

Dec. 19, 1933.

R. THOMSON

1,939,737

LATCH PIVOT FOR PNEUMATIC HAMMER DEVICES

Filed June 24, 1931

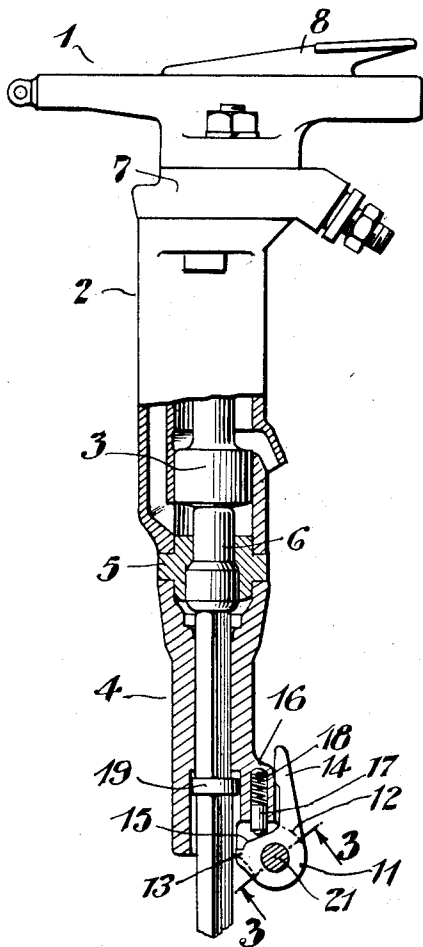


Fig. 1.

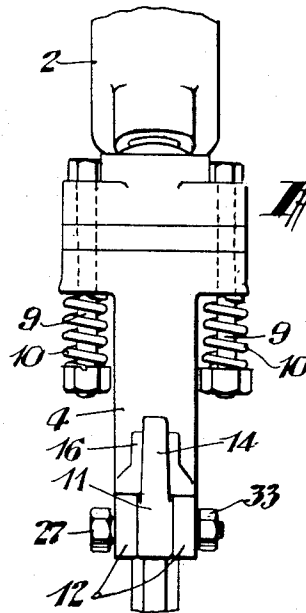


Fig. 2.

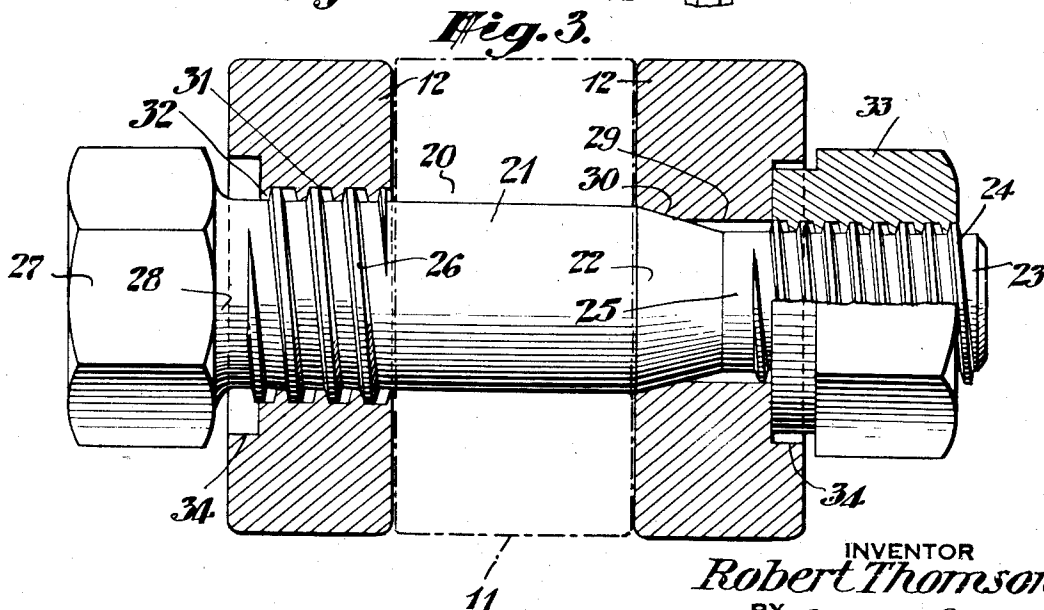


Fig. 3.

