A. E. SMILEY.

WRENCH.

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1,120,751.

Patented Dec. 15, 1914.

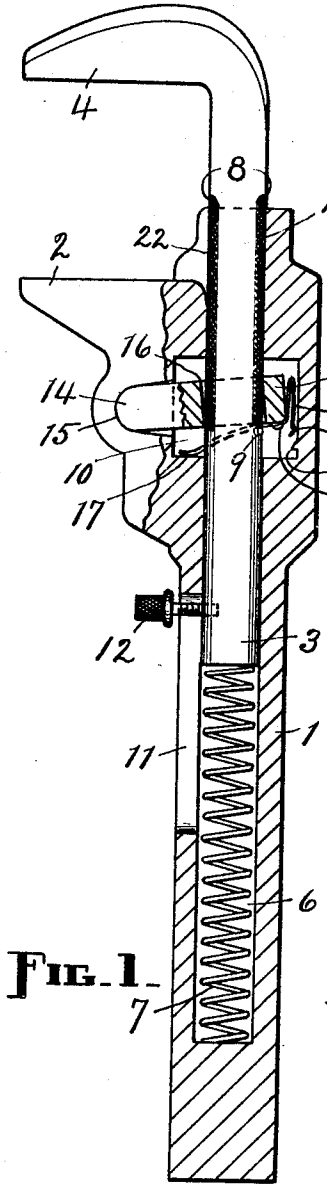


FIG. 1.

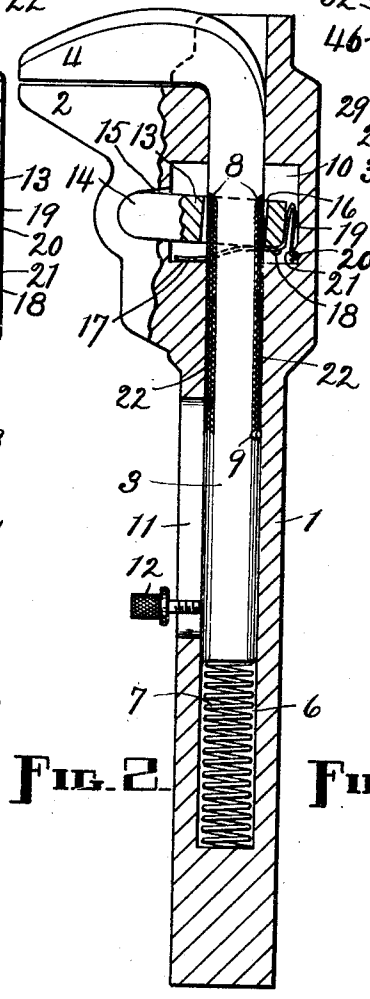


FIG. 2.

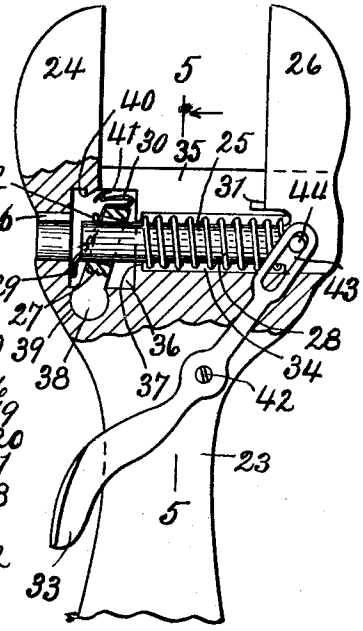


FIG. 4.

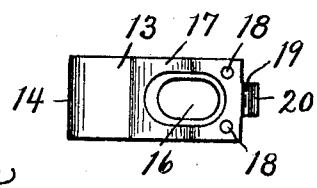


FIG. 3.

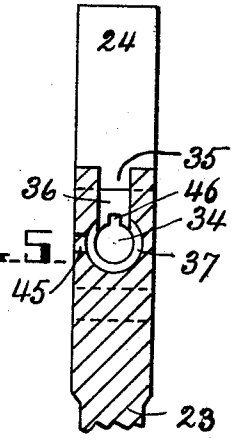


FIG. 5.

