

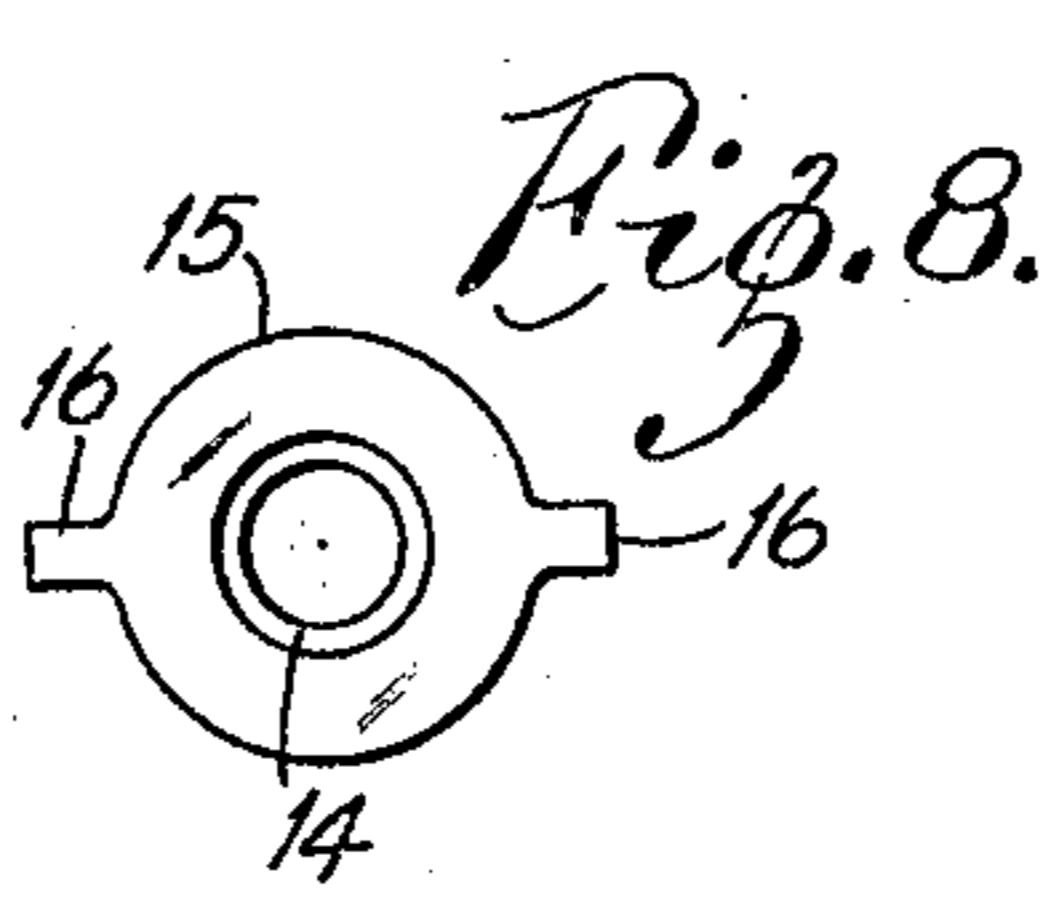
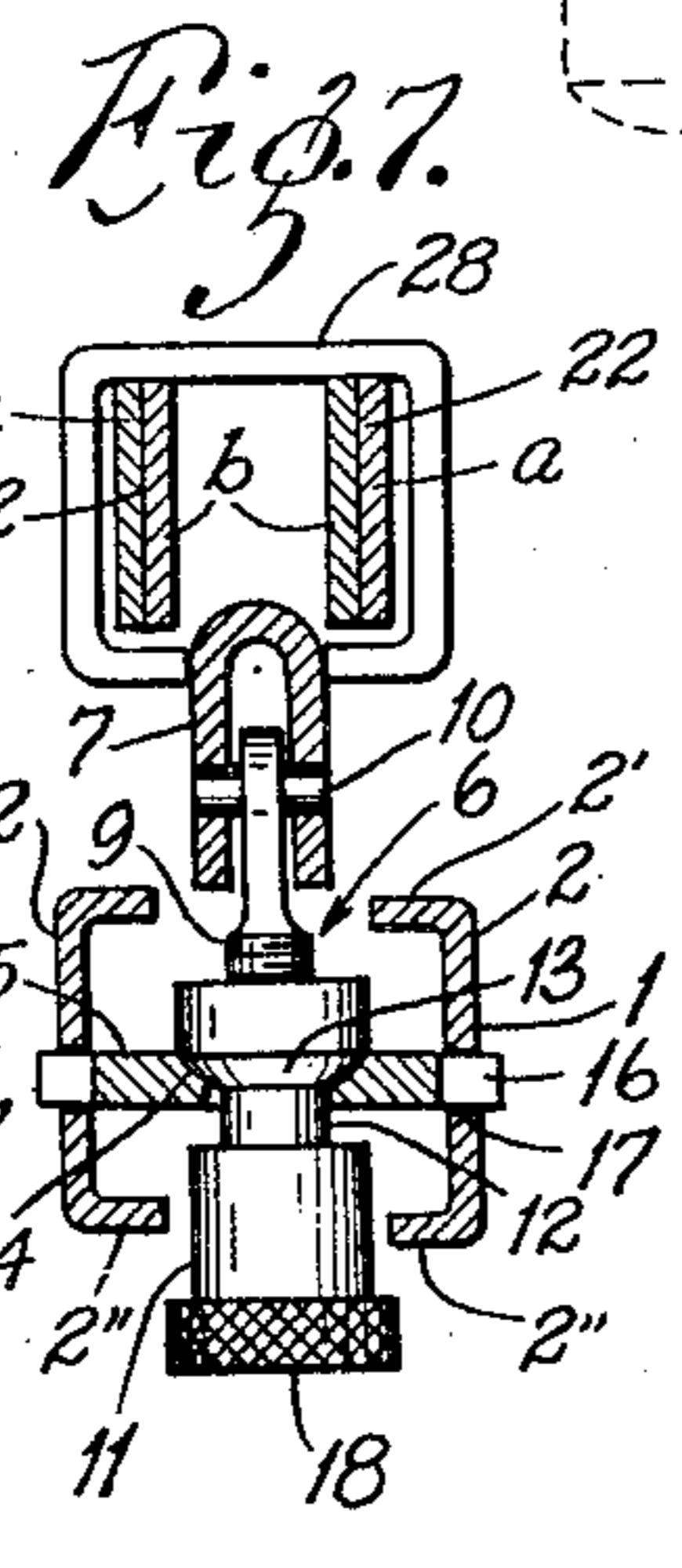
