

Oct. 22, 1968

G. DUPLESSIS

3,406,471

DIGGER TOOTH LOCKING PIN

Filed Dec. 1, 1966

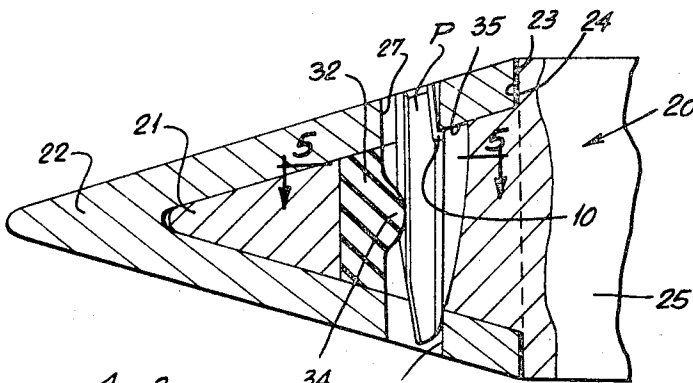


Fig. 1

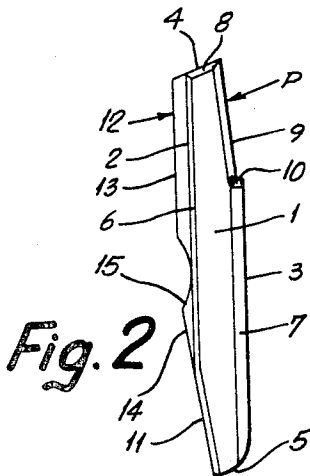


Fig. 2

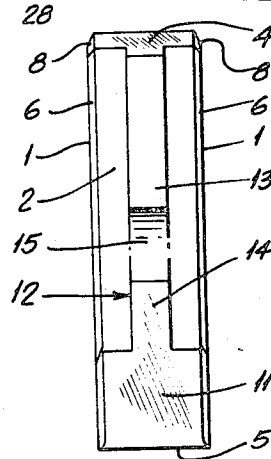


Fig. 3

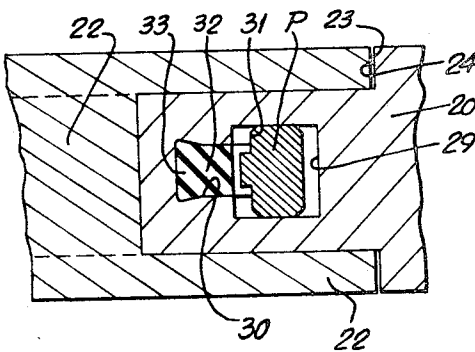


Fig. 5

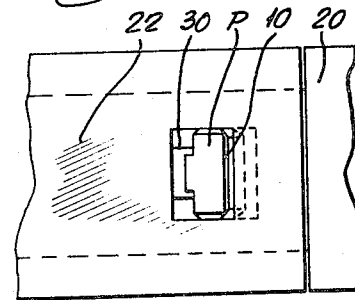


Fig. 4

INVENTOR
Gerard DUPLESSIS

BY *Pierre Lespérance*

PATENT AGENT

1

3,406,471

DIGGER TOOTH LOCKING PIN

Gerard Duplessis, 10806 St. Denis St.,
Montreal, Quebec, Canada

Filed Dec. 1, 1966, Ser. No. 598,451

Claims priority, application Canada, Aug. 11, 1966,
967,684

5 Claims. (Cl. 37-142)

The present invention relates to two-part digger or excavating teeth for the bucket of power shovels and the like and, more specifically, to a locking pin of improved design for securing the two parts of the excavating tooth together.

Excavating teeth of the character described consist of an adapter having a forwardly protruding tapered nose, on which is fitted a tooth point having a tapered socket for receiving the nose.

The tooth point is provided with aligned openings adapted to register with a transverse bore made in the nose for receiving a locking key or pin, which maintains and locks the tooth point in position on the nose.

A block of compressible material is positioned in a cavity within the nose and protrudes into the bore to engage and press the locking pin so as to prevent accidental removal or displacement of the pin. However, due to the high stresses and forces imparted to the nose and tooth point during digging; due also to the fact that the tooth point and adapter are cast metal pieces which therefore, are not manufactured to very close tolerances; and, finally, due to the fact of metal creeping especially of the tooth point during working, displacement of the locking pin still frequently happens, resulting in breakage of the adapter and/or tooth point, or resulting in a locking pin which is impossible to remove for replacing the worn tooth point.

