

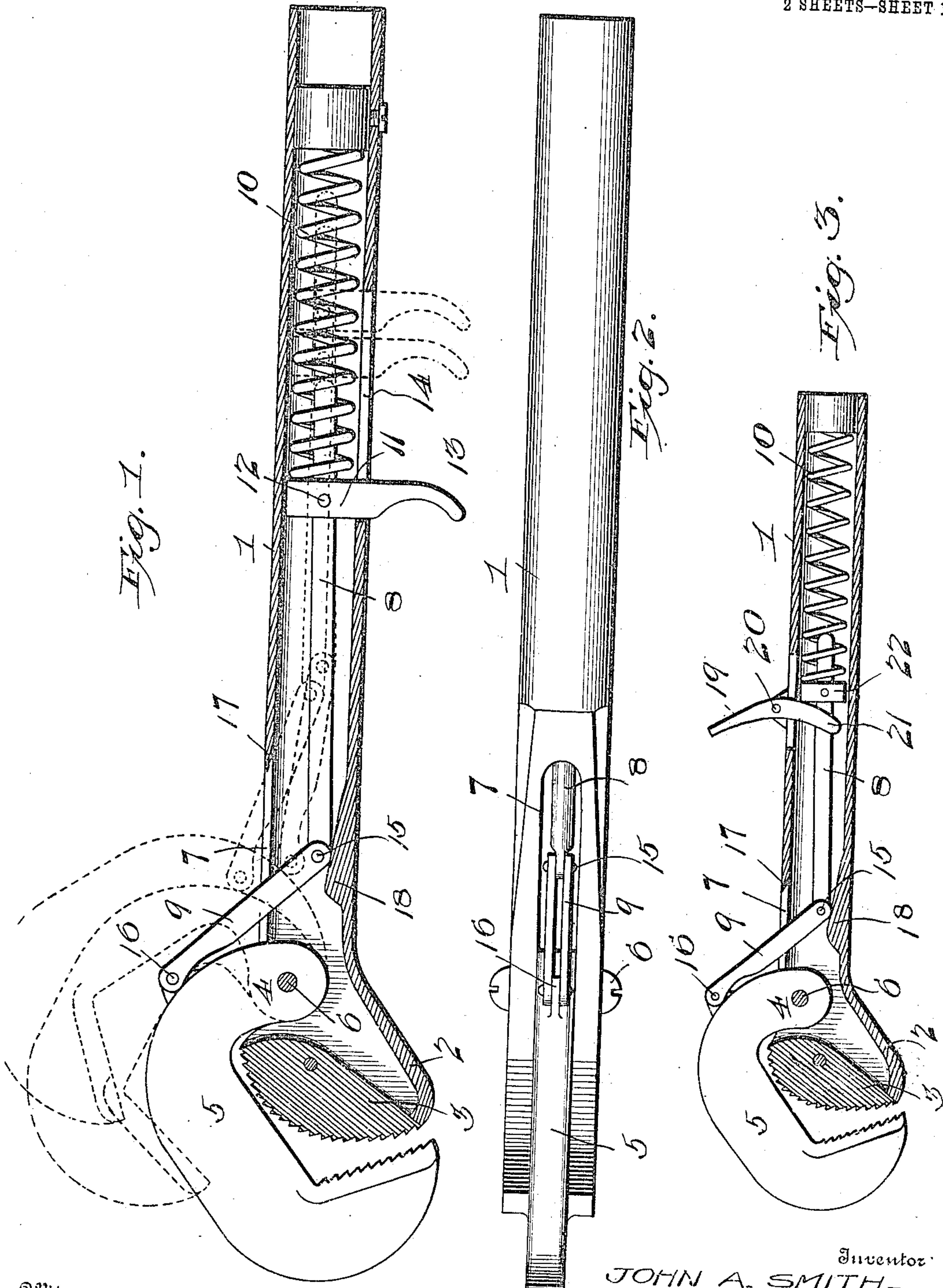
No. 831,750.

PATENTED SEPT. 25, 1906.

J. A. SMITH.
PIPE WRENCH.

APPLICATION FILED OCT. 30, 1905.

