J. MAIER.

VISE.

APPLICATION FILED SEPT. 10, 1919.

**1,333,432.**

Patented Mar. 9, 1920.

3 SHEETS—SHEET 1.

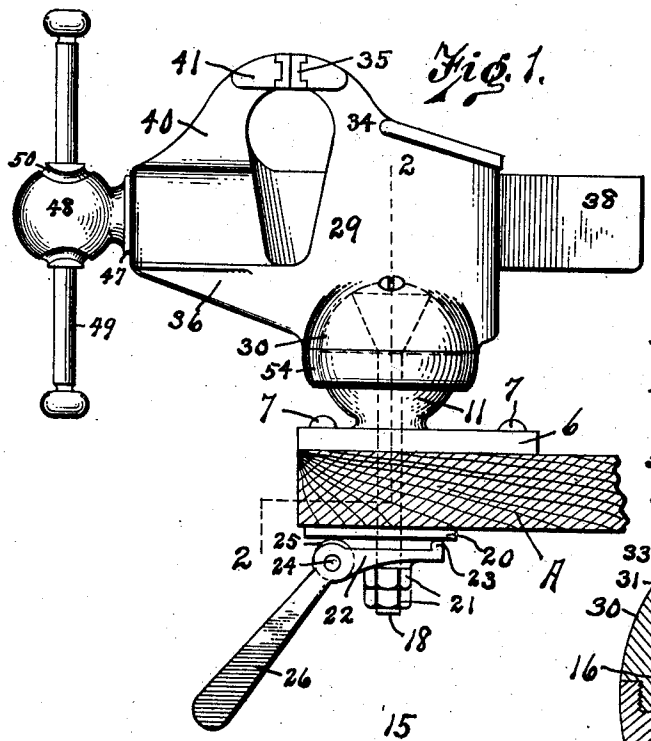



Fig. 1.

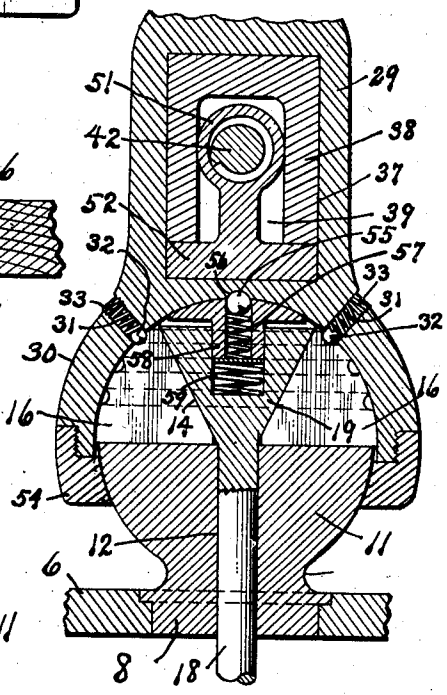



Fig. 2.

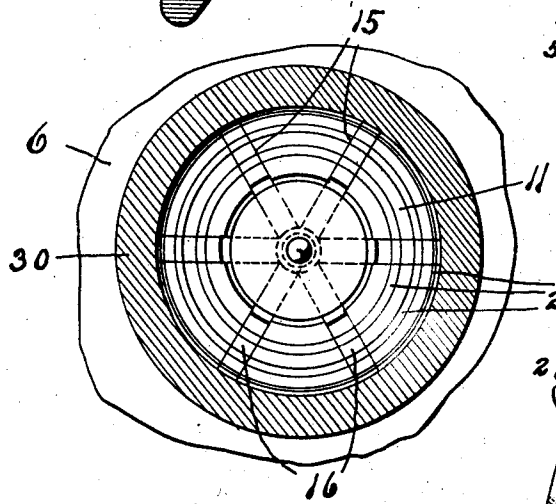



Fig. 3.

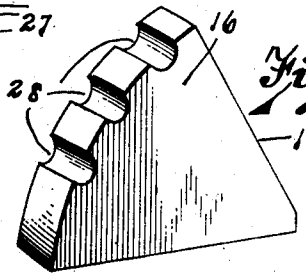



Fig. 4.

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3 SHEETS—SHEET 2.

Fig. 5.

