Nov. 3, 1964 S. E. PROCTOR 3,155,428

CUTTER TOOL RETAINED BY SPRING DETENT

Filed April 12, 1962

Fig.1.

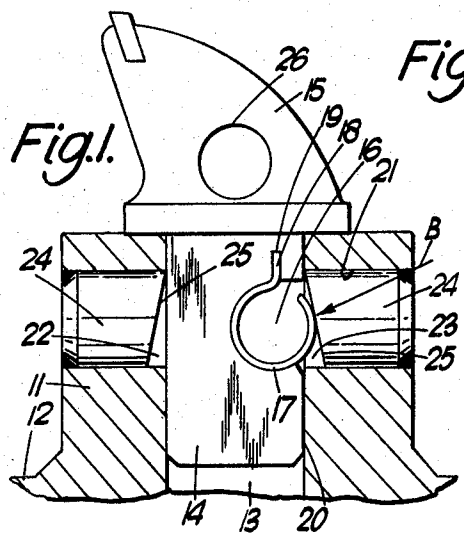


Fig.2.

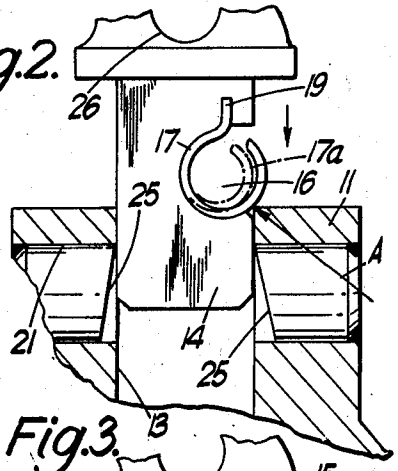


Fig.3.

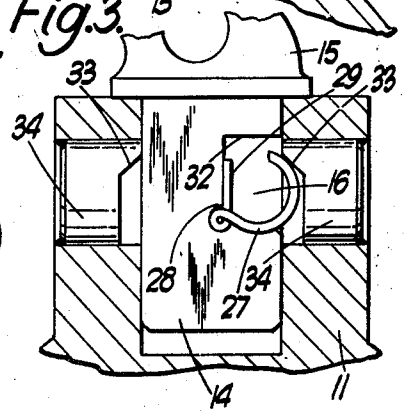


Fig.4.

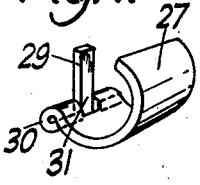
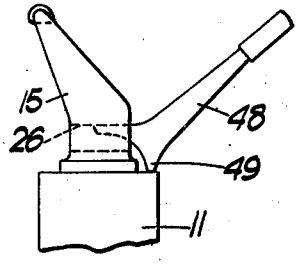


Fig.5.



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United States Patent Office 3,155,428 Patented Nov. 3, 1964

3,155,428

CUTTER TOOL RETAINED BY SPRING DETENT

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Filed Apr. 12, 1962, Ser. No. 186,987
Claims priority, application Great Britain, Apr. 13, 1961, 13,386/61; May 11, 1961, 17,286/61
3 Claims. (Cl. 299—92)

This invention comprises improvements in or relating to tool-carrying chains.

In tool-carrying chains such, for example, as the chains used in coal cutters for carrying the picks which cut the coal, it is necessary from time to time to change the picks, either by reversing them in the tool boxes so that the chain will cut in the opposite direction or by substituting fresh sharp picks for old blunted ones. The picks are normally held in the pick boxes by set screws gripping the sides of the shanks of the tools and the operation of changing all the tools in a chain takes a considerable time. This is particularly true with a coal cutter chain because of the cramped conditions under which the work often has to be performed, and various means have been proposed from time to time to make the changing of tools quicker and easier, but these frequently involve complication, or have proved unsatisfactory in service under the hard conditions which are involved with a coal cutter. It is an object of the present invention to provide an improved device.