2 SHEETS—SHEET 1.



Witnesses
C. L. Kocan
R. C. Braddock.

Inventor
JOHN A. SMITH—

By

D. P. Holhauser
Attorney

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2 SHEETS—SHEET 2.

Fig. 4.

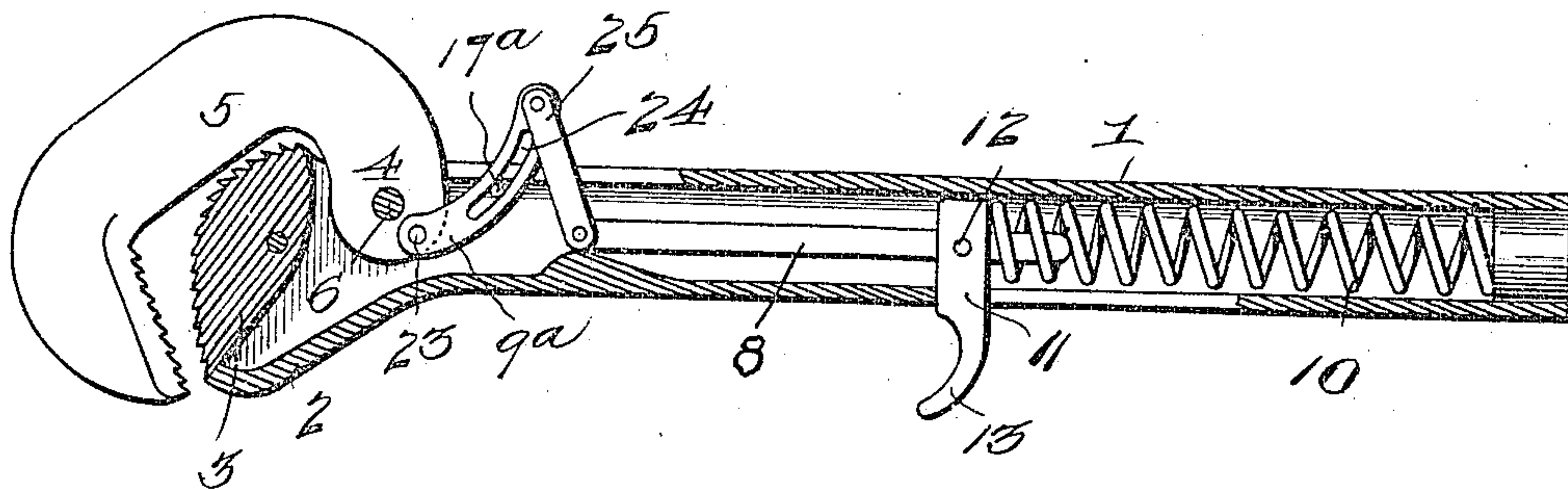


Fig. 5.