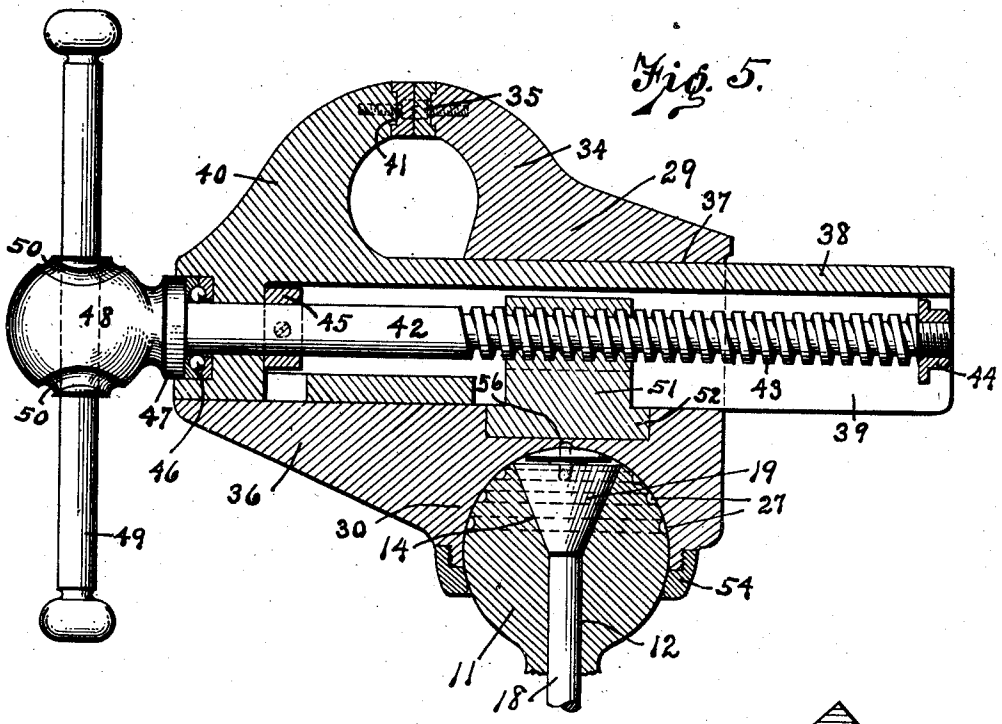



Fig. 6.

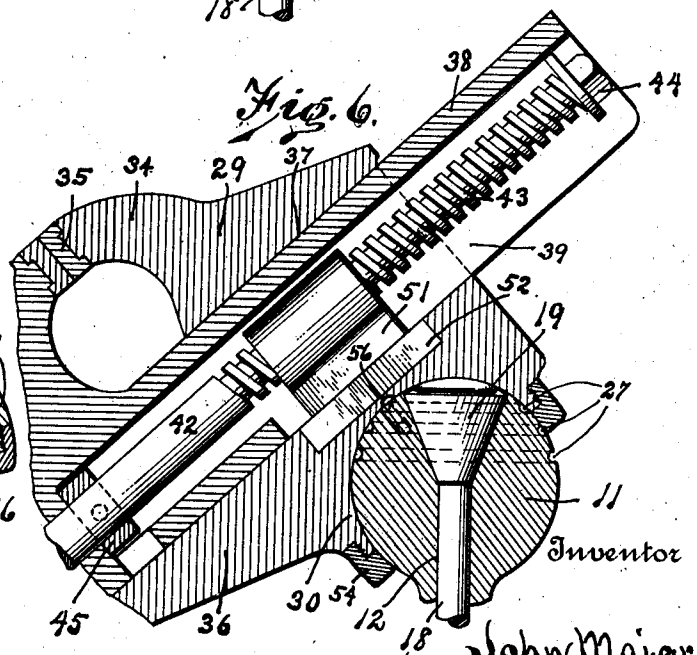
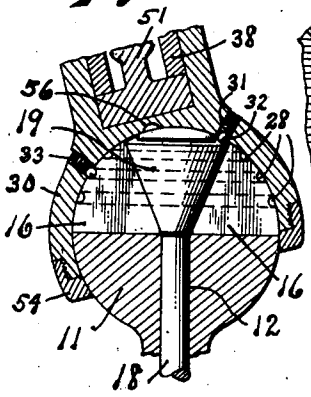



Fig. 7.




