Nov. 4, 1941. A. B. LORE 2,261,501

BEARING DESTROYER FOR ROCK BIT CUTTERS

Filed March 3, 1941

Fig. 3.

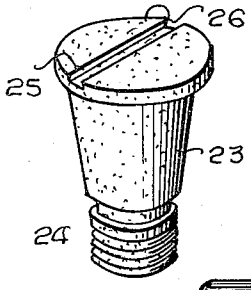


Fig. 1.

Fig. 2.

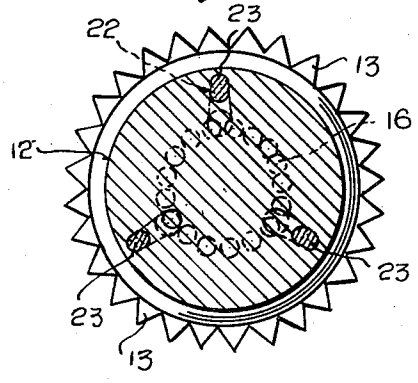
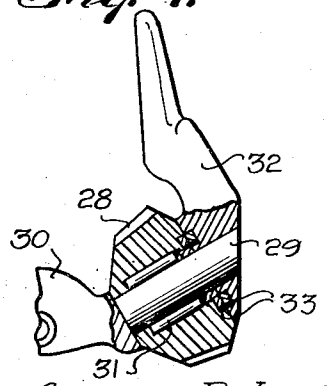


Fig. 4.



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Patented Nov. 4, 1941 2,261,501

UNITED STATES PATENT OFFICE

2,261,501

BEARING DESTROYER FOR ROCK BIT CUTTERS

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Application March 3, 1941, Serial No. 381,554

10 Claims. (Cl. 255—71)

This invention relates to well drilling equipment and it has particular reference to rotary rock bits.

The principal object of the invention is to provide in a rock bit, a cutter of the conventional shape but in the construction of which, rebuilding of the cutting teeth thereof is prohibited.

Manufacturers of rock bits of the rotary cutter type have found it advantageous to lease rather than sell outright the rotary type drill bit so that the title may remain vested in the manufacturer who is better equipped with facilities and knowledge of the performance of the tool in various formations. Efforts of unauthorized persons to rebuild a worn cutter result not only in depriving the manufacturer of legitimate revenue but likewise reduce materially the effectiveness of the tool when again put into use which is likely to reflect upon the manufacturer of the tool.

Accordingly, the invention provides a medium by which the present practice of unauthorized rebuilding of rock bit cutters is minimized or eliminated, to enable the manufacturer to realize reasonable profit from a licensed drill bit through reconditioning of worn cutters.

With the foregoing objects as paramount, the invention has particular reference to its salient features of construction and arrangement of parts which will become manifest as the description proceeds, taken in connection with the accompanying drawing, wherein:

Figure 1 is a side elevational view of a rock bit showing the invention embodied in one of the cutters thereof.

Figure 2 is a view on line 2—2 on Figure 1.

Figure 3 is a detail view of a fusible plug constituting the principal element of the invention, and

Figure 4 is a sectional view of another cutter design showing a slightly modified form of the invention.

Continuing with a more detailed description of the invention, the reference numeral 10 denotes the bit head of conventional design, with threaded pin 11. Rock bits of this type are forged in several different shapes and are provided with one or more cutters 12 as the formation may require. The cutters 12 are usually constructed with concentric or annular rows of teeth 13. Drilling fluid is supplied to the cutters through the passage 14 in the head 10.

When the teeth 13 become worn to such a degree that they are no longer effective to disintegrate the hard formation, it has been the practice of contractors in many cases to heat the cutters to a high degree and restore the teeth by the addition of hard metal. Cutters thus rebuilt are seldom, if ever, equal in efficiency to the original or new cutters supplied by the manufacturer or bit owner from whom the tool is leased.

While there is no restriction intended as to the manner of mounting the cutters on the bit body, the drawing shows, in section, one of the cutters 12 as being provided with a recess to accommodate a roller bearing 16. The core or inner race 17 has an integral pin 18, rotatably received in an angular aperture provided in one side of the head 10 and is held in the head by a weld 19 or other retaining means, disposed in the recess 20 entering from the side of the bit head. A retaining ring 21 is provided around the pin 18 corresponding with a shoulder on the latter to hold the bearing assembly 16 and cutter in place.

As a means to prevent rebuilding of the cutters, the invention provides for elongated recesses, cells or cavities 22, originating at or adjacent to the bottom of the recess 15 in the cutter and extending at a variety of angles toward the cutting face of the cutter. It is preferred that these cells be of cylindrical shape but it will become apparent that other shapes will suffice.