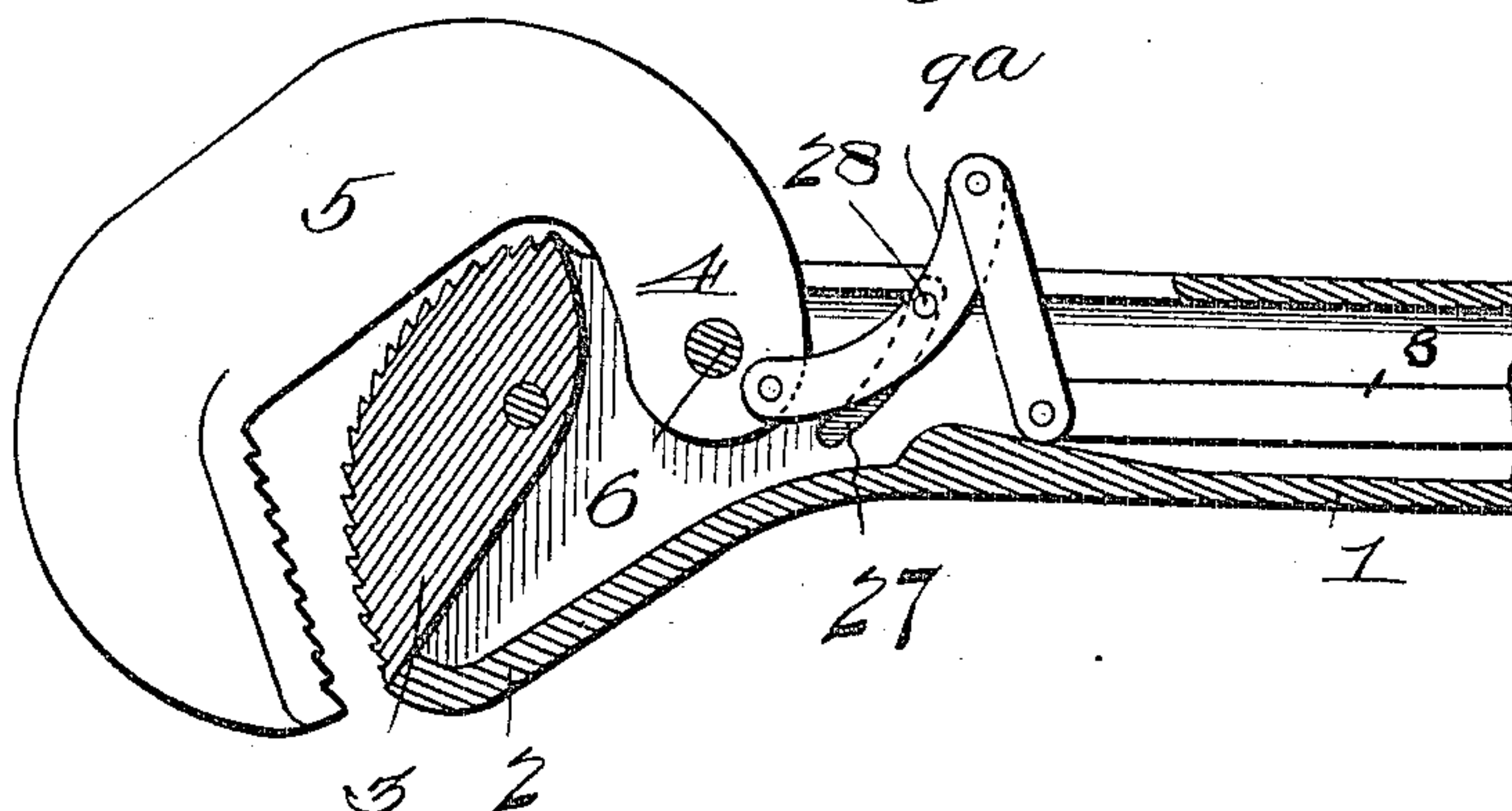
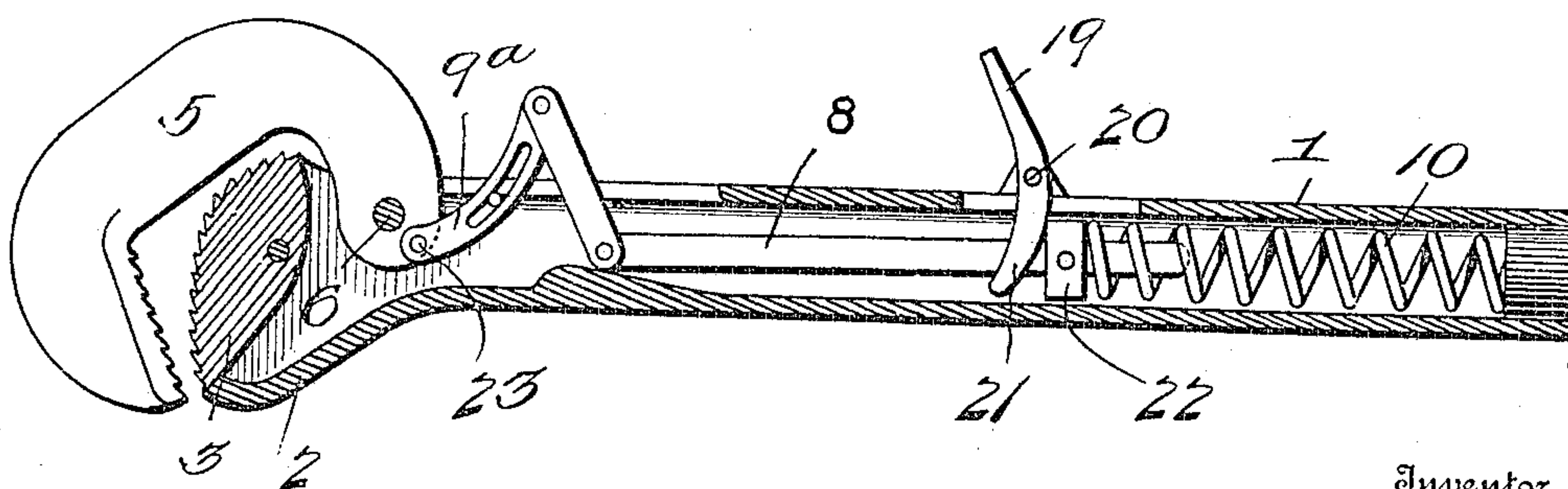