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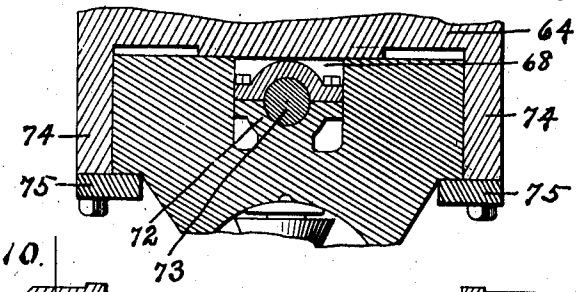
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3 SHEETS—SHEET 3.

Fig. 9.



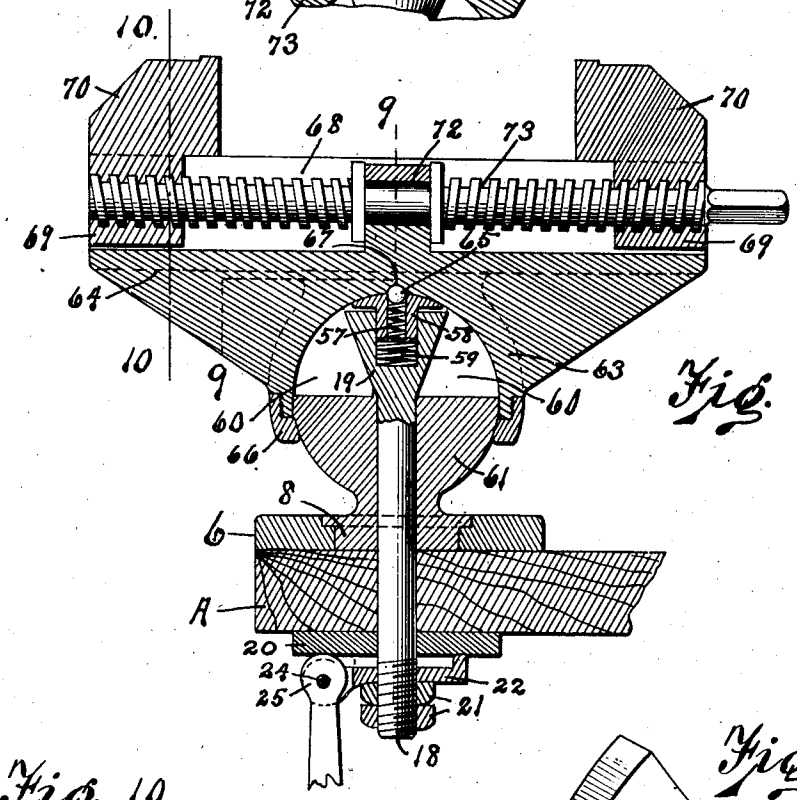




Fig. 8.

Fig. 10.

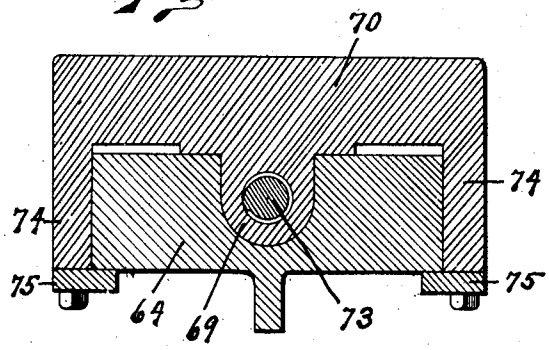
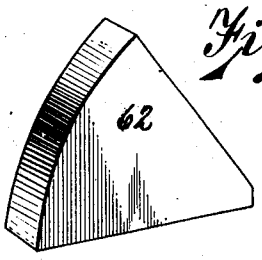



Fig. 11.




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# UNITED STATES PATENT OFFICE.

JOHN MAIER, OF DETROIT, MICHIGAN.

## VISE.

1,333,432. Specification of Letters Patent. Patented Mar. 9, 1920.

Application filed September 10, 1919. Serial No. 322,946.

