binding spring and forcing the consequent flanking pressure thereof against the flanking side of the bit, holding the bit in place.

8. The combination in a drill comprising a drill head having a plurality of bit sockets curved throughout their length, a drill bit for each socket shaped in the form of the sockets, a metallic binding spring normally straight and having integral stop means at its inner end for defining the depth of insert for the drill bit when the bit rests against the same, as it flanks the sides of the spring; whereby when said spring and bit are together forcefully inserted into one of said curved sockets of the drill head then the tendency of said normally straight springy binding member to resume its straight position as it is forcefully inserted into the curved socket, will cause a flanking pressure to be exerted against the contacting sides of the sockets and drill bit tending to hold the bit into operative position in the socket, and means provided integral with said binding spring for resisting removal thereof from said socket when the drill bit is forcefully removed.

MILTON J. KITTRELL.