The present invention relates to valve spring lifters, and more particularly to a locking device for automatically holding or securing the lifter in any one of a wide range of varying positions.

The main purpose of the invention is to counteract the force of the compressed spring in the operation of the tool. The tendency of the compressed spring is to close the jaws, thereby spreading the handles. This, of course, necessitates a continuous squeezing action on the handles by the operator. But, to be of any real use, the lock must be entirely automatic and instantly operative, so that the handles will be arrested the instant that the spring starts their closing action or movements. Also, it must be so constructed and arranged that it may be instantly released so that the tool may be removed. And, as a practical commercial device, it should not project through or beyond either handle, but should be entirely between them at all times. The present invention is designed especially to accomplish these and other purposes and to provide a simple, compact, inexpensive, sensitive, automatic lock of the character described.

In the drawings:

Fig. 1 is a side elevation of the invention, partly broken away, with jaws spread, the dotted line position, showing the lock released.

Fig. 2 is a side elevation, partly broken away, showing the jaws closed; and

Fig. 3 is a cross section on the line 3—3 of Fig. 1, looking toward the locking means.

The lifter, as a whole, is of the same general type as disclosed in our prior Patent 1,461,275, dated July 10, 1923. In so far as the present invention is concerned, the parallel jaw movement may be used or it may be omitted, equally well.

The two handles 1 are pivotally connected by a pin passing through aligned pairs of ears, just as in the patent referred to and, therefore, operate in the same manner. Movement of the rear ends of the handles toward each other, acts to spread the jaws, of course. On the other hand, the force of the valve spring, being compressed, acts oppositely.

To take the resulting strain off the hand of the operator, an automatic locking means adapted to instantly operate to hold the jaws in spread relation is necessary. On the other hand, for practical and commercial purposes, this should be very compact and should lie, at all times, between the rear portions of the handles. To these ends, we have developed a collapsible or flexible folding locking means, extendible as the handles spread. This comprises a thumb piece 2 carried by a pivot pin 3 which is seated in the side walls of one of the sheet metal stamped or channel iron handles 1 and an elbow link or bar 4 pivotally connected to the lower end of the thumb piece and cooperating with a holding pin or bar 5, similarly seated in the side walls of the other handle 1. The first mentioned handle is slotted as at 6 to allow for passage and ample free play of the upper projecting end of the thumb piece which, preferably, is somewhat enlarged and rounded off to facilitate engagement and actuation by the thumb of the user. While a pivot pin has been mentioned as the means for mounting the thumb piece, other pivotal means may be used, of course. It will be noted that this thumb piece for releasing the lock is, at all times, in the easiest and most accessible location for engagement by the user, without releasing his grip or hold on the handles.

The elbow or link 4 is substantially a right angle bend or arc, each arm extending from the bend about an equal distance. Likewise, the length of each of these arms is substantially equal to that part of the thumb piece 2 which extends between the two handles. Consequently, when the jaws have been spread, as in Fig. 1, the catch is collapsed or folded, with one arm of the elbow link lying between the side walls of one of the handles 1, the other arm extending from that handle upwardly between the side walls of the other handle and the thumb piece extending from one handle to the other,—making a somewhat irregular U. In this position it will be noticed that the pivotally connected end of the arm of the elbow link 4 is almost directly under the pin 5 and in contact therewith, while its lower edge, at a point slightly in advance of pin 5, is in contact with the web or intervening wall of handle 1, between the side walls. Likewise, the lower end of the thumb piece 2 is in engagement with pin 5. This three point engagement is maintained by a spring 7 disposed about the pivot 8 and engaging or bearing against the lower face of the upper handle 1 and the rear face of the thumb piece 2 and exerting a forward pressure on the inner part of the thumb piece 2 to
keep it in the full line position of Fig. 1. Thus, with the parts in the full line position of Fig. 1, any effort to spread the jaws is blocked or prevented by the pin 5 which is engaged by the arm of the link 4 at a point between its engagement with the handle and its pivotal connection with the lower end of the thumb piece. This engagement, of course, prevents flexing or pivotal movement so that the arm of the elbow lever 4 is forced to act as a rigid member, exactly as though it were an integral portion of thumb piece 2 and hooked under or beneath the pin. To release this lock it is only necessary to shift the elbow link so that it will not engage the web of the handle in advance of pin 5 at the same time that it also engages the pin 5. This is accomplished by simply rocking the thumb piece 2 forward, so that the parts assume the dotted line position of Fig. 1. This movement brings the curve of the elbow substantially below and about the pin 5, so that there is no leverage effect and the elbow link 4 is free to be extended. Consequently, when an effort is made to open the handles, with the parts in the dotted line position of Fig. 1, there is no resistance offered by the lock. In such movement, the pin 5 engages the inner curve of the elbow, as the opening movement starts, and the elbow simply slides freely around the pin, without engaging the web of the handle, having full freedom to flex at the pivotal connection with the lower or inner end of the thumb piece. When fully extended, by complete spreading of the handles and closing of the jaws, a small toe 8, on its extreme free end, will engage the pin 5 to prevent its being completely withdrawn—all as clearly shown in Fig. 2.