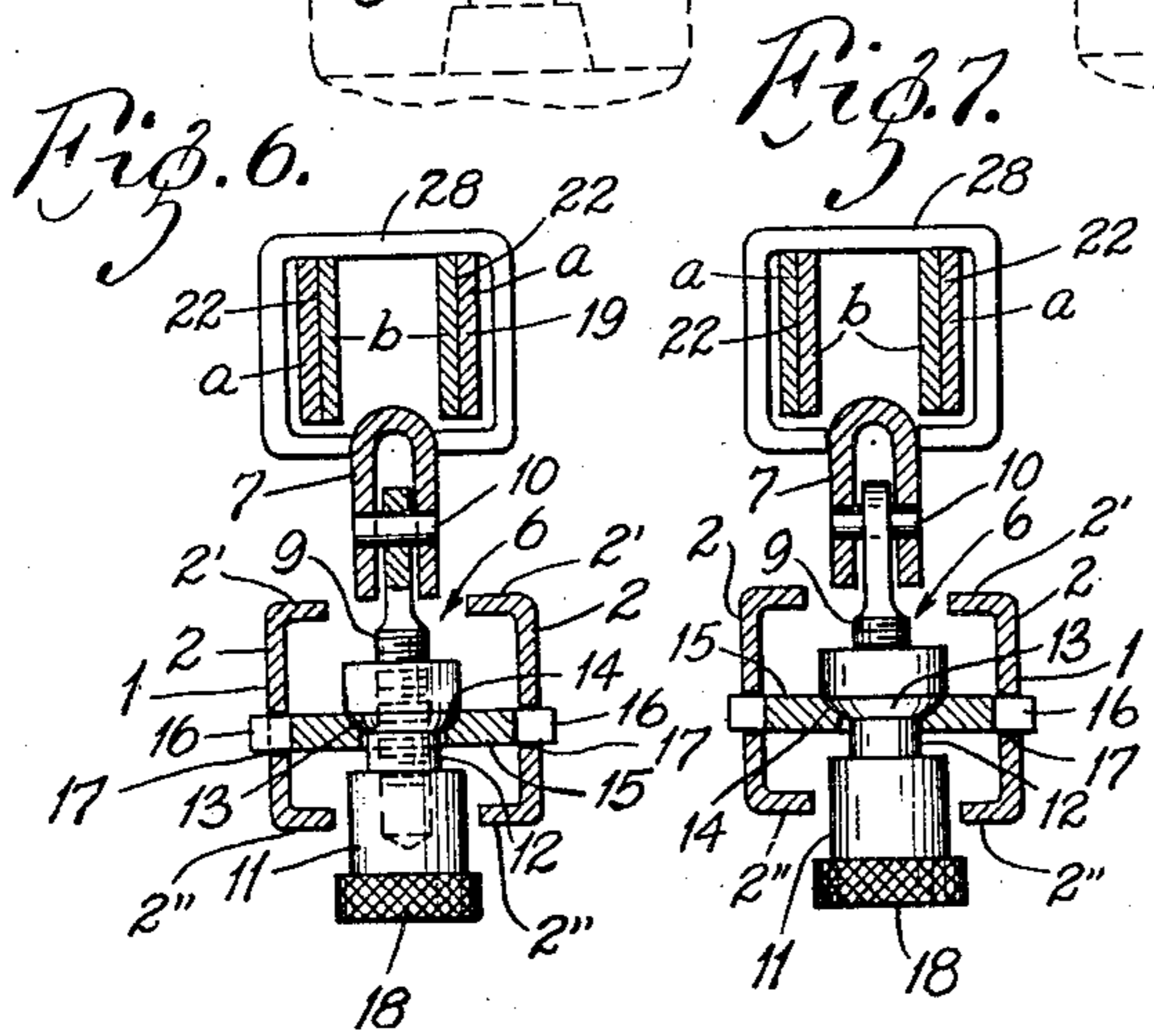