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WRENCH.

1,120,751. Specification of Letters Patent. Patented Dec. 15, 1914.

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To all whom it may concern:

Be it known that I, ARTHUR E. SMILEY, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Wrench, of which the following is a specification.

My invention relates to improvements in wrenches of the quick-acting or self-opening and self-locking type, and comprises jaw-provided shanks or equivalent members equipped with an oscillatory clutch or locking dog, a spring arranged to so act as to open the jaws and retain them open normally, and rocking and detaining means for such dog, together with such other parts and members as may be requisite to make the device complete, all as hereinafter set forth.

The principal object of my invention is to produce a self-locking wrench that can be easily and quickly adjusted to fit the object which it is to engage, without the manipulation with the fingers of a screw, or of any part except the dog with which the wrench is provided, and that only under some conditions and in some cases, as will subsequently be made clear. Except when the jaws of this wrench are in engagement with an object, the wrench may be opened automatically, or may be said to possess self-opening capabilities.

A further object is to produce a wrench, of the class hereinbefore specified, which is especially well adapted for convenient and efficient use with one hand, and one in which the setting and resetting are effected with very little effort on the part of the person using the wrench.

These and other features make the wrench adaptable for use in many places where other kinds of wrenches could be employed only with difficulty if at all.

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

The new and improved features may be applied to implements of both the monkey-wrench and the S-wrench types.

A preferred form of embodiment of the invention in both types of wrenches, whereby I attain the objects and secure the advantages of the same, is illustrated in the accompanying drawings, and I will proceed to describe the invention with reference to said drawings, although it is to be understood that the form, construction, arrangement, etc., of the parts in various aspects are not material and may be modified without departure from the spirit of the invention.

In the drawings, in which like numerals designate like parts throughout the several views, Figure 1 is a central vertical section through a monkey-wrench, which embodies my invention as aforesaid, the wrench being open to its full extent, so that the jaws are separated by the maximum width; Fig. 2, a similar section, in which the wrench with its jaws is closed; Fig. 3, a plan of the clutch member and its spring which appear in Figs. 1 and 2; Fig. 4, a side elevation and partial section of the working end portion of an S-wrench which is equipped in a similar manner to the monkey-wrench, the jaws here being shown wide open as is the case in the first view, and, Fig. 5, a section through the fixed shank of the S-wrench on lines 5—5, looking in the direction of the associated arrow, in Fig. 4.

Referring first to Figs. 1 and 2, it will be observed that I there show a fixed shank 1 which is provided with a jaw 2, and a movable shank 3 which is provided with a jaw 4. The shank 3 is arranged to slide in a longitudinal passage 6 in the shank 1, and there is a spiral spring 7 in said passage, between the inner end thereof and the inner end of said shank 3. The spring 7 has a constant tendency to force the shank 3 with its jaw 4 outwardly. The shank 3 is shouldered a little distance from the jaw 4, at 8, and said shank is provided with a projection or pin 9 about midway between such shouldered part and the inner end of the shank. The longitudinal passage 6 is intersected by a transverse passage 10 in the shank 1, which passage 10 opens through the sides thereof. A longitudinal slot 11 is made in the front side of the shank 1 to accommodate a finger-piece 12 that is set in the corresponding side of the shank 3, extends through said slot, and has its head outside thereof.

