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CLAMPING DEVICE

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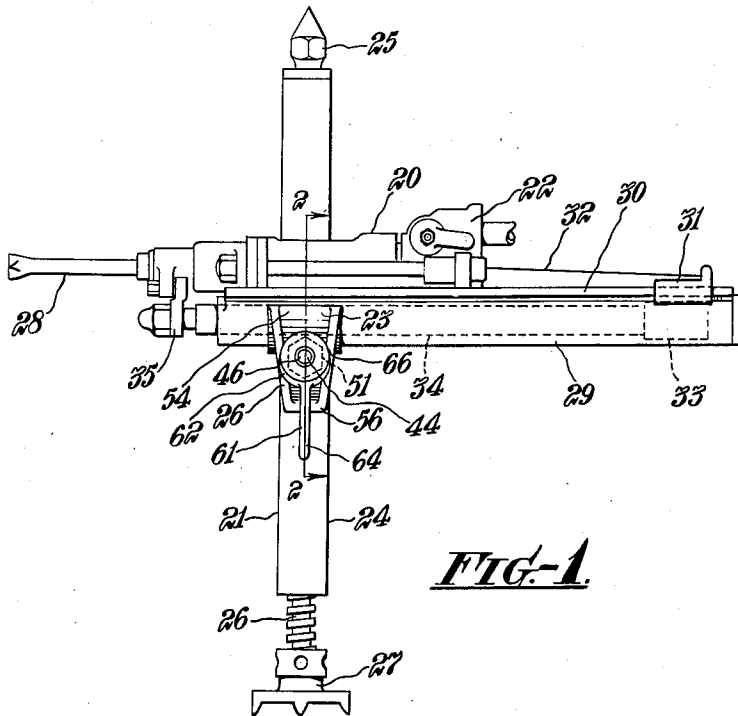


FIG. 1

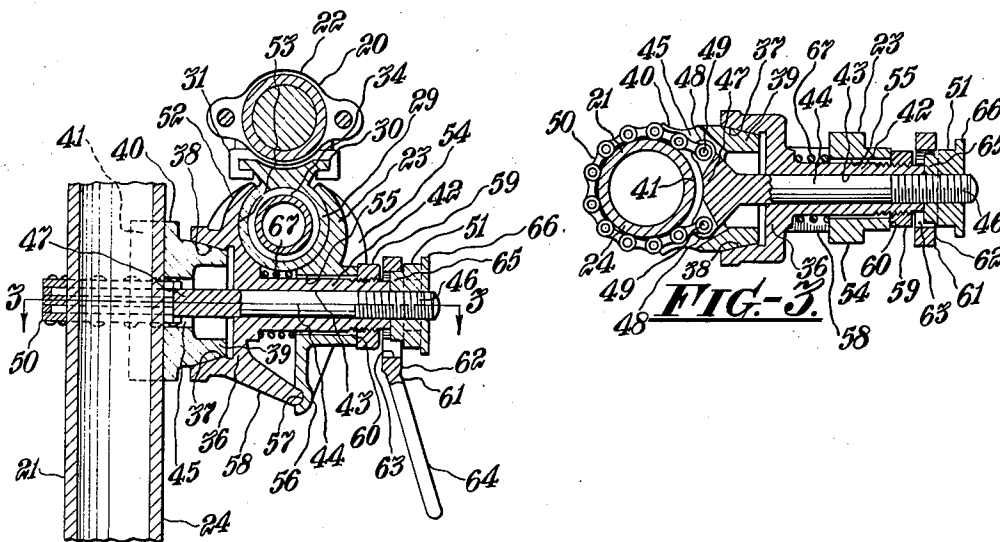


FIG. 2

FIG. 3

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CLAMPING DEVICE

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5 Claims. (Cl. 24—249.1)

This invention relates to rock drills, and more particularly to a clamping device for securing a rock drill to a support, as for example a drill column or a quarry bar.

One object of the invention is to facilitate the manipulation of the clamping device.