*To all whom it may concern:*

Be it known that I, JOHN MAIER, a citizen of the United States and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Vise, of which the following is a specification.

This invention relates to that form of vise in which a jaw is urged toward or from another jaw by means of an actuating screw, and one object of my invention is to provide a mounting for a vise of this character so designed that the body of the vise may be shifted laterally or longitudinally into any desired inclination, and in this connection to provide means for locking the vise body in its adjusted positions.

Another object is to provide means for quickly releasing the vise from its locked position to permit it to be readjusted.

A further object of the invention is to improve the construction of vises of this character, and particularly by providing means supporting and guiding the movable jaw in its inward relative movements.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein Figure 1 is a side elevation of this improved vise. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a horizontal section of the socket portion of the vise body and a plan of the ball portion of the support. Fig. 4 is a perspective of a locking dog. Fig. 5 is a vertical longitudinal section of the vise. Fig. 6 is a similar section with the vise tipped forward. Fig. 7 is a vertical section through the support showing the vise tipped laterally. Fig. 8 is a longitudinal section of a modified form of vise. Figs. 9 and 10 are sections on the lines 9—9 and 10—10 of Fig. 8 respectively. Fig. 11 is a perspective of a locking dog.

Similar reference characters refer to like parts throughout the several views.

Referring to these drawings, 6 designates a base plate which is adapted to be secured to a bench, table, or other suitable support, designated A, by means of bolts 7. This base plate receives a foot 8 which carries a spherical member 11 having a central bore 12 whose upper end is substantially conical as at 14, and the upper portion of this ball 11 is formed with a number of radially disposed slots 15 which intersect the flaring portion of the bore and which do not extend below the central plane of the ball.

Disposed within these slots are triangular locking dogs 16 whose inner edges 17 extend parallel to the portion 14 of the central bore. Disposed within this central bore 12—14 is a locking bolt 18 whose upper end is formed with a conoidal head 19 which fits the tapering portion 14 of the bore, and the shank of the bolt extends down through the table A, and through a wear plate 20 bearing against the under side of the table.

Lock nuts 21 are carried on the lower end of the shank of the bolt and support a locking plate 22 which has a flange or protuberance 23 at one end and at its other end is enlarged and formed with an aperture for the trunnion or pivot 24 of a cam 25 having a handle 26. This cam and handle act as a clamp and normally bear against the wear plate 20 in the manner illustrated in Fig. 1. When this handle is turned upward, the pressure of the clamp against the wear plate will be relieved, but when the handle 26 is turned downward, the cam and the lug 23 will bear against the wear plate 20 and draw the bolt 18 downward, thus causing the conical head 19 on this bolt to force the dogs 16 outward so as to project these dogs slightly beyond the upper surface of the spherical head 11 in the manner illustrated in Fig. 2. Preferably, the upper surface of the spherical head is formed with a plurality of concentric grooves 27, and each of the dogs 16 is provided with a like number of notches 28 which aline with these grooves.

The vise body 29 is formed with a socket 30 which is slightly more than a hemisphere so as to embrace the greater portion of the ball or spherical head 11, as illustrated in Fig. 2, a ball and socket joint being formed between the base 6 and the body of the vise permitting the body being tilted in any direction upon the globular head.

As illustrated in Fig. 6, the body may be tilted 45° from the vertical in any direction. The walls of the socket 30 are provided at opposite points with downwardly and centrally inclined bores (Fig. 2) wherein are disposed coiled springs 31 bearing

against balls 32 which are urged outward by the spring, these springs in turn bearing against screw-threaded plugs 33 in the outer ends of the bores. These balls 32 constitute detents which may enter the concentric grooves 27 and latch the body 29 in tilted positions. The reason for notching the dogs 16 is to permit the detent balls 32 to pass these dogs when the body is rotated upon the globular head. Now when the body has been shifted to exactly the position desired, it is then locked in this shifted position by the lever 26, drawing the bolt 18 downward and thus forcing out the dogs into engagement with the inside face of the socket 30 with such force as to lock the parts together.