In order to lock the jaws in varying positions or varying degrees of spread, it is necessary to have the locking or holding means operate at such stages, selectively, substantially as it has been described as operating to lock the jaws in full spread position, as in full lines in Fig. 1. For this purpose, the inner or pin engaging edge of the elbow lever 4 is corrugated at 9, each corrugation being adapted to seat the under edge of pin 5. Thus, in any of the intermediate positions, the spring 7, acting to rock the inner end of the thumb piece forward toward pin 5 will, at the same time, carry forward the elbow link until one of the corrugations 9 seats the pin 5.

The elbow link pivotally depending from the inner end of the thumb piece, rides freely on the web of the handle 1 below the pin 5, of course. Consequently, due to the curvature and angle of the link 4 and the higher position of the pivotally connected rear end, the point of engagement between elbow lever 4 and the web, at the time that the particular corrugation seats the pin 5, will be slightly in advance of the pivot pin. Thus, any effort to raise the pivoted end of the elbow link, after such engagement, will be thoroughly blocked and the jaws will be completely locked in such intermediate position, the locking action being exactly the same as previously explained for the fully spread locked position. To release the lock, at any of these intermediate positions, it is only necessary to rock the thumb piece as previously explained.

While a simple and preferred form has been disclosed, in this application, it is to be understood, of course, that such disclosure is only as an illustration, and that many changes in the construction, disposition and arrangement of various details may be made, within the scope of the appended claims, without in any way departing from the field and scope of the invention, and it is meant to include all such within this application.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. In combination with a valve spring lifter, a pair of movably mounted handles, an element carried by one of said handles and extending transversely thereof in spaced relation thereto, a locking link slidably mounted between said transverse element and an opposed adjacent wall of said handle and adapted to engage both simultaneously, and means connecting said locking link to the other handle, said locking link being movable with relation to the latter handle.

2. In combination in a valve spring lifter, a pair of movably mounted handles, a pin carried by one of said handles in spaced relation thereto, a locking link slidably mounted between said pin and the adjacent wall of said handle and adapted to engage both simultaneously, means extending from the other handle to connect said locking link thereto, and means for flexibly connecting said means and said link.

3. In combination in a valve spring lifter, a pair of movably mounted handles, a pin carried by one of said handles in spaced relation thereto, a locking link slidably mounted between said pin and the adjacent wall of said handle and adapted to engage both simultaneously, means for releasing said locking link, and means for flexibly connecting said locking link and said releasing means.

4. In combination in a valve spring lifter, a pair of movably mounted handles, a pin carried by one of said handles in spaced relation thereto, an elbow locking link slidably mounted between said pin and the adjacent wall of said handle and provided with corrugations adapted to seat said pin, said locking link being adapted to engage the adjacent wall of said handle simultaneously with the seating of said pin in said corrugations, a releasing member pivotally mounted in the other handle, and means flexibly connecting said link and said releasing means.

5. In combination in a valve spring lifter, a pair of movably mounted handles, an element carried by one of said handles and extending transversely thereof in spaced relation thereto, a locking link slidably mounted between said pin and the adjacent wall of said handle and adapted to engage both simultaneously, means extending from the other handle to connect said locking link thereto, and means for flexibly connecting said means and said link.
a pair of movably mounted handles, a pin carried by one of said handles in spaced relation thereto, an elbow locking link slidably mounted between said pin and the adjacent wall of said handle and provided with corrugations adapted to seat said pin, said link being adapted to engage the adjacent wall of said handle simultaneously with the seating of said pin in said corrugations, a releasing member pivotally mounted in the other handle, flexible connections between said link and said releasing means, and means for maintaining the locking relation of said locking link.

6. In combination in a valve spring lifter,