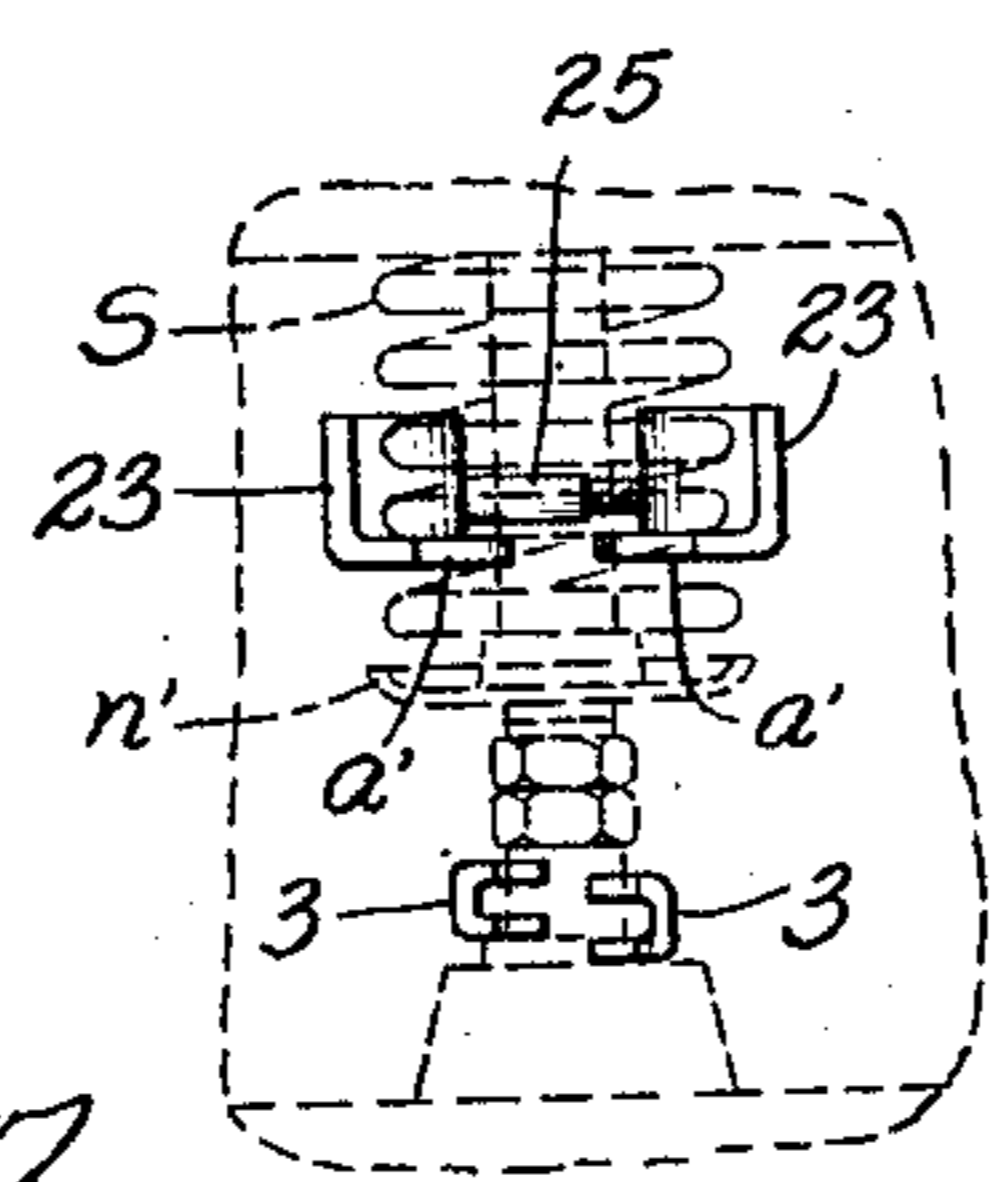
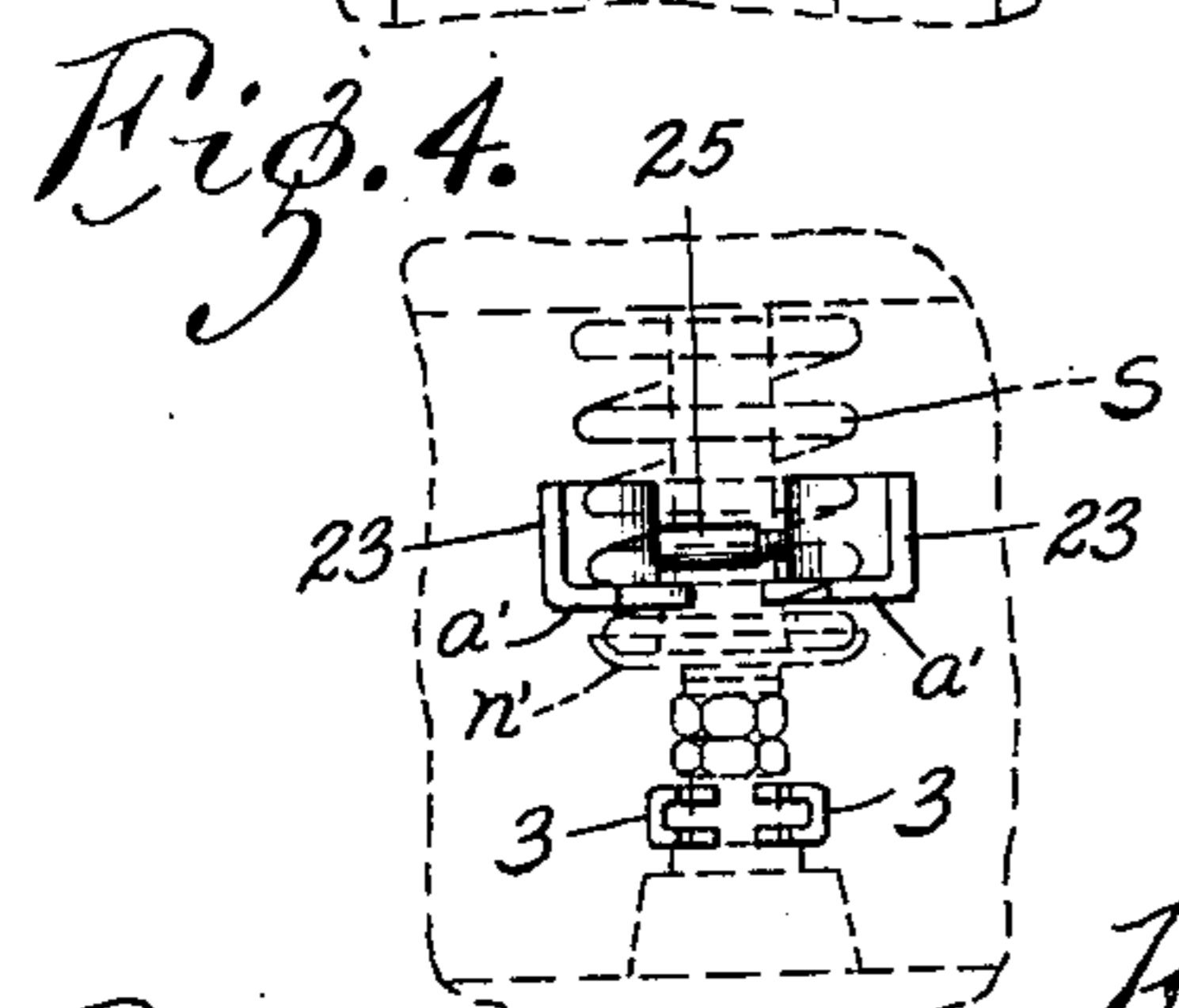