The body 29 has a fixed jaw support 34, to which the jaw 35 is connected, a supporting bracket 36 extending forward from the socket 30, and also has a longitudinally extending, rectangular passage 37 extending from front to rear. Slidable and fitting within this passage 37 and on the bracket 36 is a longitudinally extending, hollow jaw-carrying shank 38, rectangular in cross section and having a longitudinally extending slot 39 in its under side. This shank 38 carries at its forward end the upwardly extending jaw support 40, to which is attached the transversely extending jaw 41.

Rotatably supported within this shank 38 is a screw 42 having screw-threads 43. The extreme rear end of the screw has a nut 44 screwed onto it to prevent the screw from being turned out of the main nut to be described later on. A collar 45 is secured to the screw to pull the shank forward when the screw is turned back. The forward end of the screw 42 has thereon a flange 47 which bears against an anti-friction bearing, preferably a ball bearing, 46. The knob 48 has a transverse hole through which passes a handle 49. Preferably, this knob 48 is formed with grooves 50 around the handle opening so that when the handle is slipped to its full extent through the knob, the balls on the ends of the handle will not pinch the fingers against the knob 48. Disposed within the shank 38 is a nut 51 which has a downwardly extending portion 52, preferably rectangular in plan, fitting a recess in the lower portion of the body, preferably centrally above the socket 30.

To center the body of the vise, the following described means are provided in addition to the small balls 32 that engage in the grooves 27 in the head. This centering device consists of a ball 55 shown in Fig. 2, which is normally forced into the depression 56 (Figs. 6 and 7) in the body of the vise at the center of the socket 32. This ball is forced upward by a spring 57 in a support 58 that is centrally mounted in the upper part 19 of the bolt 18. A spring 59 serves to force this support 58 against the spherical wall of the socket 30 and serves to restrain the movements of the vise body on the ball 11, even when the handle 26 has been swung up to release the dogs 16.

To hold the body on the supporting ball, the lower end of the socket 30 is threaded and a ring 54, whose bore fits the ball below its greatest diameter, is screwed onto this threaded portion, sufficiently tight to hold the body in position, but sufficiently loose to permit freedom of movement at all times. This ring is screwed on before the foot 8 of the ball 11 is inserted into the recess in the base plate 6.

It will be seen that a vise constructed as described and illustrated is very strong and rigid, and will not easily get out of order, and that particularly it may be adjusted into any desired angle within reasonable limits, and may be readily locked in its angularly adjusted or tilted positions. It will be seen that the fact that the ball detents 32 snap into the groove 27 will indicate the angle to which the vise has been set. At the same time, these ball detents will yield readily so as to permit the vise to be tilted when strain on the locking bolt has been relieved. After the vise has been adjusted, the locking bolt may be drawn by actuating the cam handle 36, thus wedging out the dogs and causing them to bind and lock very powerfully against the interior face of the socket wall 30, thus locking the vise in its adjusted position.

In Figs. 9 to 11 inclusive I have shown a vise having a base 6 which receives a foot 8 supporting a ball 61. This ball has radial slots 60 to receive the dogs 62 and a bolt 18 having a conoidal head 19 and nuts 21 at its lower end is adapted to force apart the dogs into engagement with the inner face of the socket 63 through the action of the cam 25 having a pivot 24 mounted in the plate 22. This cam again engages the wear plate 20 on the lower side of the support A.

The body 64 has a socket 63 on its lower side to receive the ball 61, and a ring 66 is screwed onto this socket to prevent the body from being lifted off the ball. A ball 65 may be forced into the depression 67 in the body to center the body by the spring 57 which is mounted in the support 58. A spring 59 holds the support against the inner wall of the socket.

The top of the body is flat and rectangular and is formed with a groove 68 to receive the nuts 69 on the jaws 70. A bearing 72 is mounted in the groove 68 and receives the central portion of the screw 73, having right and left threads that enter the nuts 69 on the jaws. These jaws have depending sides 74 and shoes 75 on the lower ends of these sides to position the jaws on the head.

These dogs 62 are not provided with

notches 28 nor are there any parallel grooves 27 in the ball 61 as there are in the structure shown in Figs. 1 to 8 inclusive. But the body 64 is again locked in position by the action of the dogs 62 when forced out by the conoidal head 19 of the bolt 18, and the body is again centered on the ball by the small ball 65 resiliently pressed into a proper depression by the springs 57 and 59.