A locking and releasing clutch or locking dog 13 has a rounded end part 14 which is mounted or seated to rock in a socket 15 in the shank 1, or in the projecting part of said shank that forms at one end the jaw 2, and

said dog extends into and operates in the passage 10. The dog 13 has an opening 16 therethrough to receive that portion of the shank 3 which is between the shoulders 8 and the pin 9. The shank 3 is capable of being reciprocated in and through the opening 16, but the shoulders 8 are too large to pass through such opening, from the outer side of the dog 13, and the pin 9 is too long to pass through such opening, from the inner side of said dog. The major diameter of the opening 16 is enough greater than that of the portion of the shank 3 which operates in said opening to permit the dog 13 to be rocked sufficiently, on the one hand, to grip and tightly and securely hold said shank against movement outwardly, or to resist the force exerted on said shank, through the jaw 4, when the wrench is applied to a nut or bolt and operated to seat or unseat such nut or bolt, and to be rocked back sufficiently, on the other hand, to release said shank. The dog 13 offers no obstacle to the movement inwardly of the shank 3. A spring 17 is arranged to tilt the dog 13 normally outwardly or forwardly into locking engagement with the shank 3, such spring being riveted at 18, or otherwise secured, to the back or inner side of said dog, and arranged to bear at one terminal against the adjacent side of the passage 10. A detent member, in the form of a looped extension 19 which constitutes the other terminal of the spring 17, is provided for the dog 13 to assist in retaining it in unlocking position. The spring extension 19 is looped above the free end of the dog 13, extending first forward from the rivets 18 and then backward, and has a tooth 20 formed thereon near the free terminal thereof. In the path of the spring tooth 20, when the dog 13 is actuated into unlocking position, is a tooth or detent 21 which projects into the passage 10 from the top thereof.

This wrench is operative and entirely practical without the dog-actuating projections and the detent for the dog, that is, without the shoulders 8, the pin 9, the spring extension 19, and the tooth or projection 21, and the operation without such auxiliary elements will next be described.

To adjust the wrench to an object, when the parts are disposed as in the first view, simply move the shank 3 inwardly, against the resiliency of the spring 7, until the right amount of space is left between the jaws 2 and 4, such movement being effected either by pressing on the outer end of said shank or drawing the finger-piece 14 downwardly or rearwardly, and then release said shank to the locking action of the dog 13, which with the spring 17 has yielded freely to permit said shank to move inwardly. As soon as the shank 3 is released it is urged outwardly by the spring 7 and the spring 17 urges the dog 13 into locking engagement with said shank, with the result that the latter is instantly caught by said dog and held thereby against any pressure that may be brought to bear, in ordinary usage of the wrench, which tends to separate the jaws 2 and 4 or move the latter away from the former. If deemed necessary, in order to make absolutely certain the grip of the dog on the shank 3, said shank may be knurled, abraded, or roughened in any suitable manner, as represented at 22. All that is required in order to release the wrench from the object, or to open it wider, is to rock the dog 13 rearwardly or inwardly in the socket 15, against the resiliency of the spring 17, to release from the grip of said dog the shank 3, when the spring 7 acts to drive said shank outwardly.

Considering next the operation of the wrench in connection with the hereinbefore mentioned auxiliary elements, it will be noted that the closing or the adjustment of the jaws to the object is effected in either of the two ways pointed out above, that is, by pressure on the head or outer end of the shank 3, or pressure downward or rearward on the finger-piece 12. But the opening operation is brought about by any of three methods: first, by pressing the shank 3 inwardly to its fullest extent from the head end and then releasing it; second, by taking hold of the finger-piece 12 and doing the same thing, and, third, by rocking back (downward) the dog 13 with the finger or finger and thumb. In each of the first and second cases, the shoulders 8 encounter the dog 13, just before the shank 3 reaches the inner end of its travel, rock said dog back until the tooth 20 engages the tooth 21, in which position said dog is held out of locking engagement with said shank, and then, upon the release of said shank, the spring 7 forces said shank outwardly until, near the end of its outward travel, the pin 9 encounters said dog and rocks it forward (upwardly), taking said tooth 20 out of engagement with said tooth 21, and into locking engagement with said shank. As shown in the second view, the shank 3 is at the end of its travel and it will instantly spring outwardly, unless held by some exterior means, and the dog 13 is held by the teeth 20 and 21 in inactive position. In the third case just mentioned, the dog 13 can be rocked to release the shank 3 at any point intermediate of its travel, when said shank will be driven outward to the end of the outward travel, unless said dog be released to check said shank before the same reaches such end of travel. The result produced by the full release of the shank 3 is illustrated in Fig. 1.