Fig. 6.



Inventor
JOHN A. SMITH—

Witnesses

D. L. Kockane
R. C. Braddock

334

S. P. Holmboe

Attorney

UNITED STATES PATENT OFFICE.

JOHN A. SMITH, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
JOHN T. CLARKE, OF CHICAGO, ILLINOIS.

PIPE-WRENCH.

No. 831,750.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed October 30, 1905. Serial No. 285,170.

To all whom it may concern:

Be it known that I, JOHN A. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pipe-Wrenches, of which the following is a specification.

This invention relates to metal-working tools, and has special reference to certain novel and practical improvements in that class of tools designed particularly for use as a pipe-wrench.

To this end the invention primarily contemplates the construction of a pipe-wrench having the principal parts thereof so constructed and arranged as to provide a tool of exceptional strength and capable of not only the heaviest kind of work, but also adapted for general use in various sizes of wrenches from the simpler hand types to the extreme large sizes having long and desirable handles.

While preserving the necessary construction and relation of parts to secure strength and durability, the present invention has in view as a special object the provision of simple and easily-controlled operating mechanism for opening and closing the movable jaw of the wrench. In this connection the invention embodies an improved quick-acting leverage for effecting the opening movement of the jaw against the pressure of the spring, which normally urges the same to its closed position, said leverage insuring an easy opening movement with decreasing effort as the pressure of the closing-spring increases.

With these and many other objects in view, which will readily appear to those familiar with the art as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in carrying out the objects above indicated are necessarily susceptible to structural change without departing from the scope of the invention; but for illustrative purposes a few of the preferred embodiments are shown in the accompanying drawings, in which—

Figure 1 is an enlarged longitudinal sectional view of a pipe-wrench constructed in accordance with the present invention and showing in dotted lines several positions of the movable jaw to illustrate the various po-

sitions assumed by the jaw-actuating lever in the opening operation. Fig. 2 is a plan view of one end portion of the wrench shown in Fig. 1. Fig. 3 is a view similar to Fig. 1, illustrating a smaller type of wrench and also showing a modification wherein a thumb or hand lever may be employed as the controlling member for moving the operating-rod. Fig. 4 is a view similar to Fig. 1, illustrating a modification in the arrangement of the jaw-actuating lever, wherein the same will exert a push or thrust on the movable jaw instead of a pull and swing, as provided for by the construction shown in Fig. 1. Fig. 5 is a view similar to Fig. 4, showing another modification and illustrating the employment of a fixed fulcrum-pin on the lever instead of the slotted-lever construction shown in Fig. 4. Fig. 6 is a sectional view of another modification combining the controlling-lever idea of Fig. 3 with the modification of Fig. 4.

Like references designate corresponding parts in the several figures of the drawings.

The essential features of the present invention are embodied in the several modifications and adaptations illustrated in the drawings; but as a preferable and practical construction is shown in Figs. 1, 2, and 3 special reference will first be made thereto. As shown in the figures of the drawings referred to, the wrench embodies in its general organization a handle member designated by the numeral 1, and preferably of a tubular construction to provide a housing for accommodating all of the working parts of the jaw-operating mechanism. This is a very practical and desirable feature in wrenches of this character in order that the operating mechanism will not be exposed to the rough usage and hard blows to which wrenches and wrench parts are ordinarily subjected.