Many other changes in the details of construction may be made by those skilled in the art without departing from the spirit of my invention which is set forth in the following claims.

I claim:—

1. In a vise, a base having a globular head, a vise body having a socket fitting the globular head and permitting the body to be rotated and tilted upon the head, dogs carried upon the globular head, and means for forcing these dogs outward into engagement with the interior face of the socket to lock the body to the head.

2. In a vise, a base having a globular head, a vise body having a socket fitting the globular head and permitting the body to be rotated and tilted upon the head, dogs carried upon the globular head, and having beveled inner ends, a locking bolt passing through the head and having a conoidal head on its extremity adapted to bear against the inclined edge faces of the dogs to force the dogs outward against the inner face of the socket, and means for shifting said locking bolt to force the dogs outward.

3. In a vise, a base having a globular head, a vise body having a socket fitting the globular head and permitting the body to be rotated and tilted upon the head, dogs carried upon the globular head and having beveled inner ends, a locking bolt passing through the head and having a conoidal head on its extremity adapted to bear against the inclined edge faces of the dogs, and a cam operatively engaged with the bolt and adapted, when shifted in one direction, to urge the bolt outward.

4. In a vise, a base having a globular head formed with a central bore, the upper end of which is conoidal in form, the head being intersected by a plurality of slots, radially shiftable locking dogs disposed in said slots and having their inner ends beveled, a vise body having a socket fitting over the head, an actuating member passing through the bore of the globular head and having a conoidal head engaging with the inner ends of the dogs, and means for drawing the locking member longitudinally to force the dogs outward into engagement with the inner surface of the socket.

5. A vise of the character described including a base having a globular head formed with a plurality of horizontally disposed concentric grooves upon its upper face, and a vise body having a socket fitting over the head and having a plurality of spring actuated detents engageable in said grooves to yieldingly hold the vise body in tilted positions, and means for locking the vise body to the head.

6. A vise of the character described including a base having a globular head formed with a plurality of horizontally disposed concentric grooves upon its upper face, a vise body having a socket fitting over the head and having a plurality of spring actuated detents engageable in said grooves to yieldingly hold the vise body in tilted positions, means for locking the vise body to the head including radially movable dogs, the upper portion of the head being radially slotted to accommodate said dogs, said slots intersecting said concentric grooves and the dogs being notched at their intersection with said grooves, and manually operable means for forcing said locking dogs radially outward against the inner face of the socket.

7. In a vise, a base and a supporting ball, a vise body having an integral socket fitting the ball and rotatable and tiltable thereon, said vise body having a depression in the center of the inner wall of the socket, and a spring held locking ball at the top of the supporting ball to enter said recess to center the body of the vise.

8. In a vise, a base and a supporting ball, a vise body having an integral socket fitting the ball and rotatable and tiltable thereon, said vise body having a depression in the center of the inner wall of the socket, a bolt to secure the ball to the base, a locking ball support mounted in the upper end of the bolt, a spring in the support, and a locking ball mounted on the spring and adapted to be forced into said depression to center the vise body.

9. A locking device comprising a globular head, a socket fitting the head and rotatable and tiltable thereon, and means for locking the socket to said head comprising wedges and a conically headed bolt.

10. The combination of a globular head, a socket fitting the globular head and rotatable and tiltable thereon, dogs carried upon the globular head, and means for forcing these dogs outward into engagement with the interior face of the socket to lock the socket to the head.

11. The combination of a globular head, a body having a socket fitting the globular head and permitting the body to be rotated and tilted upon the head, dogs carried upon the globular head, and having beveled inner ends, a locking bolt passing through the head and having a conoidal head on its extremity adapted to bear against the inclined edge faces of the dogs to force the dogs outward against the inner face of the socket,

and means for shifting said locking bolt to force the dogs outward.

12. The combination of a globular head, a socket fitting the globular head and rotatable and tiltable upon the head, dogs carried upon the globular head and having beveled inner ends, a locking bolt passing through the head and having a conoidal head on its extremity adapted to bear against the inclined edge faces of the dogs, and a cam operatively engaged with the bolt and adapted, when shifted in one direction, to urge the bolt outward.

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