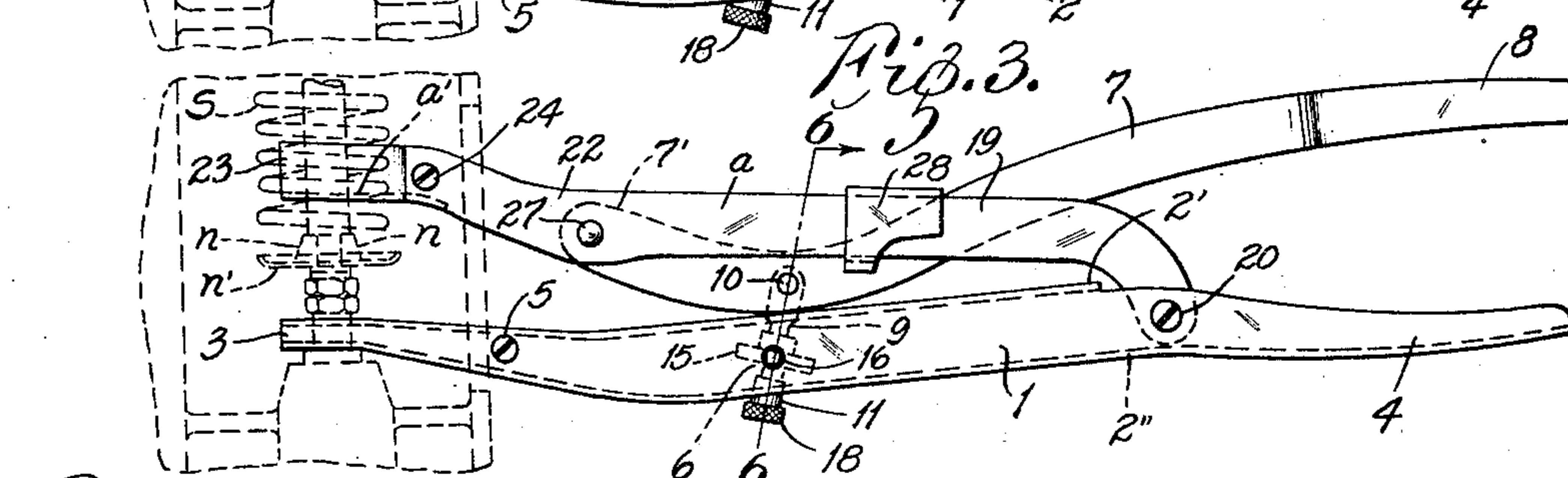
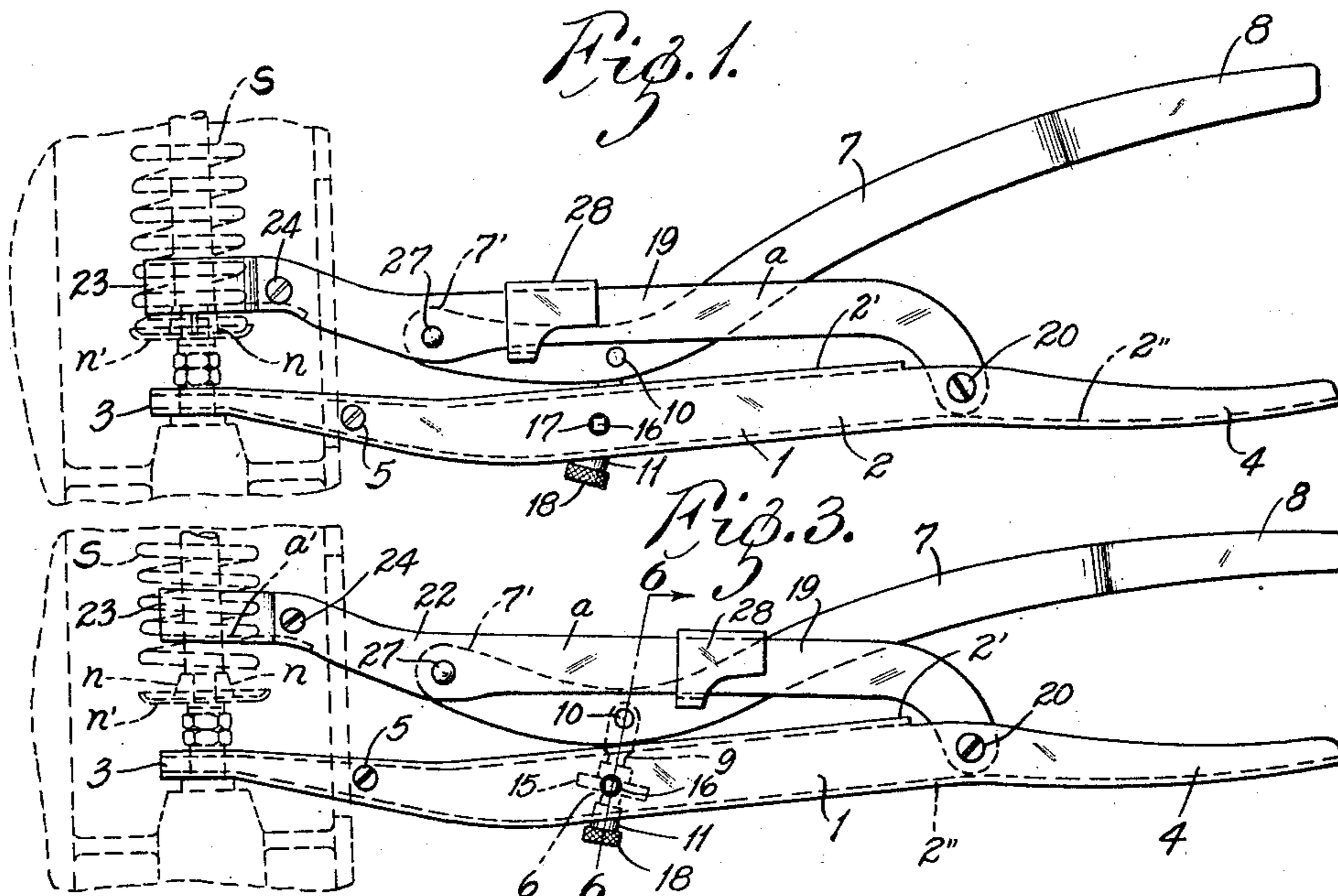
