

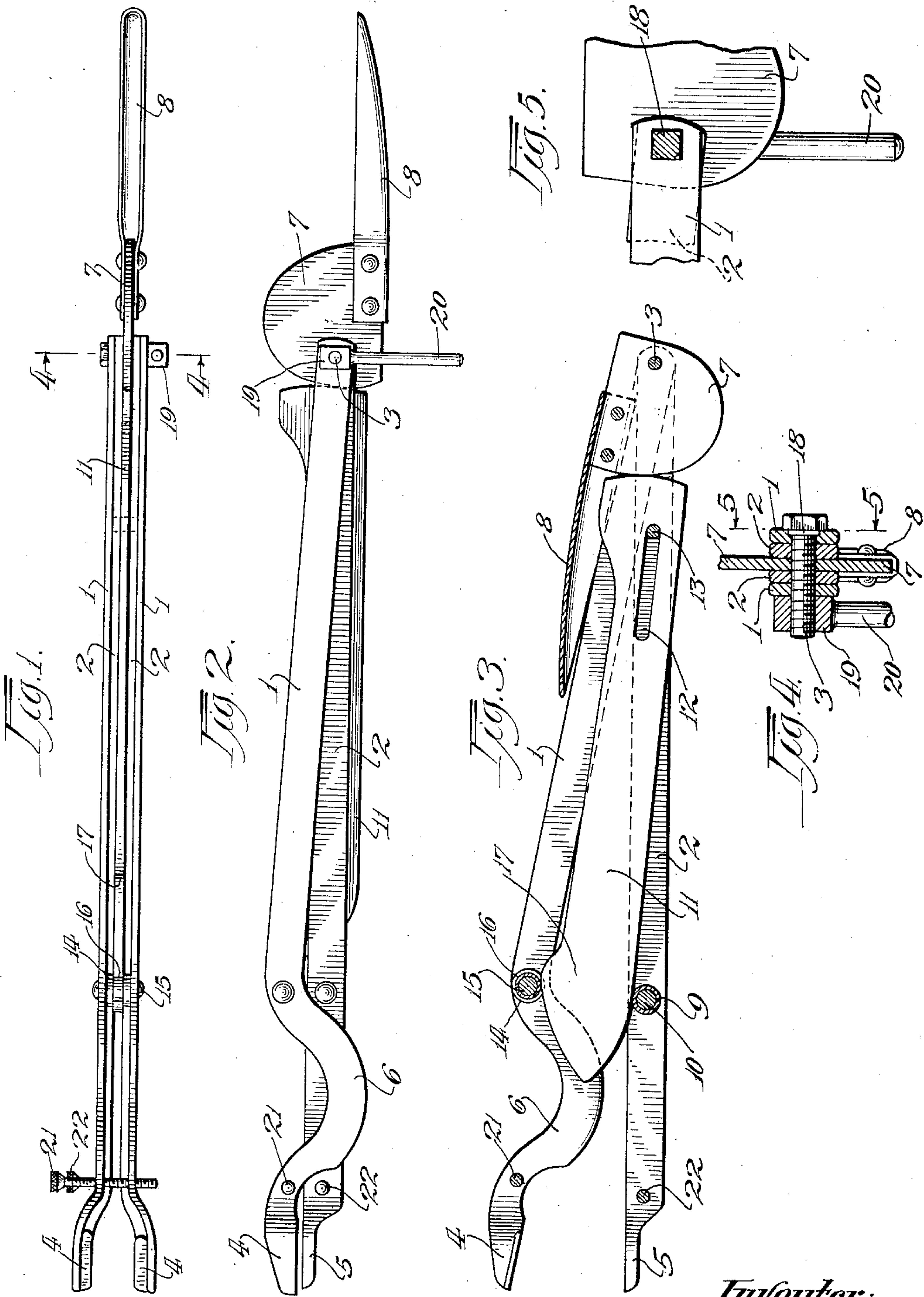
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VALVE SPRING LIFTER

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UNITED STATES PATENT OFFICE

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VALVE SPRING LIFTER

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The present invention may be said to have for its object to produce a simple and novel device for lifting the springs of poppet valves of internal combustion engines, which shall be free from the objectionable features inherent in prior lifting devices.

Specifically considered, the present invention may be said to have for one of its objects to produce a device in which there shall be a great multiplication of the force applied to an operating member, such as a hand lever, for example, to produce the lifting action; to have for another of its objects the production of a device in which the initial operating force is applied at a point quite remote from the work-engaging elements, so as to permit the tool to be easily operated in situations where the space around the valve stem is obstructed; to have for another of its objects to produce a tool that is long and slender to permit it to be inserted through a small space, and be operable from its outer end; and to have for still another object the production of a tool so shaped as to clear obstructions close to the spring to be lifted.

In carrying out my invention in a manner that embodies all of its features, I employ two long, slender arms hinged together at one end and having the other end shaped to engage the work. The arms are so formed, near the work-engaging end, that one of them has therein a bend that passes the other arm when the arms are closed upon each other, thus permitting the arms to spread apart even though there be near the valve spring to be lifted a stationary lug, rib or other member that would otherwise prevent the arms from spreading apart. The spreading of the arms is accomplished by means of a lever located at the hinge end of the device where it will not encounter obstructions and may be freely operated; the force of the lever being greatly multiplied and transmitted to the arms near the work-engaging end by means of elements that will function properly in any space into which the arms themselves can enter.