INVENTOR
Robert Thomson
BY *Daniel Davis*
ATTORNEYS

UNITED STATES PATENT OFFICE

1,939,737

LATCH PIVOT FOR PNEUMATIC HAMMER DEVICES

Robert Thomson, Arlington, N. J., assignor to
Dardelet Threadlock Corporation, New York,
N. Y., a corporation of Delaware

Application June 24, 1931. Serial No. 546,507

4 Claims. (Cl. 85—1)

In pneumatic hammer devices of a certain type a shiftable member bearing a tool is subjected to hammering action for projecting the tool, and a pivoted latch is provided to limit relative outward shift of said member during the operation of the device but permit the withdrawal of said member when the latch is released. The pivot of such a latch is subjected to rapidly repeated shocks which cause frequent breakage. Important objects of the present invention are, to provide an improved pivotal mounting for such a latch capable of withstanding the strain of said shocks; to provide an improved double shear resisting pin or bolt and an improved mounting thereof; to provide such a pin or bolt and mounting designed to prevent a concentrated bending strain upon the pin and enable it to positively and reliably resist a transverse stress by shear resistance at points located at opposite sides of the point of stress application, the pin being at the same time readily insertable and readily removable from its mounting when necessary; and to provide such a pin and mounting employing a self-locking screw thread feature to ensure a double shear resistance.

In the drawing, Fig. 1 is a side view partly in section, of a pneumatic hammer device embodying my invention;

Fig. 2 a fragmentary view of another side of hammer device; and

Fig. 3 an enlarged detail section taken on the line 3—3 of Fig. 1 showing the improved latch pivot.

In the present instance my improvement is illustrated as embodied in a pneumatic hammer or drill device of a type employed for pavement breaking. The improved double shear resisting pin or bolt and its mounting may, however, be employed very advantageously in many other connections and services.

The structure of the hammer device includes the usual cross handle 1 mounted upon the upper end of a cylinder section 2 within which a hammer piston 3 is mounted to reciprocate. A tubular section 4 known as the "front head" is joined to the lower end of the cylinder section 2 through an interposed bushing section 5. Mounted to reciprocate in said bushing section is an anvil block 6 having its upper end projecting into the path of the hammer piston. The lower end of the anvil block operatively contacts a tool shank or stock mounted to reciprocate in the tubular section 4. Compressed air is admitted to the device for operating the piston 3 through a

cylinder cover section 7 interposed between the cylinder section and the handle and having a hose connection. The operation of the device is controlled through a depressible lever or trigger 8 at the handle. The joint between the cylinder section and the front head 4 includes bolts 9 passed through lateral flanges formed on said parts and on the bushing section 5. Said bolts extend below the flanges upon the front head, have nuts at their lower ends and are encircled by compression springs 10 interposed between the front head flanges and the bolt heads. Downward shift of the anvil block under the impacts of the piston is limited by contact of the block with the front head, and the springs serve to cushion the impacts of the block. The tool carried by the shank and operated by the impacts of the anvil block upon the shank, is not shown. It may be of any suitable form for the work to be done.

At its lower end the front head carries a latch or retaining lever 11, for limiting outward shifting of the tool shank. For supporting this latch the front head has a pair of integral rigid ears 12 extending laterally from the front head and spaced apart. The latch is pivotally mounted between said ears and comprises a hub portion, a radially projecting stop lug 13 and a handle 14 extending from the hub portion substantially at a right angle to the stop lug. Between said handle and lug the latch has an inclined cam face 15. At a point above the latch center the front head is formed with a lateral enlargement 16 having a downwardly opening bore. A reciprocable pin 17 and a spring 18 are mounted in said bore and the spring projects the pin into contact with the cam face of the latch. Normally the latch is held thereby, as shown in Fig. 1, with its handle in contact with the enlargement 16 and its lug 13 projecting inward into the path of a stop flange 19 formed on the tool shank. Thereby, the outward shifting of the tool shank is positively limited. When it is required to withdraw the shank the latch handle is swung outward thereby shifting the stop lug 13, against the resistance of spring 18, out of the path of the shank flange.