In carrying out the present invention all forms thereof preferably embody the tubular handle 1, and at one end the latter is enlarged to form a rigid wrench-head 2, to which is securely fitted the stationary jaw member 3, which may be of any desired form or configuration, but which is preferably and usually of the serrated convex type. In addition to supporting the stationary jaw or jaw member 3 the chambered wrench-head 2 receives therein the inner pivoted end portion 4 of the outer movable jaw 5. This outer movable jaw 5 may necessarily vary in

configuration according to the particular style or type of wrench to which the improvements may be applied; but in the preferable construction of tool the said jaw is of the type commonly known as the "C-jaw," which necessarily provides an inner and outer hook, the inner hook constituting the inner pivoted end 4 and the outer hook working over and in opposition to the stationary jaw 3. The inner end of the outer movable jaw 5 is held within the chambered wrench-head 2 through the medium of a stout pivot-pin 6, and contiguous to the pivot for the outer jaw the tubular handle is slotted or cut away to provide a clearance-slot 7, which admits of a full throw of the movable jaw, whereby the same may be opened to its fullest extent. The elements described constitute the principal members of the wrench and are constructed in suitable weights and sizes, according to the strength required or desired; but the present invention deals particularly with the novel operating mechanism which is employed for opening and closing the movable jaw 5. This operating mechanism is designed, as stated, to be practically housed as an entirety within the tubular handle 1, and the same essentially comprises a reciprocatory operating-rod 8, arranged longitudinally within the handle, a jaw-actuating lever 9, a closing spring 10, and a controlling member 11, which cooperate to provide for the opening and closing of the jaw 5. The closing-spring 10 consists of a spiral or leaf spring of suitable tension housed within the handle 1 and arranged to respectively engage members on the rod 8 and on the handle 1 to provide for normally exerting a pressure on the rod 8 for urging the same in one direction, and so long as this result is accomplished it is obviously immaterial whether the spring is arranged on one side or the other of the controlling member 11 or is of a coiled or flat type.

In the form of the invention herein described the member or element which is moved in opposition to the pressure of the spring 10 is the controlling member 11, shown in the form of a slide suitably connected within the handle to the operating-rod, as at 12, by any suitable mechanical expedient and having a finger-grip 13 projected through a guiding-slot 14, formed in the handle and disposed longitudinally thereof. This construction provides means whereby the operator by grasping the finger-grip 13 and drawing upon the same provides for pulling the same backward in opposition to the pressure of the spring.

The distinctive feature of the invention resides in the action of the jaw-actuating lever 9. This element performs the dual function of a pull-link and also as a lever having a shiftable fulcrum. While it may be arranged in various positions to accom-

plish its purposes, the preferable arrangement is shown in Fig. 1 of the drawings, in which the element 9, which is termed a "lever," is shown pivotally connected at its opposite ends, respectively, to the outer end of the operating-rod 8 and to the movable jaw 5 at a point on the outer side of its pivoted end. The pivotal connection 15 between one end of the lever 9 and the outer end of the rod 8 may be provided through any suitable mechanical connection between these parts, and likewise the said link 9 may be pivoted at its outer end, as at 16, to the movable jaw 5 through the medium of any suitable mechanical connection, such as bifurcating one part or the other, as may be found best suited for the purposes. The jaw-actuating lever, mounted as thus described, normally lies obliquely between its connections, respectively, with the rod 8 and the movable jaw 5 and also works in the clearance-slot 7. In this connection it is to be observed that there is arranged within the path of movement of the lever 9 a fixed fulcrum element 17. In the construction shown this may be conveniently provided directly on the handle at one end of the clearance-slot 7, and the intermediate portion of the lever is drawn against this fulcrum element, as shown in Fig. 1 of the drawings. Also it may be found desirable to associate with the jaw-actuating lever 9 a fixed guiding-cam 18, projecting from the lower side of the handle on the path of movement of the inner end of the lever 9.