Passing now to the construction shown in the last two views, it is seen that the same parts in essence are present as before, only such changes being made as are necessi-

tated by the change in general type of wrench. Here there are a fixed shank 23 having a jaw 24, a movable shank 25 having a jaw 26, a dog 27, actuating springs 28 and 29, a detent spring extension 30, a lug 31, a pin 32, and an operating lever 33. The jaws 24 and 26 extend in the same direction as the shank 23, instead of being at right-angles to said shank, while the shank 25 is at right-angles to said shank 23, instead of being in parallel relation therewith. The shank 23 has a passage 34 through the same at the inner end of the jaw 24, which passage opens at the top into a slot 35 for the jaw 26, and there is a transverse passage 36 in said shank for the dog 27. The shank 25 operates in the passage 34, which passage extends beyond the passage 36 through the adjacent edge of the shank 23, and the spring 28 encircles said shank 25 and bears at one end against the base of the jaw 26 and at the other end against a shoulder 37 in said passage. Thus the jaw 26 is forced away from the jaw 24 whenever the shank 25 is released by the dog 27. The lug 31 serves the same purpose as the shoulders 8, and the pin 32 the same purpose as the pin 9, in the other wrench. The dog 27 is mounted similarly to the dog 13. Either of the dogs is placed in position before the movable shank which operates through the same is passed through the opening provided therefor, by slipping the rounded base into place from either end of the socket provided to receive it. The opening in the dog 27 for the shank 25 appears at 37, in Fig. 4, and the numerals 38 and 39, respectively, indicate the rounded base of said dog, and the socket therefor in the shank 23 below the level of the floor of the passage 36. At the top of the passage 36 is a tooth 40, and the spring extension 30 has a tooth 41 to engage said tooth 40, when the dog 27 is rocked into unlocking position, just as in the first case. The lever 33 is pivoted at 42 to one side of the shank 23, and has a slot 43 therein at the terminal which is adjacent to the base part of the jaw 26, and a pin 44 projects from said base part into said slot. A longitudinal slot 45 (see Fig. 5) for the pin 44 is provided in the side of the shank 23 upon which the lever 33 is mounted. The lever 33 is employed to actuate the shank 25 with its jaw inwardly against the resiliency of the spring 28, and takes the place of the finger-piece 12 in the other wrench. A groove 46 is provided in the top of the passage 34, at the left of the passage 36, in Fig. 4, to accommodate the pin 32 when advanced with the shank 25. The S-wrench, like the monkey-wrench, would be entirely practical and very serviceable without the dog-actuating parts 31 and 32 and the detent elements for the dog, and the operations of said first-mentioned wrench, in opening and closing, are substantially the same as those described in detail in relation to the monkey-wrench, either with or without the full complement of parts. By this last it is intended to convey that the operations of the two wrenches are practically the same, either when the auxiliary parts and members are absent from or present in both wrenches in any given case.

It is obvious that neither of the movable shanks (3 or 35) can roll in the part or parts in which it is mounted or situated.

It should be stated that, in the construction of either type of wrench, provision must be made to so limit the inward travel of the movable shank as to rock the dog just far enough for its spring-extension tooth to engage the fixed detent tooth. Too much movement in this direction on the part of the movable shank would carry the dog beyond the detaining position, and too little movement would not carry said dog far enough, thus defeating the object and purpose of the detent members in either case. It is immaterial what means are employed to limit the inward movement of the movable shanks, but as illustrated in the drawings the movable jaw of the monkey-wrench contacts with the fixed jaw by the time the spring tooth 20 snaps into engagement with the fixed tooth 21, and the movable jaw of the S-wrench is checked by the spring 28, which contracts under pressure until its convolutions are all in contact with each other, by the time the spring tooth 41 snaps into engagement with the fixed tooth 40.

Each dog-actuating spring (17 or 29) is cut out to accommodate the movable shank that plays through the dog to which the spring it attached, as best shown in Fig. 3.