A pivot structure of improved design is provided for supporting the latch 11. This structure includes a pivot pin or bolt 20 supported by the ears 12, and said ears and the pin or bolt are designed for coaction to ensure a positive double shear resistance by the pin to the severe and rapidly repeated shocks which it receives through the supported latch. The shank of the pivot

bolt has a medial portion 21 which is smooth and cylindrical and serves as a journal for the latch. At one side of said journal portion the shank has a frusto-conical portion 22 which tapers

5 away from the portion 20. Outwardly of said tapered portion the shank has a reduced end portion 23 formed with an external thread 24 and connected with the tapered portion by a short, unthreaded neck portion 25. At the opposite side
10 of the journal portion 21 the shank is formed with an external thread 26 of greater diameter than portion 20, and outwardly of thread 26, the shank has a head 27 connected to the adjacent threaded portion by a smooth neck 28. The ears
15 12 have alining apertures through which the bolt is forced. One of these apertures, designated 29, has a frusto-conical portion 30 at the inner face of the ear, with a taper corresponding to that of the shank portion 22 and adapted to snugly
20 fit it. The remainder of said aperture is cylindrical. The aperture 31 in the other ear has an internal thread 32 for engaging the bolt thread 26. A nut 33 is screwed upon the reduced threaded end of the bolt shank. The outer faces of the ears
25 12 are recessed, as at 34 around the bolt apertures and the nut 33 has a relieved inner face for seating in one of said recesses.

The engaged threads 26 and 32 of the bolt and supporting ear respectively are complementary threads of constant pitch and, as shown, are the well known self-locking Dardelet type of screw threads shown in U. S. Patent No. 1,657,244. The crest of the internal thread 32 and the root of the external thread 26 slope inward toward the bolt
30 head and preferably make an angle of six degrees with the thread axis, this angle being within the angle of friction of the metals in contact. The ribs of the thread are much narrower than their grooves and the threads are relatively displaceable one across the other for self-locking engagement.
40 The threads also have opposed coacting abutment faces making an abrupt angle to the thread axis to positively limit crosswise displacement. By the employment of this type of thread in combination with the bolt taper 22 and its seat
45 30 there is obtained a support for the bolt which positively prevents transverse play at either side of the point of stress application and ensures a double shear resistance by the bolt.

50 When the bolt is inserted and screwed into place the tapered portion 22 comes into close fitting engagement with its seat 30. During this screwing of the bolt into position the inclined locking surfaces of the threads 26 and 32 are out of contact
55 so that they offer no resistance to the turning of the bolt. Upon the seating of the taper 22 however, axial advance of the bolt is stopped and, upon further turning thereof, the threads are relatively displaced one across the other causing the inclined crest surfaces of the threads 32
60 to ride up the slope of the root surfaces of the thread 26 into mutual binding self-locking engagement entirely around and along the bolt. These slightly sloping thread surfaces coact to take up radial clearance therebetween entirely around the bolt and hold the tapered portion 22 of the bolt accurately centered in the tapered seat 30. Thus the bolt is firmly held at one side of its journal
65 portion by snugly engaged conical surfaces and firmly held at the opposite side by snugly engaged helicoidal thread surfaces which taper in an opposite direction to the taper of the conical surfaces. A snug engagement of the conical surfaces is positively assured by mere screwing of the bolt
75 into place and snug engagement of the sloping

thread surfaces is positively assured by mere further turning of the bolt. The taper of the bolt portion 22 and seat 30 is preferably much greater than that of the self-locking thread surfaces to prevent objectionable binding of the bolt in seat
80 30.