Another object is to assure firm gripping action of the clamping device on the objects which it is intended to engage.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation of a rock drilling mechanism equipped with a clamping device constructed in accordance with the practice of the invention,

Figure 2 is a transverse view taken through Figure 1 on the line 2—2, and

Figure 3 is a plan view, in section, taken through Figure 2 on the line 3—3.

Referring more particularly to the drawing, 20 designates, in general, a drilling mechanism comprising an extensible mounting 21, shown as being in the form of a drill column, and a rock drill 22 which is secured to the mounting by a clamping device 23 constructed in accordance with the practice of the invention.

The mounting 21 and the rock drill 22 may be of known types, the former, shown by way of example, comprises a cylindrical body 24 carrying a pointer 25 at its upper end for engagement with the rock surface, and in the lower end of the body 24 is a screw 26 carrying a foot piece 27 to support the mounting.

The rock drill is shown equipped with pressure fluid actuated feeding mechanism for advancing it in accordance with the penetration of the working implement 28 into the work. The feeding mechanism illustrated accordingly comprises a cylinder 29 having guide ribs 30 for a guide shoe 31 carried by an extension 32 on the rearward end of the rock drill, and in the cylinder 29 is a piston 33 having a rod 34 which extends from the front end of the cylinder and is attached to the front end of the rock drill by a bracket 35.

The valve mechanism for controlling the admission and exhaust of pressure fluid to and from the cylinder 29 has been omitted from the drawing but it is to be understood that such valve mechanism may be of a well known type and suitably positioned for effecting such control.

In the form of the invention illustrated the clamping device 23 comprises a body 36 having a coniform bore 37 of which the surface 38 constitutes a seat for a conical boss 39. The boss 39 is an integral portion of a rigid jaw 40 having a concave surface 41 to conform with the contour of the body 24 against which it seats. The coniform bore 37 is located in one side of the body 36 and on the opposite side of the body is a trunnion 42 having a bore 43 in axial alignment with the bore 37 to receive a rod 44 which extends entirely through the bore 43 and through an aperture 45 in the jaw 40.

The rod 44 has a threaded end 46 which projects from the free end of the trunnion 42. The opposite end 47 of the rod is flared and is provided with lugs 48 that lie within the aperture 45 and contain pins 49 that engage the ends of a flexible member 50, shown as being in the form of a chain, that encircles the body 24 and cooperates with the jaw 40 for clamping the body 24 between these elements. The rod 44 is slidable in the bore 43, and on the threaded end 46 of said rod is a nut 51 that acts against the free end of the trunnion 42 for drawing the chain 50 into firm frictional engagement with the body 24 and for pressing the jaw 40 against the body and the conical boss into frictional engagement with the surface 38.

In addition to its function as a support for the clamping elements engaging the body 24 of the mounting, the body 36 also serves as a gripping element to secure the clamping device to the rock drill or, as in the form of the arrangement illustrated, to the cylinder 29 of the feeding mechanism. To this end the body 36 is provided with a gripping portion 52 having a curved seating surface 53 shaped to conform with the surface of the cylinder 29, and a gripping member 54, complementary to the gripping portion 52, is disposed on the trunnion 42 to cooperate with the gripping portion 52 for holding the cylinder 29.

The gripping member 54 is loosely slidable on the trunnion 42, having a bore 55 of larger diameter than the trunnion so that the gripping member will be capable of a certain degree of tilting movement without hindrance from the trunnion. In order that such tilting movement may be conveniently effected the gripping member is provided with an arm 56 which lies on the opposite side of the bore 55 from the gripping member, proper, and has a notch 57 that engages the end of a fulcrum in the form of an arm 58 on the body 36.

The element that actuates the gripping member 54 also consists of a nut 59 threaded on the free end of the trunnion 42 and acting against a seating surface 60 on the gripping member. The nuts 59 and 51, while having bores of different diameters, are of the same external conformation and dimensions in order to be engaged by the same actuator or wrench, thereby eliminating the necessity of having a plurality of wrenches for tightening and loosening the clamping members of the device. The actuator illustrated for this purpose and designated 61 comprises an endless loop 62 having a bore 63 shaped to receive the nuts 59 and 51 and having a handle 64 integral therewith.