The passage 6 for the shank 3 is rectangular in cross-section, while said shank has rounded edges. Thus there are formed four clear passageways, and the pin 9 projects from one of the rounded parts of the shank 3 into the adjacent space or one of said passageways within the shank 1, and is able to move freely therein.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory clutch member mounted therein and provided with a detent member, and a detent carried by said shank for such detent member, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, said movable shank being provided with means to actuate said clutch member and carry its detent member into engagement with said detent, when said movable shank approaches the end of its backward travel, and to actuate said clutch

member to carry its detent member out of such engagement, when said movable shank approaches the end of its forward travel.

2. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory spring-pressed clutch member mounted therein and provided with a detent member, and a detent carried by said shank for such detent member, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, said movable shank being provided with means to actuate said clutch member and carry its detent member into engagement with said detent, when said movable shank approaches the end of its backward travel, and to actuate said clutch member to carry its detent member out of such engagement, when said movable shank approaches the end of its forward travel.

3. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory clutch member mounted therein and provided with a detent member, and a detent carried by said shank for such detent member, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, said movable shank being provided with means to actuate said clutch member and carry its detent member into engagement with said detent, when said movable shank approaches the end of its backward travel, and to actuate said clutch member to carry its detent member out of such engagement, when said movable shank approaches the end of its forward travel, and means to actuate said movable shank against the force of its spring.

4. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory spring-pressed clutch member mounted therein and provided with a detent member, and a detent carried by said shank for such detent member, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, said movable shank being provided with means to actuate said clutch member and carry its detent member into engagement with said detent, when said movable shank approaches the end of its backward travel, and to actuate said clutch member to carry its detent member out of such engagement, when said movable shank approaches the end of its forward travel, and means to actuate said movable shank against the force of its spring.

5. The combination, in a wrench, with a jaw-provided fixed member, an oscillatory clutch member mounted therein, and a detent carried by said shank for said clutch member, the latter having a member for engagement, when in unlocking position, with said detent, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, and clutch-member-actuating members carried by said movable shank on both sides of said clutch member, and adapted to move the latter to carry its detent member into and out of engagement with said detent.

6. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory clutch member mounted therein and provided with a resilient detent member, and a detent on said shank for said clutch-detent member, the latter being adapted for engagement, when said clutch member is in unlocking position, with said detent, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, and clutch-member-actuating members carried by said movable shank on both sides of said clutch member, and adapted to move the latter to carry its detent member into and out of engagement with said detent.

7. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory clutch member mounted therein and provided with a resilient detent member, and a detent on said shank for said clutch-detent member, the latter being adapted for engagement, when said clutch member is in unlocking position, with said detent, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, clutch-member-actuating members carried by said movable shank on both sides of said clutch member, and adapted to move the latter to carry its detent member into and out of engagement with said detent, and means to actuate manually said movable shank against the force of its spring.

8. The combination, in a wrench, with a jaw-provided fixed shank, an oscillatory clutch member mounted therein and provided with a resilient detent member, and a detent on said shank for said clutch-detent member, the latter being adapted for engagement, when said clutch member is in unlocking position, with said detent, of a spring-pressed jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, clutch-member-actuating members carried by said movable shank on both sides of said clutch member, and adapted to move the latter to carry its detent member into and out of engagement with said detent, and means to actuate manually said movable shank against the force of its spring.

9. The combination, in a wrench, with a jaw-provided fixed shank provided with a detent, an oscillatory clutch member mount-

ed in said shank, and a spring carried by said clutch member and arranged to rock the latter normally in one direction, said spring having a tooth-provided extension for engagement with said detent, of a jaw-provided movable shank slidingly arranged relative to said fixed shank and operating through said clutch member, said movable shank being provided with means to actuate said clutch member, against the resiliency of its spring, to carry said spring extension into engagement with said detent, when said movable shank approaches the end of its backward travel, and to actuate said clutch member to carry said extension out of such engagement, when said movable shank approaches the end of its forward travel.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."