The general object of the present invention resides, therefore, in a locking pin which is of improved design such that when in proper locking position, it is practically impossible for the locking pin to become accidentally dislodged from its intended operative position and which yet can be relatively easily removed when it is desired to replace the worn-out tooth point.

A more specific object of the present invention resides in the provision of a locking key or pin of the character described, which is provided with an upwardly facing step at its back face to prevent displacement of the locking pin upwardly and which is provided at its front face with a notched medial rib of less width than the total width of the front face of the pin, said notch being characterized by the fact that the bottom thereof is co-extensive with the front face of the pin, whereby the pressure, namely the force per unit area, exerted by the compression block on the pin is much greater when the pin is forced out of its normal position and engages only the rib than when it is in its normal position, in which position the force exerted by the block on the pin extends over the entire width of the front face of the pin. Therefore, the friction is greater in the above-noted displaced position and the pin is positively maintained in its intended operative position, so that there is assurance that the key will never become improperly positioned resulting in breakage of the adapter or tooth point, or of the distortion or bending of said elements, such that it would be impossible to remove the locking pin.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings, in which:

FIGURE 1 is a partial view of an adapter, tooth point, locking pin and retaining compressible block, shown partially in elevation and partially in longitudinal section;

2

FIGURE 2 is a side elevation of the locking pin;

FIGURE 3 is a front elevation of the locking pin;

FIGURE 4 is a partial top plan view of the assembly of FIGURE 1; and

FIGURE 5 is a partial plan section taken along line 5-5 of FIGURE 1.

Referring now more particularly to the drawings in which like reference characters indicate like elements throughout, the locking pin P in accordance with the present invention consists of an elongated four-sided body having substantially flat and parallel lateral faces 1, substantially flat front face 2 and back face 3, a substantially flat top face 4 downwardly and forwardly inclined relative to the long axis of the pin, and a rounded lower end face 5.

The four longitudinal edges of the pin are bevelled, as shown at 6 and 7, for the front bevelled edges and back bevelled edges respectively and, similarly, the lateral edges of the top face 4 are bevelled as shown at 8.

The upper zone of the pin P forms a recessed back face portion 9 with respect to the remaining portion of back face 3, to thereby define an upwardly facing step 10 at substantially right angles to the long axis of the pin P. The recessed face portion 9 is upwardly forwardly inclined with respect to the long axis of pin P, so as to make angle of between 7 and 10 degrees with said long axis. Said face portion 9 is straight and flat.

The lower portion of front face 2 is downwardly and rearwardly inclined, as shown at 11, so that the corresponding lower end portion of the pin is tapered towards lower end face 5.

A longitudinally extending central rib 12 protrudes forwardly from front face 2 and extends over the major part of the length of said front face. More particularly, rib 12 defines an upper portion 13 and a lower portion 14 separated by a curved notch 15, the bottom of which is coincident with the front face 2, so as to lie in a surface having the full width of front face 2, contrary to the remaining surface portion of notch 15 which only has the width of the rib 12, the latter being about $\frac{1}{3}$ the width of face 2.

The lower rib portion 14 forms a half-part of notch 15 and gradually downwardly tapers to merge with the front face 2 at the junction thereof with the lower front face 11. Actually, the front face of the lower rib portion 14 is aligned with lower face portion 11.

Upper rib portion 13 is of uniform thickness so that its front face is parallel with front face 2 and extends right up to the top face 4 of pin P, such that the top edge of the upper rib portion 13 forms the continuation of said top face 4.

The locking pin in accordance with the invention is used for locking the two parts of an excavating tooth, such as shown in the drawings. Said excavating tooth comprises an adapter 20, adapted to be removably secured to the lip of a bucket of a power shovel or the like and having a forwardly protruding integral tapered nose 21, on which is removably fitted a tooth point 22 having a tapered socket for receiving nose 21.

In the fitted position of the tooth point on nose 21, the free edges 23 of the tooth point are slightly spaced from the shoulders 24 defined between nose 21 and adapter main body 25.

Tooth point 22 is provided with aligned top and bottom holes 27 and 28, respectively, adapted to register, when the tooth point is in fitted position, with a bore 29, made through nose 21, and opening at the top and bottom faces of said nose 21.

In the front face of bore 29 is defined a groove 30 opening at the top and bottom faces of nose 21 and in the bore 29. Groove 30 has a width smaller than the width of bore 29 and is centrally located with respect

to said bore, such that the groove 30 defines shoulders 31 on each side thereof, said shoulders constituting the front face of the bore 29.

A block of compressible material, shown at 32, is located within groove 30 and is tightly fitted therein. Preferably, the block 32 has a dovetailed base portion 33 engaging with a dovetailed bottom portion of the recess 30, in order to prevent disengagement of the block of compressible material 32.

