TOOL RETAINER FOR ROCK DRILLS

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1
This invention relates to retainers for percussive tools, and more particularly to a retainer for preventing a working implement from becoming accidentally detached from the tool in which it is supported or from being ejected therefrom during operation.

Among the objects of the invention are the provision of improved means for positively holding the retainer for a collared working implement, such as the drill steel of a rock drill, in both retaining and releasing positions; the employment of resilient means so arranged within the implement retaining member that the latter is maintained in locked relation to the trunnions of the tool when in either retaining or releasing position; the provision of resilient means in the implement retaining member which, in addition to the foregoing function, serves as a shock absorber at such times as the implement collar may be percussively driven against the implement retaining means; and the provision of a device which is simple in construction and inexpensive to manufacture.

Other objects and features of the invention will be more clearly pointed out in the following description and appended claims.

In the accompanying drawing which illustrates one embodiment of the invention:

Fig. 1 is a front view, partly in elevation and partly in section, of a fragmentary portion of a percussive tool embodying the invention;

Fig. 2 is a side view, partly in elevation and partly in section, as indicated by the arrows 2—2 in Fig. 1, the releasing position of the latching member being indicated in broken lines;

Fig. 3 is a view looking upwardly, as indicated by the arrows 3—3 in Fig. 1, showing the percussive tool in elevation and the drill steel in cross-section;

Fig. 4 is an end view of the buffer detached from the assembly;

Fig. 5 is an end view of a shoe forming part of the retainer;

Fig. 6 is a longitudinal section view of the shoe, as indicated by the arrows 6—6 in Fig. 5;

Fig. 7 is a bottom view of the shoe; and

Fig. 8 is a cross-section of a trunnion, as indicated by the arrows 8—8 in Fig. 1.

Figs. 4 to 8 inclusive, which are of the same scale, are on a larger scale than Figs. 1 to 3.

Referring to Fig. 2, a drill steel 10 or similar working implement is provided with a collar 11 engaging the lower forward end of a chuck 12 mounted in a bore 13 in the front head 14 of a percussive tool. Shank 15 of the drill steel 10 is of polygonal cross-section and has a sliding fit with the chuck. The upper end of the shank is adapted to receive blows delivered by a piston extension 16. The structure described up to this point is conventional.

In accordance with the present invention, and as best shown in Fig. 1, front head 14 is provided with a pair of lugs 17 which extend laterally from its forward end to serve as supports for a pair of forwardly leading trunnion carriers 18. Each lug is formed with a front or lower flat surface 19 and a rear or upper flat surface 21 which are adapted to serve as seats for the mounting of a trunnion carrier. A longitudinal bore 22 extends through each lug for the accommodation of the shank 23 of a carrier, the free end of each carrier being threaded for the reception of a nut 24. Each carrier is provided with a retainer flange or collar 25 which is brought into rigid abutment with the front seat 19 of the lug by the tightening of a nut 24 against the rear seat 21 of the lug. The assembly of the carriers in rigid and immovable relation to the lugs is an important feature of the invention. The forward end of each carrier has a trunnion 26 integral therewith and directed inwardly to terminate in spaced relation with the opposite trunnion. Each trunnion has a top or rear latching flat 27 and a side latching flat 28 arranged to seat the shoe 29, as hereinafter more fully described. The two trunnions are disposed coaxially and the major portion of their surface is cylindrical.

Supported by the trunnions 26 is a latching member 31 provided with a handle 32 and implement retaining means in the form of a yoke 33. Yoke 33 is adapted to partially surround the drill steel 10 or similar working implement (Fig. 3), and is formed at its rear or upper portion with a flat surface 34 adapted to seat the collar 11 of the drill steel. The main body of the latching member has a transverse aperture 35, the opposite sides of which are flat to form walls 36 (Fig. 2) and the top 37 and bottom 38 of which are rounded. Top 37 and bottom 38 are each in the shape of a half-cylinder and form, respectively, a seat for the buffer 39 and a bearing for the latching member 31 to rotate upon the trunnions. The buffer is made of an oil resistant resilient material of the synthetic group, such as "Duprene" and is mounted in pre-compression within the aperture 35. Such buffer is formed with a rounded portion to conform to the rounded top portion of the transverse aperture of the latch and has flat side walls to conform to the
upper side walls of the latch aperture. Opposite the rounded portion, the buffer has a flat back 3 which rests upon the flat upper face 42 of the shoe 25. A transverse aperture 43 is formed to extend through the buffer to allow for resilient compression of the buffer in response to the movement of the latching member from open or unlocked to closed or latched position. When the buffer is detached from the assembly and in a condition of normal expansion, the aperture 43 is cylindrical (Fig. 4); but when the buffer is mounted under pre-compression, the aperture assumes an ellipsoidal shape (Fig. 3).