To the end that the actuator 61 may be constantly in a convenient position for engagement with either of the nuts 51 and 59 said actuator is normally disposed between the nuts which are spaced a sufficient distance apart to provide room therefor, and on the inner end of the nut 51 is a boss 65 to form a seat for the actuator when not in use. A flange 66 on the outer end of the nut 51 prevents removal of the actuator from the assembly without removing the nut 51.

Encircling the trunnion 42 is a spring 67 that seats with its ends against the gripping member 54 and the body 36 to remove the gripping member 54 from its gripping position upon unthreading of the nut 59 on the trunnion 42.

In practice, whenever it is intended to attach the rock drill to the mounting 21 the body 24 is extended through the loop formed by the chain 50. The mounting 21 is then placed in the correct position with respect to the work and the clamping device is placed in the desired position along the length of the mounting. Thereafter the nut 51 is threaded on the rod 44 against the end of the trunnion 42 to draw the chain 50 and the jaw 40 tightly into engagement with the body 24. This force will also press the conical boss 39 into firm frictional engagement with the surface 38 of the body 36. The feeding cylinder 29 of the rock drill is then inserted between the gripping member 54 and the gripping portion 52 and the nut 59 is manipulated to rock the gripping member 54 about the fulcrum 58 and into tight engagement with the cylinder 29. After the clamping elements of the device have been brought into tight frictional engagement with the body 24 and the feeding cylinder the actuator 61 is placed on the seating surface 65 until again needed.

In practice the present invention has been found to be a highly efficient device for securing a rock drilling mechanism to its mounting. Arranged in the manner described, the clamping device may be of compact construction and, therefore, of greatly reduced weight. A further highly desirable advantage of the invention is that by placing the actuating means of the several clamping elements closely adjacent each other the clamps may be tightened or loosened without

necessitating the operator to shift his position. This is extremely desirable in devices of this character since it is necessary for the operator to support a very considerable portion of the weight of the drilling mechanism until at least the clamp engaging the mounting can be tightened.

I claim:

1. A clamping device, comprising a body having a bearing surface, a rigid jaw having a bearing surface to engage the first mentioned bearing surface, a flexible member extending into the rigid jaw to cooperate with the jaw for effecting clamping action, and means for actuating the flexible member with respect to the jaw and for effective locking engagement between the bearing surfaces to lock the rigid jaw to the body.

2. A clamping device, comprising a body having an internal coniform bearing surface and a bore coaxial with the coniform surface, a rigid jaw having a conical surface to engage the bearing surface, a rod slidable in the bore, a flexible member extending into the rigid jaw to cooperate with the jaw for effecting clamping action and having its ends connected to the rod, and means for actuating the rod in the bore to move the flexible member with respect to the jaw and to press the conical surface of the jaw into frictional engagement with the coniform bearing surface.

3. A clamping device, comprising a pair of cooperative clamping members, a body to frictionally engage one of the clamping members, a hollow trunnion on the body, a rod slidable in the trunnion connected to the other clamping member, and a nut threaded on the rod and acting against the trunnion to effect clamping action of the members and to force said one clamping member into frictional engagement with the body.

4. Apparatus of the character described, comprising a pair of clamping devices, bearing surfaces on the clamping devices engaging each other to permit of relative rotational movement of the clamping devices, means for effecting clamping movement of one clamping device and for preventing relative rotational movement of the bearing surfaces, means for effecting clamping movement of the other clamping device, an actuator for manipulating both means, and a seat between both of said means to normally support the actuator.

5. Apparatus of the character described, comprising a pair of clamping devices, coniform bearing surfaces on the clamping devices cooperating with each other to permit of relative rotational movement of the clamping devices, a nut for actuating one clamping device and for forcing the coniform bearing surfaces into firm frictional engagement with each other to prevent relative rotary movement between the clamping devices, an actuator for actuating the nuts, and a seat between and directly adjacent the nuts to normally support the actuator.

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