May 9, 1944. C. S. DAVIDSON 2,348,611

CLAMP FOR HOLDING DRILL RODS OR CASINGS

Filed June 12, 1942

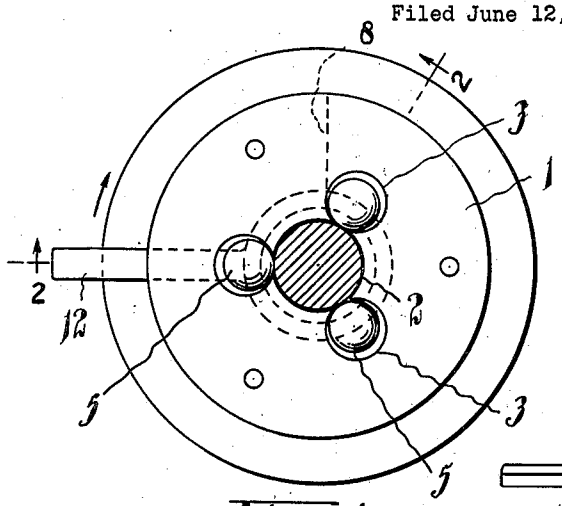

Fig. 1.

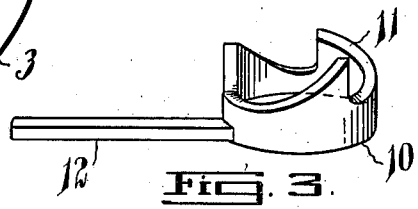

Fig. 3.

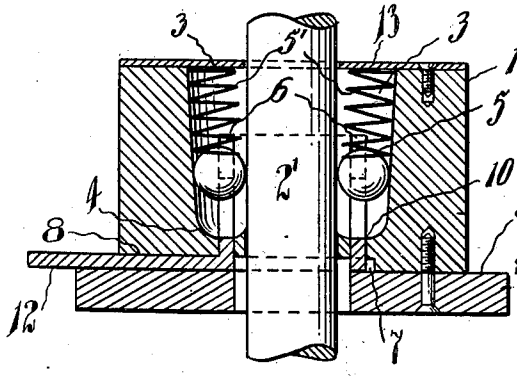

Fig. 2.

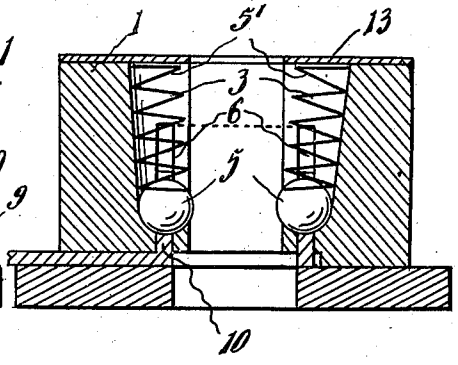

Fig. 5.

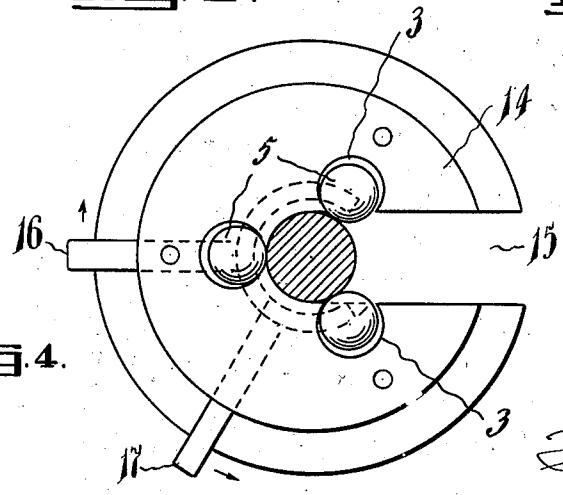

Fig. 4.

Inventor.
C. S. Davidson
by
Hyde Dennison
Atty.