The present invention comprises a tool-carrying chain having removable tools held by their shanks in tool-boxes carried by the chain characterised by the fact that the shanks are retained in the tool boxes by means of a spring detent member which yields to permit easy insertion of the shank but resists withdrawal.

In a preferred construction the detent members take the form of part-rings of spring metal each let into a recess in the side of one of the two elements it is to hold together (shank and tool-box) so as to project somewhat beyond the side and the other elements each have a surface facing the detent member which is inclined so as to overhang the detent member when the two elements are fitted together.

The following is a description, by way of example, of certain constructions in accordance with the present invention, reference being made to the accompanying drawing in which:

FIGURE 1 is a vertical section through a tool-box showing a tool held in place by a spring-ring type of detent member;

FIGURE 2 is a view similar to FIGURE 1 but showing the tool shank in the act of insertion;

FIGURE 3 is a similar view of an alternative construction;

FIGURE 4 is a detail of a spring detent member shown in FIGURE 3;

FIGURE 5 is a detail showing a pick-removing-tool.

The general construction of the coal cutter chain may be any desired and the links or some of them carry projecting tool-boxes in the usual way one of which appears at 11, FIGURE 1, projecting from a chain-link 12. These boxes 11 are pierced with rectangular openings 13 to receive the shanks 14 of cutter picks 15. Each pick shank 14 is bored through from side to side near the rear edge of the shank, with a hole 16 which is large enough to be partly open to the rear edge. In this hole there is fitted a spring-ring 17. The ring 17 is made of flat spring steel strip of the same width as the shank 14 and it is coiled into a circle a little larger than the internal diameter of the hole 16 in the shank so that it has to be compressed to get it into place. The ring extends around somewhat

less than one complete turn and it has a root portion 18 which is bent radially outwards. This root portion fits into a slot 19 extending from the hole 16 in which the spring is fitted within the shank 14, in a direction parallel to its rear edge. In order to produce the hole 16 with the slot 19 extending from it, it is convenient to bring the hole to its final shape by broaching. It will be appreciated that, owing to the location of the hole 16, when the spring-ring 17 is in place in the shank one side of the ring 17 projects beyond the plane of the rear edge 20 of the shank 14 and if the shank is pushed into the rectangular aperture 13 in the tool-box the spring-ring 17 will have to be compressed to enable it to go in, but the direction of the force exerted by the top corner of the tool-box at the shank-receiving opening is upward and inward, as shown by arrow A, FIGURE 2, and this is a direction in which the exertion of force tends to press the spring-ring in easily, as shown by the chain line position 17*a*.

The tool-box 11 is drilled through in a fore and aft direction, that is to say, parallel to the length of the chain, with an opening 21 which intersects the aperture 13 for the reception of the shank 14. When the tool shank 14 is pressed into place the spring-ring 17 will register, according to whether the tool is facing forwardly, as shown in FIGURE 1, or rearwardly, with either the forward portion 22 or the rearward portion 23 of this hole. In each portion of the hole there is a hardened steel plug 24 which is welded in place and which has an inner face 25 to bear on the spring-ring 17. The inner faces 25 of the two plugs are inclined in such a direction that the parts of the plugs which are nearest the top of the tool-box overhang the lower parts and one of them overhangs the spring-ring 17 when the shank 14 is pushed home, as in FIGURE 1. The spring-ring then bears against the inclined face 25 and holds the tool in place. If the tool is reversed to face the other way the spring-ring 17 will bear against the inclined face of the other plug.