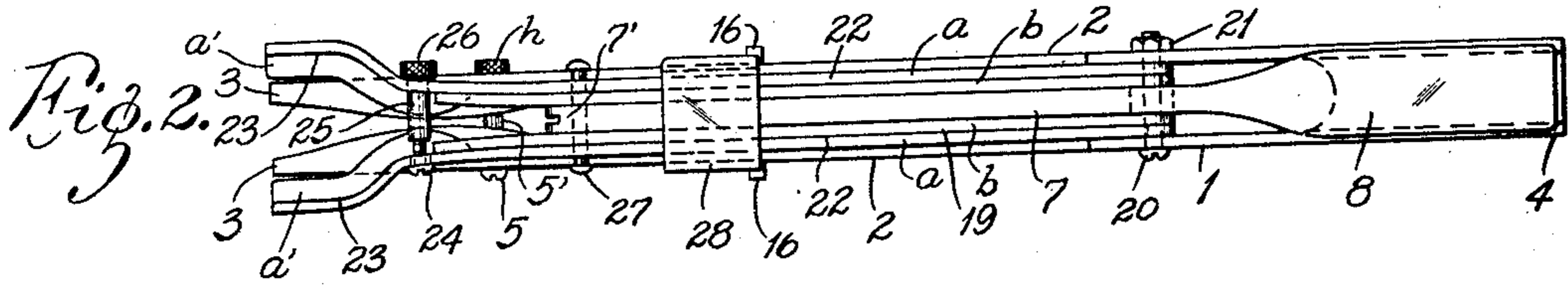
May 9, 1933.