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CLAMP FOR HOLDING DRILL RODS OR CASINGS

Cecil Stanley Davidson, Falconbridge, Ontario, Canada

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3 Claims. (Cl. 24—244)

This invention relates to improvements in devices for holding the operating rods or cables of diamond or other drills used for drilling holes in rocks or soils while extensions are being added or sections removed and which is equally applicable to handling well casings.

The principal objects of the invention are to provide a clamp which will effectively automatically grip the rod, cable or casing when the cutting end has been removed from the bottom of a hole so that the lifting device may be uncoupled and sections removed or added as may be desired, and to provide a clamp which will securely hold an extraordinary load but which will be readily releasable so as to permit immediate lowering of the drill or casing.

The principal feature of the invention consists in providing a block with inclined guideways opening into a central vertical drill orifice in which steel balls are housed to project into the central orifice to engage and grip the drill rod, means being provided for engaging said balls to lift them out of clamping contact with the rod to permit the rod to be lowered.

In the accompanying drawing Figure 1 is a plan view of my improved clamp with the cover plate removed.

Figure 2 is a vertical sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a perspective view of the means for unlocking the clamp from holding contact with the drill rod.

Figure 4 is a plan view with the cover removed of a slightly modified form of the invention.

Figure 5 is a vertical sectional view similar to Figure 2 showing the clutch balls at the bottoms of the guideways.

In the operation of diamond drills and other forms of drills used in drilling deep holes in rocks or soils it is customary for many hundreds or even thousands of feet of rod or casing to be used and it is necessary to remove the tool from time-to-time from the bored hole. When this operation is being performed the tool-lifting mechanism can only move a limited length of tool out of the hole at one operation and it is necessary to hold the remaining length of the tool securely from slipping while the above-ground sections are being removed. The present invention has been devised to facilitate this operation.

In the form of the invention as illustrated in Figures 1 and 2 a solid block 1, which is preferably formed of steel but may be of cast metal, is shown in cylindrical form and it is provided with a central, vertical, circular orifice 2, which is of slightly larger diameter than the drill rod, cable or casing with which it is to be used.

The rod or casing 2' is inserted through the central orifice which is preferably tapered.

Arranged adjacent to the orifice 2 and extending downwardly from the top of the block are a plurality of guideways 3, preferably in the form of cylindrical orifices, which extend downward and are inclined inwardly toward the central orifice at a slight angle. The lower inner portions of these orifices open through the wall of the orifice 2. The guideways 3 are preferably equally spaced. The bottom 4 of each of the orifices is preferably formed of cupped-shape form.

Within each of the guideways 3 is placed a steel ball 5 which is of slightly smaller diameter than the guideway and will fall to the bottom of the guideway by gravity with the inward part of the perimeter extending into the orifice 2, as shown in Figure 5. Springs 5' may be used to ensure the balls moving into a clutching position even though grease and dirt may get into the guideways.

A circular slot 6 extends upwardly from the bottom of the block 1 and cuts through the bottom ends of the guideways 3 about midway of their diameter. A recess 7 of circular form is formed in the bottom of the block 1 concentric with the orifice 2 and circular slot 6 and this recess is provided with a radial opening 8 preferably of quadrangle form as illustrated by dotted lines in Figure 1.

A base plate 9 is secured to the bottom face of the block 1 and encloses the recess 7 and radial opening 8. Within the recess 7 and extending up through the circular slot 6 is a ring-shaped cam 10 formed with cam surfaces 11 in the upper edge corresponding in number with the number of guideways 3. A handle 12 is secured to the cam ring 10 and extends out through the radial slot 8 to provide the means for manipulating the cam.

When the cam is placed so that the lower portions of the cam surfaces are in register with the several guideways the balls 5 will drop to the bottom of the guideways and their inner perimeters will therefore project into the orifice 2 when there is no drill rod extending through the block but when a drill rod is in place the balls will not fall to the bottom but will engage the drill rod in gripping contact as shown in Figure 2 and the downwardy inclined outer side walls of the guideways 3 hold the balls in contact with the rod and the contact of the rod surface with the balls the weight of the rod forces the balls into tight

wedging engagement so that the rod, even though having several tons weight thereof, will be gripped and held securely from slipping downwardly into the hole.