Into each cell is inserted a plug 23 of conforming shape, shown in detail in Figure 3. These plugs are molded from a suitable fusible alloy and may be impregnated with an abrasive substance such as emery, carborundum or hard metal particles. The plugs are preferably tapered and secured in position in the conformably shaped cells by threads 24, corresponding to the threads provided in the bottom end of the cells. As a convenience in installing, a screwdriver slot 25 is provided in the head 26 of each plug.

It is apparent from the foregoing that when an attempt is made to heat the cutter preparatory to rebuilding the rows of teeth thereon, the fusible plugs 23 will melt and the molten metal will flow into the bearing assembly, rendering the latter useless for further operation. The abrasive present in the metal will have the effect of so roughening the bearing surfaces as to permanently damage them against further use. In practice, the cells or cavities have no effect to weaken the cutter structure since these cells may be of small diameter and length and yet retain sufficient fusible metal as to render the

bearings inoperative, as and for the purpose described.

As a further measure to discourage rebuilding the cutters as described, there is optionally provided an annular channel surrounding the axis of the cutter 12 which is filled with the fusible alloy 27, having the same characteristics as that of which the plugs 23 are composed. Confronting this channel is a similar channel cut in that portion of the head 10 against which the cutter abuts and which channel is likewise filled with fusible metal. When the cutters are heated to a high degree, these fillers of fusible material will become liquid and flow into the space between the cutter and head. When hardened, the cutters will be held securely to the head and will not rotate.

A slightly modified form of the invention is shown in Figure 4. The cutters are independently supported in the manner exemplified by the single cutter 28, which is mounted upon the spindle 29 of the bridge 30, fragmentarily shown. Roller bearings 31 are provided in the cutter body and, as in the preceding case, confronting channels are made in the cutter and shank 32 to accommodate fusible fillers 33. When the head is heated, the fusible material will melt and flow into the bearings 31 and into the space between the cutters and shank 32 to render the cutters useless for further effective work.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. In a rockbit, a cutter construction comprising a coniform body having a recess therein perpendicular to its base, a roller bearing assembly therein, elongated cells communicating with said recess and extending into said body at a variety of angles and fusible plugs retained in said cells.

2. In a well drilling bit, a cutter comprising a coniform body having a plurality of annular rows of cutting teeth and provided with a bearing recess extending inwardly of said body from its base, said body further having a series of cavities originating in the walls of said recess and extending toward the cutting surfaces of said cutter but terminating short thereof and fusible means disposed within said cavities.

3. In a well drill bit, a cutter including a rotatable body having cutting teeth thereon and provided with an axial recess, bearings in said recess, said body further having cavities communicating with said recess, and a self-hardening, abrasive impregnated substance contained in said cavities capable of melting upon subjection of said body to excess heat.

4. In a well drill bit, a cutter including a rotatable body having cutting teeth thereon and provided with an axial recess, bearings in said recess, said body further having cavities communicating with said recess and a self-hardening, abrasive impregnated substance contained in said cavities capable of melting upon subjection of said body to excess heat whereby to flow into said bearings to render the same inoperative.

5. As a new article of manufacture, a cutter for well drill bits comprising a rotatable body having cutting teeth thereon and an axial recess extending inwardly from its base to receive an axle and bearings, said body being further provided with cavities communicating with said recess and fusible means retained in said cavities impregnated with abrasive substances.

6. As a new article of manufacture, a cutter for drill bits comprising a rotatable body having cutting teeth thereon and an axial recess therein to recieve an axle and bearings, said body being further provided with cavities communicating with said recess and said bearings, fusible means retained in said cavities and subject to fusion when excess heat is applied to said rotatable cutter during repairs.

7. A well bit including a rotatable cutter body having teeth thereon and provided with an axial recess, bearings in said recess, an axle carrying said rotatable cutter body and bearings, said axle being supported by the main body of said bit, cavities in said main bit body communicable with the axial recess of said rotatable body and a fusible material disposed in said cavities and said recess.

8. A well bit including a rotatable cutter body having teeth thereon and provided with an axial recess, bearings in said recess, an axle carrying said rotatable cutter body and bearings, said axle being supported by the main body of said bit, cavities in said main bit body communicable with the axial recess of said rotatable body and a fusible material disposed in said cavities and said recess, said fusible material being impregnated with an abrasive substance.

9. As a new article of manufacture, a drill bit head in combination with its shank, a rotatable cutter body having an axial recess therein, bearings in said recess, a shaft fixed in said shank and in operative relation to said bearings and self-hardening fusible means adjacent to said bearings, adapted to liquefy and flow into the operative area of said bearings when said cutter body is heated above normal operative temperature.

10. As a new article of manufacture, a drill bit, a shaft carried by the head of said bit, a cutter rotatably disposed on said shaft and provided with bearings and fusible means associated with said cutter capable of fusing under the action of excess heat to hold said cutter against rotation on said head.

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