J. SUNNEN

1,907,609

VALVE LIFTING TOOL

Filed May 2, 1932



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VALVE LIFTING TOOL

Application filed May 2, 1932. Serial No. 608,723.

My invention has relation to improvements in valve lifting tools and it consists in the novel features of construction more fully set forth in the specification and pointed out in the claims.

6 The present invention is an improvement over that shown in my Patent No. 1,792,451, dated February 10, 1931, and is of the same general type in that the tool comprises a base member having a handle lever and a valve part lifting lever pivotally connected to said base lever. However, the present invention has a wider scope of usefulness than that shown in the patent referred to, in that it is adjustable to perform operations on valves of various makes of engines and otherwise embodies a flexibility not possessed by that of the valve lifter of the aforesaid patent.

10 Specifically, the principal object of the invention is to provide a valve lifting tool having a wide scope of usefulness, although being of comparatively small size so that it may be easily handled. A further object of the invention is to embody lateral adjustability in the spring seats at the end of the lifting lever for the accommodation of various sizes of springs, and to provide an adjustable connection between the relatively movable members of the tool so that the spacing of said members may be varied according to the requirements of the particular operation. It is also an object of the invention to embody flexibility in the base member so that the operation of the tool will not be impaired if the terminal supporting elements of the base member have uneven support. These objects, as well as other advantages that are inherent in the invention will be better understood from a detailed description of the invention in connection with the accompanying drawing, in which:

40 Figure 1 is a side elevation of my improved valve lifter shown applied to and about to raise a valve spring for the subsequent removal thereof; Fig. 2 is a top plan of my improved valve lifter; Fig. 3 is a side elevation similar to Fig. 1, except that the valve lifter has been actuated so as to raise the valve spring (shown dotted); Fig. 4 is a front elevation showing the base supports and the

spring seats in cooperative relation for raising a valve spring; Fig. 5 is a view similar to Fig. 4, except that the base supports are shown twisted out of line due to their resting on valve parts disposed in different planes; 55 Fig. 6 is an enlarged cross-sectional detail taken through the flexible connecting link between the base member and the handle lever of the tool; Fig. 7 is a similar section showing the base supports twisted out of line with each other to correspond with their positions in Fig. 5; and Fig. 8 is a face view of what may be termed a ball-seat whereby the link is flexibly connected to the base member. 60