Having mounted the bolt the nut 33 is screwed upon the end of the bolt. Preferably, as shown, the engaged threads of the bolt end and seat are also of the self-locking Dardelet type described
85 so that when the nut is tightened against the opposed ear 12 it is frictionally locked against turning. The nut then firmly holds said ear from springing outward and maintains close contact between the bolt taper and its seat. It also helps to hold the bolt from turning and releasing the frictionally locked threads 26 and 32. Thereby the bolt is firmly held and compelled to offer shear resistance at both sides of the point of stress application. Heretofore it has been extremely difficult and in some cases impossible to mount such a pin or bolt with assurance that it would offer double shear resistance. Often very slight play at one side of the journal would cause a bending stress at the other side and repeated
90 shocks would cause the pin or bolt to quickly crystalize and break. In some cases, as that of a crosshead pin, for example, the pin is held by a shrink fit in order to ensure double shear resistance. The present invention provides for
95 positive reliable double shear resistance by a bolt which is readily insertable and removable.

What I claim is:

1. In combination, a double shear resisting pin having a medial portion to receive transverse
100 stress, an external screw thread at one side of said medial portion, and a tapered portion at the opposite side of the medial portion; and a rigid mounting for said pin having a tapered seat to fit around said tapered portion of the pin and
105 an aperture in alinement with said seat and having an internal thread to interfit said pin thread, the pin being insertable through the aperture and into the tapered seat and the seat forming an abutment limiting the insertion of the pin, said threads on the pin and in the aperture being formed to coact upon rotation of the inserted pin while in contact with the tapered seat to take up radial clearance between the threads and grip the pin and hold it centered with relation to the tapered seat, whereby the pin will be supported for positive double shear resistance at opposite sides of its medial portion.

2. In combination, a double shear resisting pin having a medial portion to receive transverse
130 stress, an external screw thread at one side of said medial portion, and a tapered portion at the opposite side of the medial portion; and a rigid mounting for said pin having a tapered seat to fit around said tapered portion of the pin and
135 an aperture in alinement with said seat and having an internal thread to interfit said pin thread, the pin being insertable endwise through the aperture and into the tapered seat and the seat forming an abutment limiting the insertion of the pin, said threads on the pin and in the aperture being formed to coact upon rotation of the inserted pin while in contact with the tapered seat to take up radial clearance between the threads and grip and hold the pin centered with relation to the tapered seat and the threads having abutment faces coactive to positively hold the pin against endwise retraction from the seat, whereby the pin will be supported for positive
140 145 150

double shear resistance at opposite sides of its medial portion.

3. In combination, a double shear resisting pin having a medial portion to receive transverse stress, an external screw thread at one side of said medial portion, and a tapered portion at the opposite side of the medial portion and tapering away from it; and a rigid mounting for said pin having an aperture with an internal thread interfitted with said external thread, and a seat fitting around said tapered portion of the pin and forming an abutment to limit insertion of the pin, one of the interfitted threads having a helicoidal surface sloping in an opposite direction from the pin taper and at a low angle to the thread axis and the other thread having an opposed surface formed for jamming engagement with said helicoidal surface upon screw tightening rotation of the pin against said seat, to take up radial clearance between the threads around the pin, whereby the pin will be gripped for positive shear resistance at opposite sides of its medial portion.

4. In combination, a double shear resisting pin having a medial portion to receive transverse stress, an external screw thread at one side of said medial portion, and a tapered portion at the opposite side of the medial portion and tapering away from it; and a mounting for said pin comprising a pair of supporting members held spaced

apart along the pin in fixed relation, one of said members having an aperture with an internal thread interfitted with said external thread of the pin and the other member having a tapered seat fitting around the tapered portion of the pin and forming an abutment limiting the insertion of the pin, said interfitted threads having substantial clearance between their interfitted convolutions to permit crosswise displacement between the threads upon tightening rotation of the pin against said seat without axial advance and the thread ribs having opposed abutment side faces making an abrupt angle to the thread axis and coactive to positively limit said crosswise displacement and lock the pin against endwise retraction of its said tapered portion from its seat, one of the threads having a helicoidal root locking surface sloping in an opposite direction to said pin taper and at an angle to the thread axis within the angle of friction of the threads and the other thread having a helicoidal crest locking surface sloping similarly to said root surface and coactive therewith upon said crosswise displacement to frictionally lock together the threads entirely around the pin, whereby the pin will be gripped for positive shear resistance at opposite sides of its medial portion.

ROBERT THOMSON.

30

35

40

45

50

55

60

65

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150