The insertion of the tools is easy for the reason above stated, namely, that the pressure exerted by the corner of the tool-box on the spring-ring 17 is in the direction which tends to close it easily, it being noted by reference to FIGURE 2 that the free end of the projecting free ended portion of the ring 17 is normally spaced from the upper edge of recess 16 to avoid interference with upward and inward deflection of said portion into the recess. Withdrawal of the shank of the tool however is resisted by pressure of the inclined face 25 of the plug 24 on the ring 17 and withdrawal is more difficult because the direction of the force is as shown by arrow B and not only is this force downward, it is aimed below the centre of the ring 17, which is therefore pressed against the bottom of hole 16 and is supported against contraction more stiffly. The tool 15 is therefore securely held in place, the spring-ring 17 constituting a detent member which resists withdrawal. However, if enough force is exerted in the outward direction the resistance of the ring 17 to contraction will be overcome and the ring will be closed by the action of the inclined face 25 so that the tool can be withdrawn.

For the purpose of withdrawing the tool the head of the tool 15 outside the tool-box is provided with a transverse opening 26 and the end of a lever 48 (FIGURE 5) can be inserted in the opening, the lever having a heel 49 to rest on the tool-box 11 beside the tool and afford leverage by which the latter may be prised out of its seating in the shank. By use of the lever all the tools may be rapidly prised out whenever desired. If they require to be reversed they can be reinserted the other way round and the detent members in their shanks will then co-operate with the inclined faces of the plugs in the opposite

side of the shank aperture 13 from that which contained the plug they engaged before. If the tools need to be changed, of course, it is an equally simple matter to insert the new tools.

It will be seen that there are no set screws involved in this construction and no loose parts to come adrift or get lost and the number of parts for the complete chain is reduced to a minimum.

Referring now to FIGURES 3 and 4, a spring-part-ring 27 is used as a detent member, such as is described above in connection with FIGURES 1 and 2, but instead of being anchored in the shank of the tool by a root portion 18 located in a slot extending from the housing-hole 16 in the shank 14 close to the upper end of the shank, the anchorage is located further round the housing-hole (anti-clockwise in the figure), at about 45° below the centre line of the housing-hole 16, and the spring-ring 27 is little more than a semi-circle. The anchorage is a small drilled hole 28 in the shank, the side of which breaks out into the hole 16 and to keep the ring 27 pressed against the lower side of hole 16 it has a tail 29 above the anchorage along part of the interior surface of the hole 16.

The ring 27 is constructed as shown in FIGURE 4, with a curl at 30 to fit the hole 28 and the extension 29 passing up from the end of the curl through an aperture 31 in the spring-ring. The upper part of hole 16 is broached out to a rectangular shape at 32. The tool-box 11 is drilled as before and plugged, but the plugs, shown at 34, have a sharper inclination at 33, where they are intended to overlie the ring 27. The operation is similar to that of FIGURES 1 and 2.

I claim:

1. A cutter tool and tool box assembly comprising: a cutter tool having a shank, an elongated tool box having an elongated socket open at its upper end to receive said shank, said shank being disposed in said socket and formed with a recess opening outwardly through a side surface of the shank transversely to the length thereof, a detent member supported within said recess and having a resiliently flexible free ended portion arcuately curved in a plane parallel to the length of said shank and projecting from said recess beyond said side surface of the shank, a retaining cam in said socket having a cam surface which is inclined with respect of the longitudinal axis of the socket and which, when the shank is home in the socket, overhangs said detent member and is engaged thereby, the free end of said portion being directed toward said open end of the socket and spaced from the upper edge of said recess to permit comparatively easy upward and inward yielding of said portion into the recess, said detent member normally contacting the lower edge of said recess to offer comparatively greater resistance to flexing of said portion into the recess by the exertion of downwardly and inwardly directed forces thereon.

2. An assembly as claimed in claim 1 wherein the detent member comprises a part-ring of spring metal and the transverse recess in the shank fits the extension of the part-ring with the exception of said free ended portion of the ring which projects from the surface of the shank, said part-ring having a root portion, said tool box being formed with a groove opening into said recess and receiving said root portion to locate the part-ring in the recess.

3. An assembly as claimed in claim 1 wherein said inclined cam surface in the socket is formed on a hardened plug fixedly housed within a bore opening through said tool box into the side of the socket.

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