Referring to the drawing, 1 represents a base member comprising channel side bars 2, 2 bent upwardly and tapering toward their forward extremities 3, 3 which comprise the supports or props of the tool when performing valve lifting operations. The inner flanges 2', 2' of channel bars 2, 2 terminate intermediate the ends thereof, and the outer flanges 2'', 2'' are connected near the ends to form a handle 4. A short distance inwardly 75 from the ends of the props 3, 3 the channel bars 2, 2 are traversed by a screw 5 and a threaded sleeve 5' having a knurled head $\frac{1}{2}$ on its outer end. By screwing the screw and sleeve together the side bars may be drawn inwardly to reduce the space between the props 3, 3 when necessary to adapt them to the construction of particular engines. Thus the base member 1 is constructed so as to possess great rigidity in a vertical plane while the elements are flexible laterally with respect to each other in order to effect adjustment of the props, as just explained. About one-third the distance back from the props 3, 3 a connecting link 6 is pivotally mounted between the channel bars 2, 2, said link having a connection at its upper end with a handle lever 7, which terminates in a handle 8 for cooperating with handle 4 in the operation of the tool. The handle lever 7 is U-shaped in cross section to impart rigidity thereto, the sides of the U being spread apart to form the handle 8. The link 6 is so constructed that the space between base member 1 and handle lever 7 may be varied, said link at the 100

same time being flexibly connected to the side bars 2, 2 of the base member 1. A detailed description of the construction of the link 6 will explain these features.

5 The link comprises a stud 9 having its upper end pivotally connected to handle lever 7 by means of a pin 10 and having its lower end threaded into a cylindrical nut 11 having an annular channel 12 formed on it, the upper 10 shoulder 13 of said channel being rounded so as to form a ball and socket connection with the correspondingly rounded opening 14 in a seat connector 15 in the form of a disk. Said disk has oppositely disposed pins 16, 16 projecting from its periphery and into openings 15 17, 17 in the channel bars 2, 2 between which the disk may rock. The lower end of nut 11 is provided with a knurled head 18 so that the nut may be easily rotated for the purpose of 20 propelling the stud 9 or drawing the same inwardly, depending on whether the base member 1 and handle lever 7 are to be spaced more or less. The advantage of the swivel connection between the link 6 and channel 25 bars 2, 2 will be explained hereinafter.

A lifting lever 19 is pivotally connected to base member 1 about midway between the link 6 and the end of handle 4 by means of a stud 20 which traverses the channel bars 2, 30 2 thereof, said stud having a nut 21 passed over its outer threaded end. The lifting lever 19 comprises a pair of lever bars 22, 22, each of which is formed of two spring elements *a* and *b*, the former being bent outwardly at its free extremity and having a horizontal flange *a'*. The oppositely disposed 35 extremities 23, 23 of elements *a*, *a* together form a seat for valve spring S (as shown in Figs. 1 to 5 inclusive). The inner spring elements *b*, *b* of the bars 22, 22 terminate short of the extremities 23, 23 of the outer elements *a*, *a*, which elements are connected by means of a stud 24 and threaded sleeve 25 for the purpose of adjusting the spacing of the bar 40 extremities 23, 23 to accommodate them to different sizes of springs. The sleeve 25 has a knurled head 26 on its outer end so that it may be more easily turned. The upwardly bent extremity 7' of handle lever 7 is pivotally 45 connected by means of a pin 27 between the sides 22, 22 of the lifting lever 19, and as the handle lever 7 is rocked upon pin 10 as a fulcrum the lifting lever 19 will be raised by the forward end 7' of the handle lever, as is 50 clearly apparent on the examination of Figs. 1 and 3. A clip 28 is slidably mounted on the lever 19 and serves as an abutment for the handle lever 7 when the handles 4 and 8 are forced together to spread apart the actuating 60 end comprising supports 3, 3 and seats 23, 23 of the tool (as shown in Fig. 3).

The operation of my improved valve lifting tool is as follows:

65 The operator inserts the forked extremity 3, 3, comprising the supporting elements, into

the space housing the valve spring S so as to straddle the cam-follower, or some other part of the valve structure, below the valve stem. With the base member 1 thus supported the spring seat, comprising spaced extremities 70 23, 23 of lifting lever 19, is forced between adjacent coils of the spring S so that opposite coils will rest upon flanges *a'*, *a'*. Obviously, the spacing of the spring extremities 23, 23 has been previously adjusted by turning the 75 sleeve 25 so as to best accommodate the spring S. With the operative end of the tool engaged, the operator then presses the handles 4 and 8 together so as to rock the handle lever 7 downwardly and thus raising the lifting 80 lever 22 at its forward end to lift the spring S by compressing the same until it is clear of the split locks *n*, *n*, as shown in Fig. 3. The valve lifter may be locked in this position with the spring S elevated by sliding the 85 clip 28 rearwardly until it impinges on the handle lever 7 (Fig. 3). The handles may now be released by the operator as the clip 28 prevents them from spreading under the pressure imposed on the forward end of the 90 tool by the valve spring S. The split locks *n*, *n*, as well as the spring seat *n'*, may now be easily removed so as to release the spring S. It sometimes happens in applying the tool to 95 certain valve structures that the supporting extremities 3, 3 of the base member 1 do not have a very wide surface on which to bear so that one or the other of these members may slip off of this supporting surface (as shown 100 in Fig. 5), which causes the bars 2, 2 to be twisted out of line (as shown in Figs. 5 and 7). In order to accommodate this twisting action without imposing undue strains upon the link connection 6, I have formed the link, 105 as described above, so that the connecting element 15 between said link and bars 2, 2 is free to oscillate or rock relative to the link 6. This is accomplished by means of the ball-seat formed by the shoulder 13 and opening 14, as above described and shown in Fig. 7. 110

The swivel connection between the link 6 and base member side bars 2, 2 allows for relative movement of the base element in a vertical plane without throwing the spring S out of line and, as a result thereof, cramping the 115 spring retainer on the valve stem and binding the valve parts so that they would be difficult to remove.

The spring construction of the lifting lever side bars 22, 22 introduces the necessary flex- 120 ibility into these side bars to permit adjustment of the spacing of the spring seats 23, 23 without sacrificing strength. The outer and inner elements *a* and *b* of each bar 22 are spot welded together near their free ends (that is, 125 just behind the spring seats 23, 23) and are similar to spring leaves in their action in that they are capable of a certain relative movement as they are flexed in action. It is 130 obvious that, in order to permit this spring

action the stud 20 on which the lever bars 22, 22 are pivoted must be fitted with clearance into the perforated ends of the elements *a* and *b* which comprise each of said bars 22.

5 Having described my invention, I claim:

1. A valve lifter comprising a base member terminating at one end in a handle and at the opposite end in a suitable support, a handle lever having connection with said base member, a lifting lever pivotally connected at one end to the base member and having operative engagement with the handle lever, said lifting lever comprising a pair of spaced laminated elements terminating in valve part engaging seats the laminations of each element being securely fixed together for rigidity adjacent to said seats, and means for varying the spacing of said seats.

2. A valve lifter comprising a base member terminating at one end in a handle and at the opposite end in a pair of spaced supports, means for adjusting the spacing of said supports, a handle lever having connection with said base member, a lifting lever pivotally connected at one end to the base member and having operative engagement with the handle lever, said lifting lever comprising a pair of spaced laminated elements terminating in valve part engaging seats the laminations of each element being joined adjacent to the seats to integrate each element adjacent to said seats, and means for contracting the laminated elements to vary the spacing of said seats.

3. A valve lifter having a base member comprising a pair of spaced channel bars, a lifting lever pivotally connected at one end between said channel bars and having an adjustable spring seat formed on the opposite end thereof, a handle lever connected to the lifting lever and a link connection between said handle lever and base member channel bars, said link connection being flexible to permit said channel bars to move vertically out of line without imposing strain on said link connection.

4. A valve lifter having a base member comprising a pair of spaced bars, a lifting lever pivotally connected at one end between said bars and having a seat formed on the opposite end thereof, a handle lever connected to the lifting lever, and said handle lever having a flexible pivot connection with the bars of the base member to permit said bars to move vertically out of line without imposing strain on the pivot.

5. A valve lifter comprising cooperating valve lifting members pivotally connected, one of said members comprising spaced laminated elements and having a seat formed on its free end the laminations of each element being joined adjacent to said seat to integrate such part of each element for rigidity, suitable handles for operating the lifting mem-

bers, and means for varying the spacing of said elements adjacent to said seats.

6. A valve lifter comprising a base member, a lifting member pivotally connected therewith, each of said members comprising spaced side bars, and a suitable handle member having a flexible pivot connection with the bars of the base member to permit said bars to move vertically out of line without imposing strain on the pivot.

7. A valve lifter comprising a base member terminating at one end in a handle and at the opposite end in a pair of spaced supports, a handle lever having connection with said base member, a lifting lever pivotally connected at one end to the base member and having operative engagement with the handle lever, said lifting lever comprising a pair of spaced laminated elements terminating in valve part engaging seats the laminations of each element being joined to form an integral portion adjacent to the seats, and means for varying the spacing of said seats.

8. A valve lifter comprising cooperating valve lifting members pivotally connected, one of said members comprising spaced laminated elements, each of which has a seat portion on its free end, said laminations being joined to provide each element with an integral portion adjacent to the seat portions.

In testimony whereof I hereunto affix my signature.

JOSEPH SUNNEN.

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