Said block 32 is provided at mid-length with a boss 34 protruding within bore 29 and in which is preferably embedded a cylindrical metal block, not shown, forming a wear surface for engagement with the locking pin.

In the assembled position of the tooth point 22 on nose 21, the top hole 27 is forwardly offset with respect to bore 29, such that the back wall of top hole 27 is forwardly disposed with respect to the back wall of bore 29 so as to form a downwardly facing step 35, at the junction of the tooth point with the nose.

Upon insertion of the lower pointed end 5 of the locking pin through the top hole 27 of the tooth point 22 and then through bore 29, with the locking pin in a downwardly and backwardly inclined position, the front face 2 of the pin at the lower end thereof engages the top edge of the front face 31 of the bore 29 on both sides of the compressible block 32, and the tapered lower face portion 11 engages the top edge of the compression block 32 and initiates compression of said block. The back face 3 of the pin engages the back face of the top hole 27 and the pin, during said initial portion of the insertion, being in metal-to-metal contact with the nose and tooth point 22, produces a firm fitting of the tooth point on the nose.

Hammering of the locking pin causes the boss 34 of the compressible block 32 to slide on the lower rib portion 14 until said boss engages notch 15. Rib 12 compresses block 32 and engages groove 30. Step 10 of the locking pin snaps underneath step 35 of tooth point 22. In the fully inserted position of the locking pin, as shown in FIGURE 1, the latter is prevented from accidentally moving upwardly because step 6 engages step 35 in metal-to-metal contact, thereby latching the locking pin against upward movement, and also boss 34 engages notch 15 of the locking pin, which forms a second latching means for the locking pin, the lower rib portion 14 preventing upward displacement of the pin.

Conversely, the locking pin is prevented from downward movement because the boss 34 of the compressible block 32, engaged in notch 15, abuts the upper rib portion 13.

The block 32 exerts a balanced rearward force on the top and bottom of the tooth point.

In the fully inserted position of the pin, the front face of the latter is free of any contact with the front face of the openings 27 and 28.

The locking pin is relatively easily removed by hammering its lower end 5, whereby step 10 will finally clear step 35 and boss 34 of the block 32 will clear the lower rib portion 14.

If, for any reason, difficulty is experienced in having step 10 clear step 35, a screwdriver or other implement can be wedged between the back face of top hole 27 and the inclined recessed back face portion 9 of the pin to

move the top of the pin forwardly in order to help clear step 10.

Due to the above-noted latching feature of the locking pin in accordance with the invention, to prevent both downward and upward movement of the latter from its intended position, it has been found that the pin in accordance with the invention remains in position despite heavy stresses to which the digging tooth is subjected during use.

While a preferred embodiment in accordance with the present invention has been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claims.

What I claim is:

1. A locking pin for a two-part excavating tooth, comprising an elongated solid four-sided body having substantially flat lateral faces and having front and back faces, a pointed lower end and a top end face, said back face having a recessed upper face portion defining an upwardly facing step located nearer said top face than said lower end, a longitudinal rib protruding medially of said front face and extending from said top end face downwardly toward said lower end below the level of said step, said rib having a notch made therein intermediate its ends and disposed below the level of said step, the bottom of said notch coinciding with a surface extending substantially the full width of said pin.

2. A locking pin as claimed in claim 1, wherein said recessed upper face portion is upwardly forwardly inclined with respect to the longitudinal axis of said pin.

3. A locking pin as claimed in claim 1, wherein said rib has a width equal to about one-third of the total width of said body.

4. A locking pin as claimed in claim 1, wherein said notch is located at about substantially mid-length of said body.

5. A locking pin as claimed in claim 4, wherein the portion of said rib below said notch has a front face downwardly tapering and merging with the front face of said body at a point short of the lower end of said body, the front face of said body being inclined downwardly and rearwardly from the point of junction of the front face of said rib with said front face of said body to the lower end of said body, said inclined front face portion being in alignment with the inclined front face of the lower rib portion.

References Cited

UNITED STATES PATENTS

2,674,816	4/1954	Daniels et al.	37—142
2,904,908	9/1959	Ratowski	37—142
2,982,035	5/1961	Stephenson	37—142
2,990,634	7/1961	Eyolfson	37—142
3,368,293	2/1968	Judkins et al.	37—142

FOREIGN PATENTS

565,417	11/1944	England.
641,404	5/1962	Canada.

ROBERT E. PULFREY, *Primary Examiner*.

E. S. BURR, *Assistant Examiner*.