The action of the parts constructed and arranged as described may be briefly stated as follows: Normally the pressure of the spring 10 is exerted in a direction for moving the jaw 5 to a closed position and holding it in such position. When it is desired to open said jaw either for releasing the wrench from or applying it to the object, it is simply necessary to draw upon the controlling member or slide 11. The first impulse thus applied to the operating-rod 8 draws upon the element 9 as a link and serves to start the opening movement of the movable jaw. A continued pull carries an intermediate part of the element 9 against the fixed fulcrum 17, and from then to the completion of the pull the said element acts as a lever whose fulcrum shifts toward the pivotal point 16, with the result of providing a constantly-increasing and easier leverage as the pressure of the spring increases. This insures a quick and easy opening movement for the movable jaw, and to close the latter it is simply necessary to release the grip upon the member 11, whereupon the spring 10 forces the parts to their normal positions. In this connection—that is, the closing action—the inner end of the lever 9 rides onto the guiding-cam 18, which thereby guides the lever in a direction which causes the same to exert a thrust upon

the jaw that will completely close the same onto the stationary jaw.

A suggested modification of the invention is shown in Fig. 3 of the drawings, wherein instead of the slide 11 a simple thumb or hand lever 19 is exposed to the pressure of the thumb or hand and is pivoted intermediate at its ends, as at 20, on the handle. The inner end portion 21 of the lever 19 is arranged to move against a fixed abutment 22 on the rod 8 in an outward direction. A modified arrangement of the jaw-actuating lever 9 may also be resorted to without departing from the essential features of the invention. For instance, as shown in Fig. 4 of the drawings, the jaw-actuating lever (designated by the reference character 9^a) is shown arranged so as to exert a push instead of a pull on the pivoted end of the jaw 5. In this construction the lever 9^a is illustrated as pivoted at its inner end, as at 23, to the heel of the jaw 5 at the inner side of the pivot 6 and is provided with a curved camming-slot 24, working over a fixed fulcrum-pin 17^a, fitted to the handle. The outer end of the lever 9^a is pivotally connected, as at 25, to the outer end of the operating-rod. In other respects the construction is shown to be the same as illustrated in Fig. 1, and it will be observed that, as the operating-rod is pulled upon, the lever 9^a will shift upon its fulcrum-pin 17^a, and hence exert a leverage in a direction that will cause the opening of the jaw.

A modification of the construction shown in Fig. 4 is illustrated in Fig. 5 and consists in providing grooved camming-guides 27 in the sides of the wrench-head 2 for the reception of a fulcrum-pin 28, carried by the lever 9^a. Another modification is shown in Fig. 6, wherein the features of Figs. 3 and 4 are combined, illustrating the wide range of modification that may be resorted to without af-

fecting the essential feature of the invention, which resides in the interpositioning of a shiftable lever between the movable jaw 45 and the operating-rod of the operating mechanism. Other modifications will readily suggest themselves without further description.

Having thus described my invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a wrench, a handle carrying a stationary jaw and a movable jaw, and an operating mechanism for the movable jaw including a lever-link connected with said jaw and having a sliding shift on a fulcrum-point. 55

2. In a wrench, a handle carrying a stationary jaw and a movable jaw, an operating mechanism carried by the handle and having a rod and a lever-link connected to the rod 60 and to the movable jaw, said lever-link having a sliding shift on a fulcrum-point.

3. In a wrench, a handle carrying a stationary jaw and a movable jaw, said handle being also provided with a fixed fulcrum element, and an operating mechanism for the movable jaw including a lever-link having a sliding shift on said fulcrum element. 65

4. In a wrench, a handle carrying a stationary jaw and a movable jaw, said handle 70 being further provided with a fixed fulcrum element and an interior fixed guiding-cam, and an operating mechanism carried by the handle and including a reciprocatory operating-rod, and a lever-link pivoted to said rod 75 and to the movable jaw, said lever-link having a sliding shift on said fulcrum element and also on the guiding-cam.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN A. SMITH.

Witnesses:

FRANK L. NICHOLS,
D. P. WOLHAUPTER.