Shoe 25 is preferably bonded to the buffer. Said shoe extends transversely of the latch member 31 and its end walls are coterminal with the end walls of the main body of the latching member and of the buffer. The outer portions of the shoe (Figs. 6, 7 and 8) are formed with concave arcuate recesses 44 to conform to the periphery of the trunnions thereby to provide a rotary cooperation between the shoe 29 and the trunnions 26 upon the alternate movement of the latching member from open to closed position. Each trunnion has an inner side flat 45 (Fig. 2) so that the trunnions may be reversed in position whenever the corner 51 becomes worn. To reverse the position of the trunnions, it is only necessary to loosen nuts 24 and remove the trunnions and latch member as a unit from the front head. This sub-assembly is then disassembled, the trunnions reversed, the parts re-assembled and remounted on the front head.

Each carrier 18 is formed with a flange 46, the inner face 47 of which loosely abuts the flat sides 48 of the latch member 31 and the end faces 49 of the shoe 29 to prevent the yoke from being shifted out of alignment with the drill steel and to confine the shoe in operative position in reference to the trunnions.

In operation, the latching member 31 may be set in two relative positions relatively to the working implement 10 and is held respectively in latched position to prevent the removal or erection of the implement from the tool or in unlatched position to permit the insertion or removal of the implement by the operator. When it is desired to insert the implement 10 into the tool, or to remove it therefrom, the latch member 31 is unlatched or set to the position shown by the broken lines in Fig. 2. Clearance is thereby provided for the insertion or removal of the working implement from the tool chuck 12. Upon insertion of the implement in the chuck, the latch member is locked by throwing its handle 32 inwardly and rearwardly in clockwise direction to the position shown in solid lines in Fig. 2 so that the shoe 29 is moved from its dotted line position rotatively to its solid line position or from its position in contact with the side flat 28 of the trunnions to a position in contact with the upper or rear flat 27 of the trunnions. The resilience of the buffer 39 and the provision of the aperture 43 therein permit of its compression to allow the shoe to pass from one position to the other; over the corner 51 (Fig. 8) of the trunnions. Corners 51 are beveled to allow for easier and smoother passage of the shoe. When the shoe is in either position, the resilience of the buffer will force the shoe against the upper flats 27 or against the side flats 28, as the case may be, to maintain it in locked position. Upon such movement of the latch member, the yoke will be brought downwardly or forwardly, as shown in Fig. 2, to partially surround the working implement and the yoke flat or seat 34 is thus brought into the path of collar 11 of the implement. In such latched or locked position, the forward or downward movement of the working implement is limited by engagement of the collar 11 with the side flats 28 and the implement is thus positively prevented from being ejected from the tool during operation or from falling out of the front head while at rest.

It should also be observed that the latch member 31 is so disposed, when in latched position, that any blows transmitted through the collar 11 to the yoke 33 will be absorbed by the resilient buffer or cushion 32. This will occur, for example, at times when the operator may lift the entire tool from the surface on which it is operating without shutting off the driving power, or when the working implement 10 may become stuck or held against further movement in such working surface, or in case the powers is turned on by accident when the tool is not in use. Thus the buffer 39 functions resiliently not only to compress the shoe 29 into locking engagement with the trunnion flats 28 and 27 to hold the latch member in retaining and releasing position respectively but also as a shock absorber or cushion. A further advantage of this arrangement of the buffer 39 is that the latch member 31 may be rigidly and immovably secured to the front head 14 so that whenever the collar 11 of the working implement 10 strikes the yoke 33, the latch member 31 will be the only element to move in absorbing the shock. In relevant prior art, the whole retainer assembly including the trunnions move, thereby causing considerable wear to develop in the assembly.