When the upper section of the rod has been removed and the lifting mechanism has been again coupled to the rod the upward pull of the lifting mechanism automatically frees the grip of the balls thereon and the rod moves upwardly freely, but if for any reason the lifting mechanism should slip the rod will be automatically gripped.

It is important that after a section of rod has been added and the drill has been raised from the bottom of the hole the clamp should be released and many conditions arise in drilling operations where it is desirable to let the rod down, and further, it is desirable that the clamp should not be in clamping operation when the drill is being operated to bore. In order to release the rod from the gripping device it is merely necessary for the operator to manipulate the handle 12, rotate the cam 10 within the recess 7, bring the cam surfaces into contact with the underside of the balls and thus lift them out of clutching contact with the rod. The rod can be freed in this manner and after having been allowed to slip a desired distance it can be caught again by simply operating the handle 12 to allow the balls to drop down into gripping engagement with the rod.

It is found in practice that this device will grip and hold extraordinary weights even though the movement has accelerated to a considerable speed after being released and there is no appreciable damage to the rod or clamp.

A cover plate 13 is provided which is secured on top of the block 1 to close the upper end of the guideways 3 so that the balls will not fall out when the clamp is being handled.

A slight modification of the device is illustrated in Figure 5. The block 14 is similar to the block 1 but it is provided with a radial slot 15 extending out from the central orifice 2 so that instead of the block having to be threaded over the rod it can be slipped into position even when the rod is coupled to the lifting or drilling mechanism.

When a block is formed with an entry slot such as described it will of course be necessary to divide the cam into two parts so that it can be operated to lift the multiple arrangement of balls. Owing to the slot 15 having to open through the cam it will be necessary to provide two ring portions to operate in opposite directions in the guide slot and two handles 16 and 17 are shown.

It will be appreciated that the blocks 1 or 14 can be made of a very heavy cross section to withstand any outward pressure that may be applied thereto by the weight of the drilling tool, and the surfaces of the guideways may be tempered or chilled to prevent pitting through the applied pressure against the balls when heavy loads are checked quickly.

The device is simple and inexpensive to build but is extremely effective in operation and, as will be readily understood, it can be used in various diameters and with different numbers of ball grips so that it may be accommodated to use in handling well casings and cables as well as the ordinary drill rod.

What I claim as my invention is:

1. In a clamp for holding drill rods or the like, in which a block provided with a central orifice has a plurality of inwardly inclined guideways extending longitudinally thereof, the lower portions of said guideways entering said central orifice, said block having a circular slot concentric with the central orifice extending upwardly from the bottom and intersecting the lower ends of said guideways, balls arranged in said guideways, a cam ring rotatably housed in said slot and having upwardly extending portions adapted to engage and lift said balls clear of gripping contact with the rod, and means for securing said cam ring in said slot.

2. A clamp for holding drill rods or the like, as claimed in claim 1, in which an annular groove is formed in the bottom of said block and is provided with a radial orifice, the cam ring being rotatable in said groove and having a handle extending through said radial orifice, and a base plate closing said annular groove.

3. A clamp for holding drill rods or the like, comprising a block having a central longitudinal orifice and a radial slot extending out from the central orifice, said block having a plurality of inwardly inclined guideways arranged either side of said slot, said guideways opening into said central orifice, balls arranged in said guideways, a slot concentric with said central orifice extending upwardly from the bottom of the block and entering the bottom of said guideways, a cam member rotatably mounted in said concentric slot having cam portions extending upwardly to engage the balls in said guideways to lift same clear of gripping contact with the rod inserted in the central orifice, and means extending radially from said cam member for rotating same in said slot.

CECIL STANLEY DAVIDSON.