The various features of novelty whereby my invention is characterized will herein-
after be pointed out with particularity in

the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a top plan view of a preferred form of tool embodying my invention, in the closed or idle position; Fig. 2 is a side view of the tool as it appears in Fig. 1; Fig. 3 is a longitudinal section in a plane at right angles to the hinge axis, showing the tool fully open or spread; Fig. 4 is a section, on a larger scale, on line 4—4 of Fig. 1; and Fig. 5 is a section, on line 5—5, of Fig. 4.

Referring to the drawing, 1 and 2 represent two long arms hinged together at one end by means of a hinge pin 3 passing through the same. Each arm is conveniently composed of two flat bars set on edge and spaced apart from each other; the members constituting the arm 1 being far enough apart to receive between them the other arm. The manner in which the spacing of the bars is effected will be explained later. The free ends of the arms are suitably shaped to form seats for the lower end of a spring, as indicated at 4, 4, and feet 5, 5 adapted to rest on a stationary part below the spring. The arm 1 has a long, deep bend 6 therein, just behind or inwardly from the work-engaging part. When the arms are closed together, as indicated in Fig. 6, the bent portion of the arm 1 dips well below the top of the arm 2. Therefore, the arms may be spread far apart before the bottom of valley in the top of the bar 1 reaches the height at which the work-engaging part of this arm stands when the arms are closed. In other words, the bend in the arm will permit the tool to be opened whenever there is enough head room to permit the nose of the tool to be slipped under a valve spring.

Between the rear ends of the two bars constituting the arm 2 is a cam 7 having fixed thereto and projecting therefrom a lever 8, thus spacing these bars apart at their rear ends. The forward portions of the bars are held apart by a tubular spacer or roller 9 disposed at some distance inwardly from the work-engaging element 5. A rivet 10 passing through the two bars and through the

member 9 connects these three elements together, the bars being held in fixed spaced relation to each other. Resting at its front end on the member 9 is a long bar or stem 11 in the form of a long, narrow plate set on edge. The rear portion of the stem lies between the two bars of the arm 2, the extreme end engaging with the forward edge of the cam 7. The stem has therein, near the rear end, a long slot 12 extending lengthwise thereof. A pin or rivet 13, extending through the two members of the arm 2 and the slot 12, holds the stem to the arm and serves as a guide on which the stem moves when shifting in the lengthwise direction.

The bars of the arm 1 lie outside of the other arm whereby the arms may be nested one within the other to the extent permitted by the work-engaging ends 4 and 5. Just inwardly from or in rear of the bend 6 in the arm 1, and directly above the spacer 9, is a spacing roller 14 arranged between the two bars of the arm and secured thereby by a rivet 15 which extends through the roller and the arm members. This roller has a peripheral groove 16 whose width equals the thickness of the stem 11 so that the upper edge of the stem may be received in the groove.

At the extreme forward end of the stem 11 is a cam or wedge 17 in the form of a spear head.

The parts are so proportioned that, when the handle or lever 8 is swung back, as shown in Figs. 1 and 2, the stem 11 may be retracted until only the extreme point of the spear head lies between the members 9 and 14. When the lever is swung up, the cam 7 forces the stem and spear head forward, and the spear head, acting as a wedge, forces the members 9 and 14 apart, spreading the arms of the device. This spreading action continues until the lever has been laid flat on the arm 1, as indicated in Fig. 3. It will be seen that the cam greatly multiplies the force applied to the lever, this resultant force being again greatly multiplied by the wedge 17. Consequently, a small force or pressure applied to the lever will be translated into a very powerful force applied to the arms in a direction to spread them.

The cam 7 is preferably so shaped that, when the lever is in the position shown in Fig. 3, it acts as a lock to prevent the arms from closing. In fact, the cam may be made to serve as a lock in any angular position thereof. If an additional locking action is desired, it may conveniently be obtained through the hinge pin 3 which extends through the four bars constituting the two arms and also through the cam. In the arrangement shown, the pin 3 is in the form of a bolt having adjacent to the head a square part 18 that is seated in a square recess in one of the bars of the arm 1. Screwed on the other end of the bolt is a nut 19 pro-

vided with a handle 20 for turning it. The nut may be screwed tight in any position of the cam, thus causing the four bars of which the arms are made and the cam to be firmly clamped together and preventing any closing of the arms until the nut is backed off.

The work-engaging ends of the arms may be in the form of jaws and, if desired, these jaws may be adjusted by means of screws. Thus, in the arrangement shown, the parts of the bars of the arm 1 projecting beyond the roller 14 are connected together by a screw 21 extending through both of them. Similarly, a screw 22 passes through the forwardly projecting parts of the bars that form the lower arm 2. By means of the screws, the jaws may be spread or narrowed, as desired.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. A device of the character described, two arms, hinged together at one end and shaped at the other end to engage the work, a cam mounted between said arms and rotatable about the hinge axis of the arms, a lever fixed to and projecting from the cam for turning the same, a stem disposed between and extending lengthwise of the arms, one end of said stem abutting against said cam, a wedge formation at the other end of the stem, and abutments on said arms on opposite sides of and in engagement with said wedge formation, whereby, when the lever is swung in a direction to cause the stem to be pushed forward, the work-engaging ends of the arms are moved relatively to each other.

2. In a device of the character described, two arms, each in the form of two long parallel bars, the rear ends of said arms being nested, a cam disposed between the rear ends of said arms, a hinge pin extending through the four bars at the rear ends of the arms and through said cam, means cooperating with the pin to clamp the cam and the arms together, a lever fixed to and projecting from the cam, a flat stem extending forwardly through the device from said cam toward the free ends of the arms, a wedge formation at the end of said stem, and elements on the arms engaging with opposite edges of said wedge formation.

In testimony whereof, I sign this specification.

HERBERT A. BERKMAN.