What is claimed is:

1. In a power operated percussive tool having a front head and a collared working implement supported therein, a retainer for said implement comprising transverse latching member adapted to be mounted on the front head and directed inwardly therefrom in axial alignment with each other, a latching member mounted on the trunnions for limited relative movement parallel to the implement and adapted to be moved from into retaining and releasing position means for yieldably locking the latch member in selected positions including a plurality of flat surfaces on each trunnion, and means on the latching member movable into the path of the collared implement to retain said implement in operative position and movable out of said path to release said implement, said yieldable locking means including a resilient member arranged between the latch member and trunnions to absorb the energy of impact of the collared implement on the latching member and prevent transmission thereof to the trunnions.

2. A retainer for a collared implement of a power operated percussive tool comprising a pair of carrier members adapted to be mounted on the front head of the tool, a pair of trunnions on the carrier members directed inwardly therefrom in axial alignment with each other and having locking means thereon including flat surfaces said trunnions being inter-changeable each with the other, a centrally aperturest free latch member mounted on the trunnions between the carrier members and movable alternately between the retaining and releasing positions, the aperture in the latch member being elongated to permit limited forward movement of the latch member relative to the trunnions, means on the latch member movable into the path of the
collared implement to retain said implement in operative position and movable out of said path to release said implement, and resilient means so disposed within the rear part of the aperture of the latching member as to yieldably lock the latching member in retaining and releasing positions upon said flat surfaces upon predetermined movement of the latching means, said means being also adapted to urge the latching member toward its extreme rearward position relative to the trunnions and allow forward displacement of the latter to absorb the shocks of blows of the collared implement whenever the latter is percussively driven against the latching member.

5. An implement retainer, according to claim 2, in which the resilient means comprises a shoe having a surface adapted to cooperate with the flat surfaces on the trunnions and a resilient buffer adjacent the shoe adapted to yieldably lock the shoe in latched engagement with the flat surfaces.

4. In an implement retainer for a power operated percussive tool, in combination with a front head and a collared working implement, a pair of carrier members, trunnions on the carriers directed inwardly therefrom in axial alignment with each other and terminating in spaced relation to each other, a latching member rotatably mounted on the trunnions and disposed between the carriers, said member having an elongated central aperture for the reception of the trunnions at the forward end of the aperture, locking means on each trunnion including a plurality of flat surfaces, a shoe arranged within the central aperture at the rear of the trunnions, resilient means arranged adjacent the shoe within the rear part of said central aperture adapted to press said shoe against the flat surfaces of the trunnions thereby to yieldably lock the latching member in retaining and releasing positions and to hold the latching member normally in its rearmost position, said resilient means being also adapted to yield to permit the latching member to move forward and to absorb the shock of blows of the collared implement whenever the latter is percussively driven against the latching member thus preventing the transmission of impacts to the trunnions, and a yoke on the latching member having a seating surface adapted to receive the collar of the working implement when said yoke is moved into the path of the collar.

5. In a power operated percussive tool having a fronthead and a collared working implement supported therein, a retainer for said implement comprising trunnions rigidly attached to the fronthead and directed inwardly therefrom in axial alignment with each other, a latching member having an enlarged aperture receiving the trunnions loosely, thus allowing limited relative movement in forward and rearward directions, said latching member being movable about the axis of the trunnions into selected retaining and releasing positions and having a portion movable into and out of the path of the implement to retain or release the latter, and means for yieldingly holding the latching member in selected positions on the trunnions, said holding means comprising a buffer disposed in the rear part of said aperture and under compression to urge and normally hold the latching member in its maximum rearward position relative to the trunnions, the buffer being arranged to absorb the forward impacts of the implement on the latching member while permitting the latching member to move forwardly relative to the trunnions, thus preventing the transmission of impact shocks from the latching member to the trunnions.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,807,799</td>
<td>Slater</td>
<td>June 2, 1931</td>
</tr>
<tr>
<td>2,230,046</td>
<td>Curtis</td>
<td>Jan. 28, 1941</td>
</tr>
</tbody>
</table>